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Web 2.0 and Higher Education: A psychological perspective

University Fernando Pessoa

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Thesis submitted to University Fernando Pessoa as part of the requirements to obtain the Doctoral degree in Information Sciences (Systems and Technologies of Information), under the supervision of Professor Luís Borges Gouveia

ABSTRACT

LUÍS SIMÕES DA CUNHA: Web 2.0 and Higher Education – A psychological perspective

(Under the supervision of Professor Luís Borges Gouveia)

The emergence of tools like Blogs or Wikis made the creation of online contents much easier than before. The evolving concept of Web 2.0 emphasizes the fact that the user can now easily participate in the delivery of Web contents, taking advantage of existing tools.

In this thesis, two empirical studies are described.

The first study was conducted with the aim of understanding faculty's perceived usefulness of Web 2.0 tools for their teaching practices. For this study, an online survey was used which allowed gathering the opinions of 681 teachers from 11 different Portuguese higher education institutions. The integrative models generated from this study revealed that attitudes and self-efficacy (i.e. perception of self-competence) were found positive predictors of faculty's intentions to use, and actual using Web 2.0 (in general), and Facebook and Blogs (in particular). Social norms were found influential in faculty's intention to use Web 2.0 (in general), and Facebook, for teaching purposes, but faculty members were only significantly influenced by their peers, and not by their superiors, nor by their students. Furthermore, for Blogs, even peer influence was found non-significant as a predictor of faculty's intention to use this specific tool in their teaching activities. Women faculty members were slightly less prone to actually use

Web 2.0 tools for their teaching activities, and the same gender effect was found for the specific case of Facebook and of Blogs.

The second study was performed with the student population. Data from a sample of 550 higher education students were collected on five different higher education institutions, in the classroom environment. In addition to instruments measuring the use of Web 2.0 (in general) and Facebook (in particular), a group of eight additional scales enabled the assessment of psychological variables whose relevance for understanding students educational use of Web 2.0 and Facebook was explored. In the integrative models resulting from this study, it was shown that students' attitudes and intentions to use of Web 2.0 to supplement their in-class learning were positively affected by *social* self-efficacy, identity collective self-esteem, and the dimension of self-concept labeled "impulsivity / activity". Negative effects on students' attitudes and intentions to use Web 2.0 in this context were found for public collective self-esteem, and for *general* self-efficacy. The students' educational usage of Facebook was positively influenced by their satisfaction with life, identity collective self-esteem, and institutional dimensions of academic experiences. Public collective self-esteem was a negative predictor of the educational usage of Facebook by students. Although statistically significant, the effects of the mentioned psychological variables were relatively weak.

Keywords: Knowledge Society, technology adoption, Web 2.0, Higher Education, psychological dimensions

RESUMO

LUÍS SIMÕES DA CUNHA: Web 2.0 e Ensino Superior – Uma perspectiva psicológica

(Sob a orientação do Professor Doutor Luís Borges Gouveia)

A emergência de ferramentas como os Blogues ou os Wikis tornaram muito mais fácil a criação de conteúdos online. O conceito de Web 2.0, em permanente evolução, visa enfatizar o facto de que os utilizadores podem, hoje em dia, participar de forma simples na distribuição e partilha de conteúdos Web, tirando partido das novas ferramentas existentes.

Nesta tese, são descritos dois estudos empíricos.

O primeiro estudo visou estudar a utilidade que docentes do Ensino Superior percepcionavam no uso de ferramentas Web 2.0 no contexto das suas atividades lectivas. Para este estudo, foi levado a cabo um inquérito online que permitiu obter a opinião de 681 professores do ensino universitário e politécnico de 11 instituições diferentes.

Os modelos integradores que resultaram deste estudo revelaram que a intenção de uso, e o uso efetivo, de Web 2.0 (em geral), e de Facebook e Blogues (em particular), por parte dos docentes, no contexto da sua atividade lectiva, são afectados de forma positiva pelas atitudes e pela percepção de auto-eficácia dos professores em relação a estas ferramentas. As normas sociais influenciam as intenções dos docentes para usarem ferramentas de Web 2.0 (em geral), e de Facebook, no contexto das suas atividades lectivas, mas os docentes revelaram ser apenas influenciados pelos seus pares nesta

matéria, e não pelos seus superiores, ou pelos alunos. Para além disso, no caso específico do uso de Blogues em educação, nem mesmo a influência dos colegas foi revelada significativa. Verificou-se que os docentes do género feminino apresentavam uma ligeira tendência para usarem menos Web 2.0 (em geral), Facebook, e Blogues, no contexto das suas atividades lectivas.

O segundo estudo visou a população dos estudantes. Dados de uma amostra de 550 alunos de cinco instituições de Ensino Superior foram recolhidos, em contexto de sala-de-aula. Neste estudo, para além de instrumentos que avaliaram o uso de Web 2.0 (em geral), e de Facebook (em particular), foram usadas oito escalas que permitiram medir um conjunto de variáveis psicológicas, tendo-se estudado a sua relevância para compreender o uso pedagógico de Web 2.0 e de Facebook, pelos alunos.

Os modelos integradores que resultaram deste estudo revelaram que as atitudes e intenções dos estudantes em relação ao uso de ferramentas de Web 2.0 para complementar a sua aprendizagem nas aulas eram influenciadas positivamente pelas variáveis: auto-eficácia social, dimensão de identidade da auto-estima colectiva, e pela dimensão do autoconceito designada por "impulsividade/atividade". Efeitos negativos nas intenções e atitudes dos estudantes em relação ao uso de Web 2.0 neste contexto foram registados para as variáveis: dimensão pública da auto-estima colectiva, e auto-eficácia geral. O uso educativo do Facebook pelos estudantes é influenciado de forma positiva pelas variáveis: satisfação com a vida, dimensão de identidade da auto-estima colectiva, e pela dimensão "institucional" das vivências académicas. A dimensão pública da auto-estima colectiva revelou ser a única variável a influenciar negativamente o uso do Facebook para fins educativos, por parte dos estudantes. Os efeitos das variáveis psicológicas mencionadas são ténues, embora estatisticamente significativos.

Palavras-chave: Sociedade do Conhecimento, adopção de tecnologia, Web 2.0, Ensino Superior, dimensões psicológicas

EXTRAIT

LUÍS SIMÕES DA CUNHA: Le Web 2.0 et l'éducation supérieure : une perspective psychologique

(Sous la supervision du Professeur Luís Borges Gouveia)

L'émergence d'outils tels que les blogs ou les wikis a rendu la création de contenus en ligne bien plus simple que par le passé. Le concept évolutif du Web 2.0 met l'accent sur le fait que l'utilisateur peut désormais participer facilement à la livraison de contenus Web, tirant parti des outils existants.

Cette thèse décrit deux études empiriques.

La première étude a été réalisée dans le but de comprendre l'utilité perçue par le corps professoral quant aux outils du Web 2.0 pour leurs pratiques d'enseignement. Pour cette étude, un sondage en ligne a été réalisé, et a permis de collecter les opinions de 681 enseignants issus de 11 institutions portugaises d'enseignement supérieur. Les modèles d'intégration générés à partir de cette étude ont révélé que les attitudes et l'auto-efficacité (c-à-d. la perception de l'auto-compétence) se sont avérés être des prédicteurs positifs des intentions d'utilisation, et de l'utilisation effective, par le corps professoral, du Web 2.0 (en général) et de Facebook et de blogs (en particulier). Il a été constaté que les normes sociales avaient une influence sur les intentions des enseignants d'utiliser le Web 2.0 (en général), et Facebook à des fins d'enseignement, mais les membres des facultés ont été influencés de manière considérable uniquement par leurs pairs et non par leurs supérieurs ou par leurs étudiants. De plus, pour les blogs, même l'influence des pairs s'est avérée être insignifiante comme agent annonciateur de l'intention des enseignants d'utiliser cet outil spécifique dans leurs activités d'enseignement. Les

enseignants de sexe féminin étaient légèrement moins susceptibles d'utiliser les outils du Web 2.0 pour leurs activités d'enseignement, et la même constatation de différence des sexes a été faite pour les cas spécifiques de Facebook et des blogs.

La seconde étude a été réalisée au sein de la population estudiantine. Des données ont été collectées auprès de 550 étudiants de l'enseignement supérieur, dans cinq institutions d'enseignement supérieur différentes, dans l'environnement des salles de cours. Outre les instruments mesurant l'utilisation du Web 2.0 (en général) et deFacebook (en particulier), un groupe de huit échelles supplémentaires a permis l'évaluation de variables psychologiques dont la pertinence a été explorée pour la compréhension de l'utilisation pédagogique que les étudiants font du Web 2.0 et de Facebook. Les modèles d'intégration résultant de cette étude ont démontré que les attitudes et les intentions des étudiants d'utiliser le Web 2.0 afin de compléter ce qu'ils apprennent en classe étaient affectées de manière positive par l'auto-efficacité *sociale*, l'amour-propre collectif identitaire, et la dimension de l'auto-concept dénommé "impulsivité / activité". Les effets négatifs sur les attitudes et les intentions des étudiants quant à l'utilisation du Web 2.0 dans ce contexte ont été constatés pour l'amour-propre collectif public, et pour l'auto-efficacité *générale*. L'utilisation pédagogique que les étudiants font de Facebook a été influencée positivement par leur satisfaction de la vie, l'amour-propre collectif identitaire, et les dimensions institutionnelles des expériences académiques. L'amour-propre collectif public a été un agent annonciateur négatif pour l'utilisation pédagogique que les étudiants font de Facebook. Bien qu'ils soient important au niveau statistique, les effets des variables psychologiques mentionnées étaient relativement faibles.

Mots-clés Société des connaissances, adoption des technologies, web 2.0, enseignement supérieur, dimensions psychologiques.

To my beloved Wife, and our beloved Son

To my beloved Mother and Brother

To my Hero, with all my love and gratitude:

My Father (*In Memoriam*)

To Porto, and to Life

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INDEX

INDEX OF FIGURES

INDEX OF TABLES

CHAPTER I – INTRODUCTION

1.1. Introduction

The generalized use of the Internet, and specially the World Wide Web, began only about a decade and a half ago, and yet the nature of communication on the Web has been deeply transformed recently, with the introduction of tools and services which allow for a much greater participation of people in the creation of online material (Simões & Gouveia, 2011).

The first generation of the World Wide Web was strongly linked to the idea of a Web page as an isolated entity, which worked as an information repository (O'Reilly, 2005).

In reality, the inventor of the World Wide Web, Tim Berners-Lee, had already foreseen the potential of the Web to enable every individual to be a producer of online contents, and not only an information consumer (Berners-Lee, 1999). However, with the popularization of tools like Blogs or Wikis, the creation of online content became much easier than before.

With appearance of new Internet-based social software tools, grouped under the term "Web 2.0" (O'Reilly, 2005), users have been enabled to assume a much more participatory role in the production of online information, a move towards a "*bottom-up*" model of content generation (Simões & Gouveia, 2011).

The concept of Web 2.0 emphasizes the fact the user can now easily participate in the delivery of Web contents, taking advantage of tools like Blogs, Wikis, Podcasts, Social Tagging and Bookmarking, Facebook, and many others. Participatory media, supported by Web 2.0 can greatly enhance traditional presence learning, by promoting collaborative attitudes and more active participation and autonomy within students (Morais, Beça, Santos & Batista, 2010).

The user has become a producer *and* a designer of online materials, through the personalization achievable by sites like *Flickr*, *Facebook* or *YouTube*. Information technology has also led to previously compartmentalized aspects of a person's life (work, rest, leisure, and learning) to become interwoven.

Web 2.0 tools can bring new dynamics to the way learning is performed, potentiating the development of new forms of knowledge acquisition, usage and construction (Trinder, Guiller, Margaryan, Littlejohn, & Nicol, 2008).

According to Weigel (2002), technology has a disruptive influence on organizations, and normally it contributes to organizational change, rather than to *status quo* maintenance.

However, even if a new set of tools has the potential to dramatically change the way organizations operate, at first it is common to incorporate the new tools in the traditional dynamics of institutions (Weigel, 2002).

According to Herrington and Herrington (2006), most higher education institutions insist in using a centre-staged model of teaching, in which discipline experts transmit theoretical knowledge that passive learners receive and consume. In a model of this type, collaboration is discouraged, and students who engage in collaborative learning strategies have to do so outside the official lecture hall, as if they were carrying subversive or illicit methods in their learning.

In many cases, this potentially leads to *superficial* learning of theoretical materials by the student (e.g. textbooks) who then regurgitates the information on exams (Herrington & Herrington, 2006).

At the same time, and increasingly, however, we are witnessing the emergence of new perspectives about the purpose of the higher education, in a world in rapid transformation due to technological, social and economical changes (Bryant, 2006; Brown & Czerniewicz, 2008).

At their core, universities seek to create, preserve and convey knowledge, but in the transition to a knowledge society, higher education institutions are in the center of a process of deep institutional change, and they are facing strong pressures to adjust their methods of knowledge creation, sharing and preservation (and even the way the knowledge evaluation process is conducted), due to the technological changes of the past years (Simões & Gouveia, 2008).

Many of the major universities are already testing new forms of accomplishing their

social mission and the incorporation of new technological tools in education can be seen as a symbol of the adaptation of the university models of teaching and organization to the knowledge society (Beerkens, 2008).

We can state, as examples, initiatives like the MIT *Opencourseware*, Berkeley's *Webcast.Berkeley* initiative or the Open University's (UK) *OpenLearn"*project, only to name a few leading schools that are adopting forms of communication that were unforeseen a mere decade ago.

However, more than 40 years ago, McLuhan and Leonard (1967) were able to predict the profound transformations that would take place in education, due to the evolution of electronic communication technology. These authors realized, early on, that a new "global tribal village" was emerging and that education could be dramatically affected by the development of these new tools.

In fact, the broad social, economic, and technological changes that have occurred in the past decades have been reflected on Higher Education, which has been challenged by the movement towards a global economy and to the knowledge society.

According to Altbach, Reisberg, and Rumbley, (2009), the global revolution that is nowadays taking place in higher education is comparable in range to the one that happened when the German research model extended its influence worldwide in the 19th century.

Even if traditionally this sector has always kept some impermeability to external pressures, today's higher education institutions face a paradigmatic change over the relations between traditional academic culture and the requirements of the labor world (Santos, 1989).

At the educational level, a greater emphasis is being made in respect to the need to enhance the skills of the population, but also to the inevitability of updating those skills at a regular basis (Beerkens, 2008).

1.2. Research Objectives

In recent years, several authors have been arguing that Web 2.0 and social media could be enabling technologies for a process of "reinvention" of higher education institutions, since these kinds of technologies could be used to promote more collaborative, discursive and relational approaches to learning (e.g. Conole & Alevizou, 2010; Selwyn, 2007; Armstrong & Franklin, 2008; Dalsgaard, 2006).

There is a new generation of students entering Higher Education institutions who have grown within an environment where information technology has opened unprecedented opportunities of social interaction and peer-construction of knowledge. Also, the emergence of social software has enabled people to connect and collaborate throughout computer-mediated communication and to easily form online communities (Simões & Gouveia, 2008).

Redecker, Ala-Mutka, Bacigalupo, Ferrari, & Punie (2009), verified that there is a need for structured guidelines related to the selection of the appropriate services, given student's previous experience and attitudes towards social computing, and their desired interaction patterns. These authors assert that tasks based on Web 2.0 tools should be relevant, transparent and targeted.

Even "intuitive" assumptions, like taking for granted that students appreciate the incorporation of new technological tools in the context of their college education, have been disputed. Kvavik (2005), for example, found that although students value the moderate use of technology in their classes (providing conveniences such as syllabi, class readings, online submission of assignments), they also ranked face-to-face interaction at the top of their list of educational preferences.

Psychologists such as Piaget (1960/1995) and Vygotsky (1978) emphasized the social nature of learning, particularly in situations in which learners are faced with challenges they cannot solve alone, without the resources of a group. *Discussion*, a process by which members of a group present their ideas to others and receive feedback, provides the cognitive scaffolding necessary for higher-level thinking (Vygotsky, 1978). This

type of activity is inherent to many Web 2.0 tools, allowing us to expect major potential impacts in Higher Education if these technologies are integrated in teaching practices at this level.

Therefore, the empirical studies that were conducted had two main broad objectives.

The first objective was to clarify the extent in which faculty and students perceived Web 2.0 tools as having an important role in teaching and in learning in the context of higher education.

The second objective consisted in studying the influence of psychological variables on higher education students' attitudes and intentions towards the academic use of Web 2.0, in general, and Facebook, in particular.

Figure 1.1 provides a schematic representation of the context in which our research objectives were formulated. Our main focus are the psychological factors related to adoption of Web 2.0 (e.g. Facebook, YouTube, Blogs) in higher education, in a world in which people and institutions face rapid social, economical and technological changes, on a global scale.

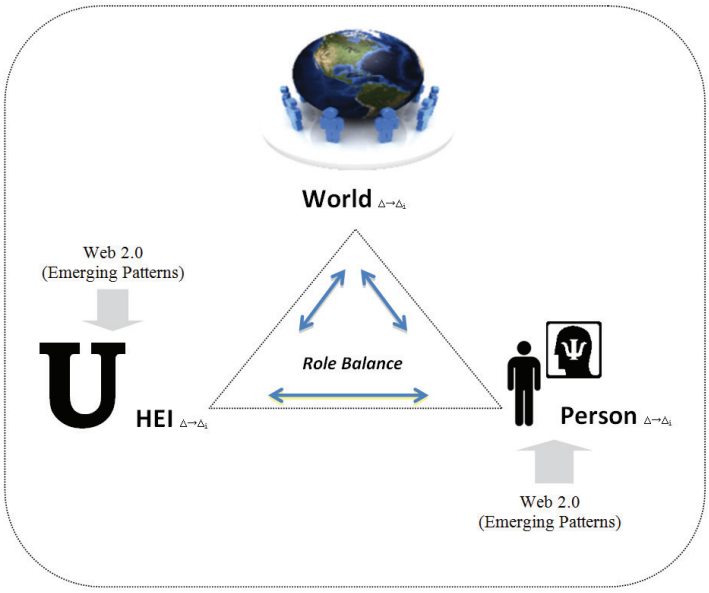

Figure 1.1. Relationships between changes ("Δ→Δ$_i$") in psychological dimensions ("Ψ"), higher education institutions ("U"), and the global world in which they are embedded.

1.2.1. General Research Questions

Web 2.0 can have an important role in the democratization of higher education, and its effective use can promote the engaging of new audiences and the widening of participation beyond the walls of the "Ivory Tower" (Priego, 2011).

The first two research questions which the research presented in this thesis sought to answer were the following:

Research Question 1: *Is the availability of Web 2.0 tools having a significant impact on teaching and learning activities in the context of higher education?*

Research Question 2: *What benefits do faculty and students perceive from the use of Web 2.0 tools to support teaching and learning in higher education?*

Answers for these first two questions were provided at the end of the two studies that were carried independently for the students and the faculty population.

1.2.2. Specific Research Questions: Faculty and Web 2.0

Redecker et al. (2009) consider that the role of the teacher has grown in importance (instead of diminishing) due to the need to provide coordination, moderation and mentorship on the open Web 2.0 environment: the teacher needs to guide and assist any student that may need it, which requires constant effort and attention.

The next group of questions was specifically formulated to obtain information concerning the factors which predicted teachers (faculty) adoption of Web 2.0 tools in the context of their pedagogical activities. Therefore, research questions 3 to 5 were formulated as:

Research Question 3: *What factors best predict faculty's decision to adopt Web 2.0 tools to supplement their classroom instruction?*

Research Question 4: *What factors best predict faculty's decision to adopt Facebook in order to supplement their classroom instruction?*

Research Question 5: *What factors best predict faculty's decision to adopt Blogs in order to supplement their classroom instruction?*

Answers for these three research questions were provided by integrative models, based on the Theory of Planned Behavior (Ajzen, 1991), but enriched with additional variables, including demographic information and factors such as degree of satisfaction with institutional electronic learning management systems.

1.2.3. Specific Research Questions: Students and Web 2.0

One of the key aspects that higher education institutions face, according to Lemaitre (2010), is the need to adjust the curricula of their programs to the increasingly heterogeneous nature of their students' previous educational background. Some of the students enrolling in higher education come poorly prepared, not only in the core disciplines related to their studies, but also in terms of basic communicational or social skills.

With the availability of Web 2.0 tools, publishing information becomes easy, and several studies (and the empirical experience of many teachers) have demonstrated that when the student knows that his/her work will be available on the Internet, they do it with much greater interest and effort (Cruz & Carvalho, 2006; Eça, 1998). This effect is even more enhanced if there are channels through which the student can receive direct commentary on his/her work (e.g. via a Blog).

Through the next research question, we sought to obtain answers in respect to students' Web 2.0 adoption and acceptance, using two well known theoretical frameworks for behavior prediction (Theory of Planned Behavior; Ajzen, 1991), and for technology acceptance (Technology Acceptance Model; Davis, 1989).

Thus, our sixth research question was formulated as:

Research Question 6: *What factors, among those proposed by the Theory of Planned Behavior (Ajzen, 1991) and the Technology Acceptance Model (Davis, 1989), best predict students' decision to adopt Web 2.0 tools, to supplement their in-class learning?*

The last two questions were related to our second research objective (described in Section 1.2), and sought to provide an account of which, among a selected group of psychological variables, were important to understand students' use of Web 2.0 (in general), and Facebook (in particular), to supplement their in-class learning.

Therefore, research questions 7 and 8 were formulated as:

Research Question 7: *In what extent the studied psychological variables influence students' attitudes and intentions regarding the use Web 2.0 to supplement their in-class learning?*

Research Question 8: *What factors, including the studied psychological variables, best predict students' decision to adopt Facebook in order to supplement their classroom instruction?*

In order to answer these last two questions, integrative models were built, which incorporated those psychological variables that were found relevant for understanding students' use of Web 2.0 and/or Facebook.

The selection of the psychological dimensions to be explored was based in either existing literature (e.g. Gangadharbatla, 2008; Ellison, Steinfield, & Lampe, 2007) or taking into consideration the sociability nature of these tools (McLoughlin & Lee, 2007), which motivated our interest in finding how dimensions such as satisfaction with social support, or academic experiences affected the students' decisions to use Web 2.0 for educational purposes.

1.3. Structure of the Thesis

This thesis is divided into nine chapters. This introductory chapter provides a general description of the context in which the empirical studies were conducted. The two principal research objectives are presented, followed by the research questions for which answers were sought.

The second chapter presents an account of the history of higher education in the European and Portuguese contexts, and provides an overview of the present-day situation of higher education in Europe and in Portugal, depicting the major challenges that this sector faces due to massification, globalization, the move towards the knowledge society, and recent developments in information technology.

Chapter three discusses how the recent emergence of social software tools, grouped under the term "Web 2.0" (O'Reilly, 2005), is challenging higher education, and also debates some critical issues regarding the use of Web 2.0 for teaching and for learning, in the context of higher education.

In chapter four, the concept and processes of technology appropriation are debated, and a group of theoretical frameworks that have been suggested in the literature for predicting and explaining technology acceptance and adoption are presented.

Chapter five provides a detailed review of five recent studies which were particularly important for our research, either because they were based in similar theoretical frameworks, or because they explored the inter-relations among variables which were specifically relevant for our study, given our research objectives.

In chapter six, an overall perspective of the empirical research conducted for this thesis is provided and the hypotheses that were formulated to answer our research questions are presented.

Chapter seven details the study that was conducted to assess the adoption of Web 2.0 by faculty, in the context of their teaching activities. Also, this study sought to provide a detailed view of those factors involved in Faculty's decision to adopt two specific Web

2.0 tools: Facebook and Blogs.

In chapter eight, the factors that led to students' use of Web 2.0 (in general), and Facebook (in particular) are explored, and the role of the studied psychological variables on students' decisions to use Web 2.0 and Facebook to supplement their in-class learning is scrutinized.

The thesis concludes with chapter nine, in which answers to all the research questions are presented, and directions for future work are delineated.

CHAPTER II - HIGHER EDUCATION, SOCIAL CHANGE AND TECHNOLOGICAL DEVELOPMENT

2.1. Introduction

The term "higher education", which became progressively more popular worldwide since the second half of the 20th century (Teichler, 2001) suggests that, within each country, there is a macro-structure comprised of activities and institutions sharing some communalities, and that are in some form interrelated (Guri-Rosenblit, Sebkova & Teichler, 2007).

In this chapter, we begin by presenting an historical account of the development of higher education, first in the broader European context, and then focusing on the history of the Portuguese higher education system.

The more recent developments of the last decades are discussed afterwards, both at a larger European level, and then focusing on the changes that have been occurring recently in Portugal.

The last part of the chapter is concerned with the major challenges that have been identified for the future of higher education, among which recent developments in information and communication technology play a fundamental role.

2.2. History of Higher Education in Europe

Universities are among the oldest institutions in the Western world (Guri-Rosenblit et al., 2007). These institutions started to appear in the middle ages, as town life and *professional guilds* developed. Guilds were association of craftsmen who worked at a particular trade, and were typical endorsed by monarchs, or other authorities, mainly to assure commercial trade rights, property of tools, and supply of materials. The concept of "university" originated from the need for mutual recognition among the members of these associations or guilds (Bathmaker, 2003).

The first University was created in Bologna, on 1088, followed by the University of Paris, founded on 1150. In the 13th century, universities flourished all over Europe:

such as the universities of Montpellier, Oxford, Padua, Salamanca and Cambridge, among several others (Verger, 1992).

The spirit of inquiry that underlies the creation of the first universities was largely influenced by the rediscovery of the works of Aristotle, which is considered one of the most important document discoveries in the western world history (Rubenstein, 2003), and a turning point in the history of western thought (Dales, 1990).

Starting in the 9th century, and until the 1500s, a corpus of more than 2000 manuscripts containing Latin translations of Aristotle's works began to form (Dod, 1982).

During this period, groups of scholars, using Latin as common language to communicate, tried to reconcile the perspectives of the then dominant Catholic Church with those re-emerging from Greek antiquity. This period in the History of Western thought became known as "Scholasticism" (Dales, 1990). Within the logic of Scholasticism, lecturers tried to prove that passages in the Bible were compatible with Aristotelian reasoning (Rubenstein, 2003).

The academic culture which developed in certain regions of Europe (for instance in Germany, in France and in England), was different from the one which emerged in southern universities (especially in Italy): in Southern Europe (e.g. Bologna), universities tended to be governed by the students, whereas in other regions the system of faculty governance was the most common (Scott, 2006).

The University of Paris became known as a "university of masters", in which teachers, united in a guild, shared the control of the university with a rector elected by the students (generally a young master). By contrast, the Bologna University, a "student university", presented a rival model, where guilds of students controlled the organization of their studies (Perkin, 2006).

However, even in Bologna, and other Southern Europe universities, the student governance model gradually converged to the Parisian model, and this pre-modern experience of a university ruled by the students faded into a distant memory (Luescher-Mamashela, 2011).

It is interesting to retain how the modern day governance model of the university,

mainly dependent on faculty, was disputed for several centuries, starting with the first inceptions of this institution (Perkin, 2006).

According to Grendler (2004), from the late 15th to end of the 18th centuries, in what is called the "Early Modern" period, European universities would witness an enormous increment in size, productivity and research. For comparison, the same author refers that in the 400 years after the foundation of the first university, at end of the Middle Ages (1400s), there were just 29 universities in Europe (Grendler, 2004). That number practically doubled in the one hundred period from 1400 to 1500 and, by the end of the 18th century, there were 143 universities in Europe (Frijhoff, 1996).

With the rise of the nation-state, universities became increasingly under state control, and new universities formed under to fulfill the needs and directives of the states. Even if universities kept some independence, their leadership increasingly tended to be appointed by the state (Scott, 2006).

At the end of the 18th century, the structure and function of higher education was approaching its modern form. Aristotelian methods and epistemology were no longer the center of academic preoccupations, and a more mechanistic orientation towards the understanding of nature began emerging. The place of theology at the top of the hierarchy of knowledge became increasingly disputed, and knowledge production and dissemination became more open and valued by the new modern state (Scott, 2006).

In the nineteen century, the university became a place where universal knowledge could be found or pursued. Its purpose was to create an environment where students could be exposed to the best thinking and knowledge in the world (Smith & Webster, 1997).

At the beginning of the nineteenth century, two major perspectives on university organization emerged and diffused in Europe: the French and the German (Rüegg, 2004).

With the establishment of the University of Berlin, early in the 19th century, the institutional model that embraced the concept of linking science and research to national goals of modernization influenced the creation of many other universities in the world.

The University of Berlin received inspiration from the thinking of Wilhelm von

Humboldt (1767-1835) who envisioned an institution in which the balance between research and teaching was different from other models of higher education that had existed until that time. Students were still being taught at the university, but the emphasis was put in research, and teaching was to become much more integrated with knowledge production (Mohrman, Ma & Baker, 2008).

In France, the model for university organization was born from the *tabua rasa* of the French Revolution, although some of its elements were already present at the end of the Age of Enlightenment. According to Rüegg (2004), the French model was characterized by *"severe, often military, discipline, strictly organized and controlled by an enlightened despotism that governed to the last detail the curriculum, the awarding of degrees, the conformity of views held concerning official doctrines, and even personal habits such as the ban on the wearing of beards in 1852" (pp. 4-5).*

Although enduring several decades, the French model began to receive strong influences from the German model, especially from the last third of the nineteenth century onwards and, ultimately, by the end of the 19th century, the Humboldtian university model was established in Europe, the US, and Japan (Rüegg, 2004), although the influence of the German model in other countries' higher educational system is disputed (e.g. Ash, 2006, for the case of the United States).

In the 20th century, urbanization and industrialization led to the massification of higher education (Rudy, 1984), a phenomenon which has been challenging the Humboldtian conception of the university. As Ash (2006) emphasizes, it should be taken into consideration that the German model was created in a context where only 1% of the citizens of one age group had access to higher education.

The change that started to happen at the end of the 20th century, and that now continues on the early 21st, is even more dramatic than the one that occurred with the introduction of the Humboldtian model, in the early 1800's, starting in the number of people and institutions involved (Altbach, Reisberg, & Rumbley, 2009) but also in the temporal scale that change is taking place, due to current information and communication technologies and present day transportation resources.

In the next section we present a narrower historical account of the development of

higher education in the Portuguese national context.

2.3. History of Higher Education in Portugal

At the kingdom of D. Dinis, Portugal enjoyed from an unprecedented "European wave", that stroke the country's artistic, literary, legislative, politic and scientific areas (Mattoso, 1993). The creation of the first University was thus not an isolated act, but one more reveling element of this tendency (Moreira, 2010).

The first Portuguese university started its activity near 1290, in Lisbon as "Generale Studium", and it represented an answer to the increasing educational requests of the Portuguese society, particularly the clergy and the bourgeoisie (Mattoso, 1993).

Even before the first Portuguese university was created, many Portuguese students went to the nearby Salamanca University, which at that time enjoyed from great international prestige (Carvalho, 1985).

Despite national rivalry between Portugal and the Castellan Kingdom, the first Portuguese university was very much influenced by the organizational model of the Salamanca University, and many professors were directly recruited from that institution (Mattoso, 1993).

During its first century of existence, the Portuguese university changed location four times, oscillating from Lisbon to Coimbra and back. From 1377 until the end of the 15th century, the university lived through a more stable period, fixating in Lisbon (Arroteia, 1996).

During this period, the Portuguese university kept its essential academic structure, and contrary to what happened in Cambridge, Oxford or Paris, "Colleges" did not gain a significant role in Portugal.

A certain degree of stagnation in the development of the university eventually triggered a new academic reform, which included the transference from Lisbon to Coimbra (again), on 1537 (Arroteia, 1996).

Between 1559 and 1759 there was another university operating in Évora which was run by the Jesuits, until it was shut down by the government of the Marquis of Pombal, which was very strongly oriented towards secularization of the Portuguese society (Torgal, 2000).

The reforms started by the Marquis of Pombal resulted from the "Enlightenment" ideals that circulated in Europe on the 18th century. Many Portuguese citizens from cultivated sectors of the bourgeoisie, the clergy, and nobility travelled abroad and contacted with new scientific and cultural topics and methods. (Cruzeiro, 1988; Moreira, 2010).

By then, the Portuguese university had very much stagnated in socio-cultural rituals that didn't respond to the needs of the Portuguese State and Society, and were discrepant with the "Enlightenment" values emergent in Europe at that time (Serrão, 1985).

There was a special name given to those persons who brought the ideals that were emerging in Europe to the realm of the national reality: "estrangeirados" (a Portuguese term reflecting the "foreign" influence that these individuals received from their exposure to the ideals circulating in other countries at that time). Two important "estrangeirados" were Luís António Verney and Ribeiro Sanches, whose opinions had great influence on the renewal of the Portuguese university (Moreira, 2010).

For example, the suggestions made by Ribeiro Sanches regarding the teaching of Medicine led to the reformation of the Medical School ("Faculdade de Medicina"), aimed at enhancing experimental research in this scientific domain (Torgal & Dias, 2002).

The "Enlightenment" ideals also led to the creation of two more schools ("Faculdades"), one of Mathematics and the other of Philosophy. The School of Philosophy had a separate place for what was at that time called "Natural Philosophy", which was the seed for the creation of the first Physics Laboratory (Torgal & Dias, 2002).

However, conversely to what happened in many universities in Europe (especially in England and Germany), the Portuguese university, at Coimbra, was very much entangled to the State, had was looked with suspicion, hardly attaining true creative autonomy (Torgal, 2000).

During the "Liberal Revolution" of the early 1800s, a new reform was made to the Portuguese university, which reinforced the nation's higher education system (Moreira, 2010). Another eight schools were created in the two major Portuguese cities: Lisbon and Porto. Although these new schools were created to fulfill specific roles (like the formation of army officials), they were the seeds for the future Lisbon and Porto academies (Serrão, 1985).

During the transition from the late 1800s to the early 1900s the "Republican" ideals pushed a profound restructuring of the complete educational panorama in Portugal. When the Portuguese Republic was proclaimed, in 1910, Portugal was a poorly industrialized country, with a predominant rural society. But the new Republican ideology emphasized the role of education in the promotion of the nation's progress and the need to change the limited mental framework of the vast majority of citizens at that time (Arroteia, 1996).

The first provisional government of the First Republic was responsible for a profound reform of Coimbra's University and for the creation of two new universities, one in Lisbon and the other in Porto. In fact, the transition to the Republican Regime was highly beneficial to the higher education sector in Portugal, although the inexistence of an effective mechanism to promote social mobility meant that the social stratification problem remained to be solved, and was even accentuated when the 1926 Military Coup replaced the Portuguese political regime by a dictatorship (Moreira, 2010).

In the period between 1926 and the "carnation revolution" of 1974, the Technical University of Lisbon was created, incorporating the Instituto Superior Técnico and some other institutes, such as the Instituto Superior de Comércio. In 1972 the ISCTE, a public university institute, was created and in 1973 several state-run universities started to operate in Lisbon, Évora, Braga and Aveiro.

In 1973, within the context of the Veiga Simão's reforms, the Polytechnic subsector of higher education was established, with the goal of educating specialized technicians and education professionals through relatively short cycles of study (Fonseca, 2001).

After the restoration of democracy in Portugal, many new public Universities were created, and starting in the 1980s many new private Universities began participating in

the higher education sector.

After this brief historical recount about the evolution of the national higher education, in the next section we describe the more recent events and the current day situation of this sector, first in the broader European context, and then more specifically, in Portugal.

2.4. Higher Education in Europe – Recent Years and Present Day Situation

In 1998, the Ministers of Education of four countries (France, Germany, Italy and the United Kingdom) signed the Sorbonne Declaration, aiming at harmonizing the architecture of the European higher education system (Sorbonne Joint Declaration, 1998).

The Sorbonne declaration was centered on the following goals:

a) to improve student and faculty mobility in the European space, as well as promoting their integration in the global European labor market;

b) to formulate a shared degree structure for undergraduate (1st cycle) and postgraduate courses (2nd and 3rd cycles);

c) to improve the transparency of the procedures followed in qualification recognition among European countries, through the adoption of a common framework of qualifications and study cycles.

Receiving great inspiration by the 1998 Sorbonne Declaration, in 1999 the Bologna Declaration was signed by the Ministers responsible for the higher education sector of 29 European countries. The Bologna Declaration aimed at the creation of a coherent European Higher Education Area (EHEA) by 2010.

Among the most salient goals of the Bologna Declaration, the following can be enumerated (EHEA, 2010a):

a) establishment of a system of easily comparable academic credits (ECTS);

b) adoption of a system of easily comparable degrees and generalization of a system with two main cycles (undergraduate/graduate);

c) promotion of the cross-mobility of all the main actors in the higher education sector (students, faculty, researchers, administrative personnel);

d) development of European co-operation in quality assurance;

e) promotion of a European dimension in higher education.

The Bologna Declaration was rooted in the goal of incrementing the international competiveness and attractiveness of the European higher education system (Eurydice, 2010).

After an important conference in Prague, in 2001, in which 33 countries participated, the Bologna Follow-up Group was created. This group was composed of representatives of each of the signatory countries and of the European Commission, and several consultative entities collaborated with the Group. After the conference, a Communiqué was released, which emphasized three key aspects of the Bologna process (EHEA, 2010b):

a) the development of lifelong learning;

b) the involvement of students and higher education students in the reforms;

c) the promotion of the attractiveness of the European Higher Education Area.

Two years later, in 2003, the Berlin Conference took place, and seven new countries signed the Bologna process, elevating the number of participating countries to 40. In this important conference, a set of priority goals for the following years was defined. The resulting Berlin Communiqué emphasized the following aspects (EHEA, 2010c):

a) the development of quality assurance systems, at the institutional, national and European levels;

b) implementation of the two-cycle system;

c) inclusion of the doctorate as a third cycle in the process;

c) recognition of degrees and cycles of study, including the free emission of the Diploma Supplement, beginning in 2005;

d) formulation of a common qualifications framework for the European Higher Education Area;

e) strengthening of the links between the European Higher Education Area and the European Research Area.

In 2005 the number of signatory countries was further augmented to 45, at the Bergen Conference, and the priorities fixated previously were enlarged to include (EHEA, 2010d):

a) the reinforcement of the social dimension of higher education, by eliminating obstacles to mobility;

b) the promotion of flexible learning pathways in higher education;

c) the implementation of standard quality assurance guidelines:

d) the development of national qualification frameworks compatible with the previously accorded Framework of Qualifications for the European Higher Education Area.

By 2007, a Ministerial meeting took place in London and the first legal body created through the Bologna process was established (the European Quality Assurance Register). In this meeting, two other important areas saw significant developments: the social dimension, through the development of national plans, and the global dimension, through the agreement of the Ministers in respect to the development of the global dimension of higher education in Europe (EHEA, 2010e).

More recently, in the 2009 Leuven Ministerial meeting, the achievements of the first ten years of the Bologna process were contemplated, and there was an agreement regarding the following key aspects (EHEA, 2010f):

a) each country should set measurable goals in respect to the amplification of the participation of larger sectors of the population in higher education, with a particular preoccupation with under-represented social groups;

b) by 2020, at least 20% of all students graduating in the European Higher Education Area should have had some study period abroad;

c) employability and lifelong learning are to be conceived as key aspects of higher education;

d) the ongoing curricular reform must have a student-centered character.

By 2010 the three-cycle structure was generally adopted in Europe, and the combination of a first cycle comprised of 180 ECTS (3 years) and a second cycle of 120 ECTS (2 years) became the most common model (Eurydice, 2010). Figure 2.1 depicts the overall Bologna model implemented in the signatory countries. Although there are several countries for each a unique degree structure model is not defined, even in these countries the 3 + 2 year degree structure is also commonly used.

The European Credit Transfer and Accumulation System (ECTS) is fully implemented in the great majority of the signatory countries, and almost all of the countries which still do not implement the ECTS provide at least the Diploma Supplement, the other fundamental tool for the realization of the Bologna process (Eurydice, 2010).

The establishment of National Qualification Frameworks is under progress, and many countries have made significant advances towards self-certifying their own qualification structures (Eurydice, 2010).

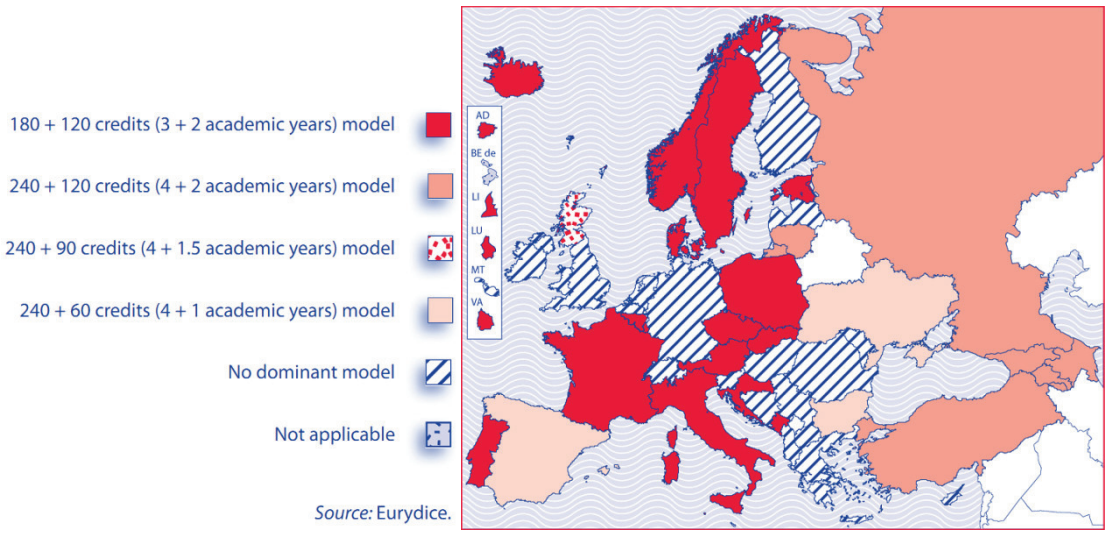

Figure 2.1. Higher education Bologna structure model in 2009/10 (Source: Eurydice, 2010)

The present economical crisis is having a significant impact in European higher education. The enrolment rates have been affected, and higher education institutions are dealing with the necessity to revise their staffing and infrastructural policies, as well as the further development of lifelong learning. In this context, the goals that were set to be attained by 2020 may have to be revised, or at least will require more effort to achieve than was previously planned (Eurydice, 2010).

2.5. Higher Education in Portugal – Recent Years and Present Day Situation

The Portuguese Higher Education System is organized around public and private institutions, either of the University or the Polytechnic type.

From 2005 onwards, there was a profound legislative reform, which accompanied the general European movement of higher education modernization. These changes include the approval of a new legal framework for higher education institutions, the entry into force of a new law for the assessment of institutions, the implementation of the Bologna Process and the revision of the regulations governing faculty members' careers (CNE, 2010).

Table 2.1 depicts the change in the number of higher education institutions, from 1995/96 to 2008/09. From the official data, provided by the Planning, Strategy, Evaluation and International Relations Office [GPEARI] of the Ministry of Science, Technology and Higher Education [MCTES], we can see that the majority of higher education institutions are private (around 68%). Also, the data reveals that polytechnic institutions are more numerous than the universities. However, the majority of the available vacancies for student enrolment are provided by public institutions (57%) from both the university and the polytechnic sectors, as can be inspected on Table 2.2, which includes data referring to the period between 1995/96 to 2009/10.

Table 2.1. Evolution of the number of higher education institutions operating in Portugal

		1995/96	2008/9
Public	Universities	18	18
	Polytechnics	31	28
	Total	49	46
Private	Universities	42	41
	Polytechnics	57	58
	Total	99	99
Total		**148**	**145**

Source: MCTES (2010)

These data reveal that in the last decade and a half there was a consolidation of the national higher education system. Another salient aspect is the increase of the number of vacancies for those students that completed their secondary education.

According to the MCTES, Portugal follows the OECD average regarding the percentage of students enrolled in tertiary education: about 4% of the overall population, corresponding to 375000 students, as of 2005 (MCTES, 2010).

The scarce number of students enrolled in the 1960s (near 30000) dramatically increased to near 400000 in the early 2000s. Within the decades of 1980 and 1990, the Portuguese higher education system experienced considerable growth, and young people of all social classes gained access to this level of studies. (CNE, 2010; MCTES, 2010a). Figure 2.2 presents the variation in the number of students in higher education since the late 1970s, and Table 2.3 details the evolution of the number of students enrolled in each of the Portuguese higher education subsystems, between 1995/6 and 2009/2010.

Table 2.2. Evolution of the number of available vacancies on Portuguese higher education institutions

		1995/96	2009-10
Public	Universities	20817	27 609
	Polytechnics	13489	24 600
	Total	34306	52 209
Private	Universities	26161	25 451
	Polytechnics	11125	14 241
	Total	37286	39 692
Total		**71592**	**91 901**

Source: MCTES (2010)

Figure 2.2 presents the variation in the number of students in higher education since the late 1970s.

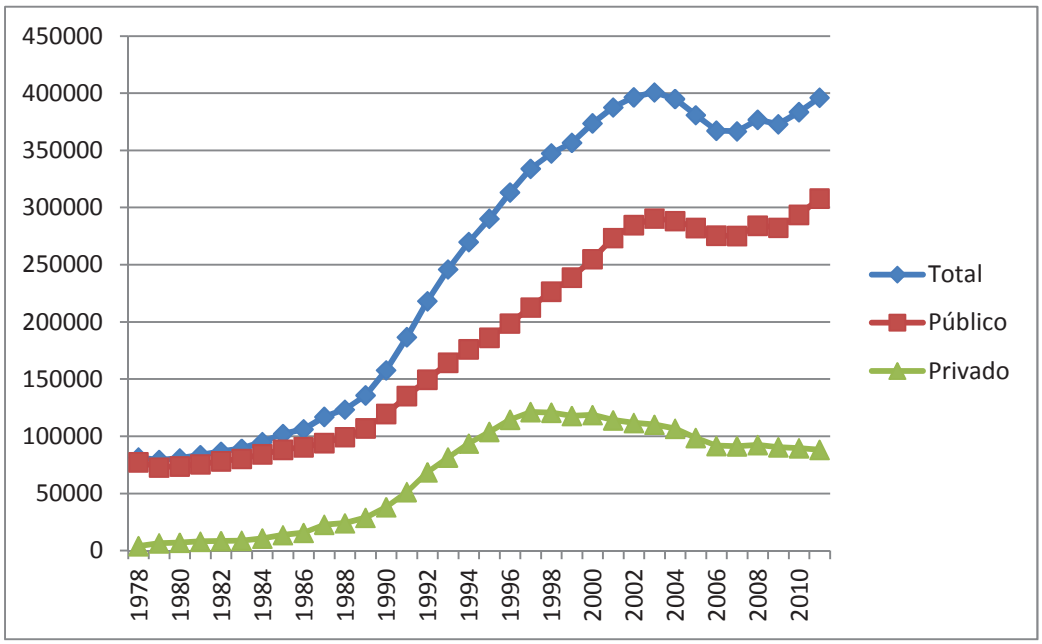

Figure 2.2. Number of students enrolled in Portuguese higher education institutions Source: MCTES (2010)

Table 2.3 details the evolution of the number of students enrolled in each of the Portuguese higher education subsystems, between 1995/6 and 2009/2010.

Table 2.3. Evolution of the number students enrolled in Portuguese higher education institutions

		1995/96	2009/10
Public	Universities	139 101	183 806
	Polytechnics	59 673	110 022
	Total (Public)	**198 774**	**293 828**
Private	Universities	89 744	60 174
	Polytechnics	24 897	29 625
	Total (Private)	**114 641**	**89 799**
Total		**313 415**	**383 627**

Source: MCTES (2010)

The number of students enrolled in higher education grew significantly, and by 2008 36% of all 20-year old young people were attending this level of studies (CNE, 2010). The number of graduates increased by 20% between 2005 and 2008, with the number of Science and Technology graduates rising to 18/1000 of the 20-29 year population, which is significantly above the EU average (MCTES, 2010). Table 2.4 represents the percentages of students enrolled in each academic field.

Table 2.4. Distribution of student enrolment for academic fields of study (%)

Academic Field	1995/96	2009/10
Education	11,9	5,0
Arts and Humanities	10,1	9,3
Social Sciences, Management ant Law	26,1	29,0
Natural and Exact Sciences	10,9	8,8
Engineering	25,6	25,6
Agriculture	4,5	2,2
Health and Social Welfare	7,3	14,0
Services	3,7	6,1
Total (%)	**100,0**	**100,0**

Source: MCTES (2010)

The proportion of the Portuguese population aged 30-34 with higher education qualifications was 21.6% in 2008. This number is still far from the EU goal of achieving a total number of 40% of higher education graduates in this age group (CNE, 2010).

Faculty members represent the majority of higher education workers, and this professional group comprehends two thirds of all people employed in all higher education subsystems (DGES, 2008).

Table 2.5. Total number and age group distribution of Portuguese faculty members (2009 data)

Age Group	N	%
< 30	2274	6%
30-39	10518	29%
40-49	12296	34%
50-59	8106	22%
≥ 60	3021	8%
Total	**36215**	**100%**

Source: MCTES (2010)

Although the proportion of women is increasing, the majority of faculty members are men, within the 30-39 and 40-49 age groups (as depicted in Tables 2.5 and 2.6).

Table 2.6. Distribution of Portuguese faculty members, by subsystem and gender (2009 data)

		Men (%)	Women (%)
Public	Universities	44	37
	Polytechnics	26	31
	Total	**70**	**68**
Private	Universities	20	18
	Polytechnics	10	14
	Total	**30**	**32**
Total (%)		**100**	**100**

Source: MCTES (2010)

Between 2001 and 2008, the number of faculty members with less than 40 years-old decreased from 48% to 37%, which reveals an aging tendency within this professional group, although this aging was less pronounced in respect to the female faculty sub-group. In the same period there was a significant increase on the number of faculty members qualified at the PhD-level, which grow from about 9,400 to more than 14,000 (Machado et al., 2011).

The data presented in this section summarized a set of important aspects regarding the current state of higher education in Portugal. In the next subchapter, some of the main challenges that are presented to higher education, globally, are debated.

2.6. Present and Future Challenges for Higher Education

In their widely influential UNESCO report on Higher Education, Altbach, et al. (2009) identified four fundamental forces impelling the present day academic revolution:

1. Massification of higher education.

2. Globalization.

3. Advent of the knowledge society, and the importance of the research university within it.

4. Information technology.

Over the next sections, each of these challenges for higher education will be discussed.

2.6.1. Massification of higher education

Presently, the higher education system is confronted with diverse pressure forces. Even if traditionally this sector has always kept some impermeability to external pressures, today's higher education institutions face a paradigmatic change over the relations between traditional academic culture and the requirements of the labor world (Santos,

1989).

The rapid obsolescence of acquired knowledge, which results from the permanent transformation of production models, led to the necessity of reconcile the labor and the academic spheres (Santos, 1989). One consequence of this phenomenon is the emphasis that is currently put on life-long learning.

Life-long learning emphasizes that it is never too late to learn. In an increasingly demanding world, where each person may need to have more than one profession in the course his/her working career, lifelong learning becomes indispensable.

The goals of lifelong learning range from the enhancement of economic progress and development, to the promotion of personal fulfilment, social inclusiveness and democratic participation (Aspin & Chapman, 2000).

Massification is a central phenomenon of 21st century higher education (Guri-Rosenblit et al., 2007). Due to the democratization and broadening of higher education access, institutions are finding increasing pressures to adapt their activity to a situation in which the students are much more diverse. These pressures are leading to the reorganization of teaching, which is apparent in the changing structure of academic offerings: from very short cycle programs directed linked to immediate requests of the labor market to the more traditional academic degree programs, modified to address recent needs while maintaining high quality standards of the learning process (Lemaitre, 2010).

Another key aspect that higher education institutions face, according to Lemaitre (2010), is the need to adjust the curricula of their programs to the increasingly heterogeneous nature of their students' previous educational background. Some of the students enrolling in higher education come poorly prepared, not only in the core disciplines related to their studies, but also in terms of basic communicational or social skills.

The recent greater diversity of higher education publics requires the formulation of alternative pathways for knowledge and training delivery, in order to take into account the needs of non-traditional students (Gouveia, 2012).

According to Gouveia (2012), today's society requires a higher education system

capable of fulfilling the initial and life-long learning requirements of such diverse groups as:

a) traditional students, arriving at higher education level of studies coming from what is now considered “the old” pathway for University and Polytechnics access, i.e. after completion of secondary education, and at the last stages of adolescence, or as young adults;

b) mature students, and senior people: this new publics comprise mainly persons who already have a professional career, and seek to enhance their competences and knowledge;

c) international students, who search for different cultural and scientific opportunities;

d) sharing/exchange students: the ones who are part of university programs for sharing higher education among several places or in more general agreement as the case of Erasmus in Europe. Mostly of those programs are seeking to promote the interchange of cultural diversity and network growth;

e) professional and corporate students, from given brands, institutions, or economic sectors seeking specific new perspectives in relatively narrow areas relevant for their fields of activity.

The rapidly changing labor market makes it important that the programs offered by HEI institutions be flexible enough to accommodate for different options of paths of study, by the part of students.

The traditional pedagogical approach, in which teaching meant mainly the transmission of knowledge and the provision of information, has been made obsolete by the wealth of information readily available to everyone. Currently the emphasis is on providing the basic structure for the available information, giving students the competencies to select (or discard) the information based on their critical judgment and on its adjustment to its relevance for the goals at hand (Lemaitre, 2010).

2.6.2. Globalization

Globalization is a process that has a long history, and is far from being related only to economic transformations. Rather, it is encompasses a broad set of social transformations (economical, political and cultural) that leads to disembedding from territorial / national scopes and contexts.

The first use of the term "global" with this meaning appeared in 1892 in an article of "Harper's Magazine", and this use of the word was included in the Webster's dictionary (a very prestigious and old dictionary of the English Language). The term "globalization" ended up displacing the French expression "mondialisation" that was more commonly used until the 1970's (Rodrigues & Devessas, 2007).

This coincided with the appearance of the influential works of Marshall McLuhan (e.g. McLuhan, 1962) who introduced the idea of "global village" which has become pervasive in our present day conception of the globalization process.

Central to the concept of globalization is the flow of knowledge, people, values, ideas, goods, capital and services across a nation's individual history, culture and priorities (Friedman, 2006).

It can be argued that globalization is a trend present from the beginnings of the human species, but recent studied have identified a series of three major waves in the globalization process (Rodrigues e Devessas, 2007), the first of which was initiated by the Portuguese at the beginning of the 15th century, where an unprecedented "commercial revolution" took place and trading gain a dimension that had not existed in the Mongolian Empire or the golden Mediterranean age (Huberman, 2008). The second wave of globalization started after the defeat of Napoleon and in the aftermath of the congress of Vienna, at the beginning of the 19th century. This wave included the opening of the Suez Canal with its consequences in maritime travel and trading (Clark & Feenstra, 2003).

In the 21st Century, the movement towards globalization has reached an unprecedented peak, driven by an increasingly integrated world economy and advances in information and communication technology (Altbach, et al, 2009), of which the emergence of Web 2.0 is a more recent example.

The globalization of societies and economies has been impacting higher education all over the world. The rising of English as a dominant language in academic and scientific settings replicates in a certain way the role that Latin played in Medieval Europe.

Universities have always been influenced by international trends. In Portugal, a classical well known example of how ideas circulating in Europe led to internal debates concerning the university can be found in the critics made by Luís António Verney (1746) regarding the status of national higher education, which he found to be in dissonance to the "Enlightenment" set of found among intellectual circles in Europe at that time.

Knight (2008) reflected upon some myths regarding the internationalization of Higher Education, such as:

a) the belief that by having more foreign students in campus equates to a more internationalized organizational culture and educative offer;
b) using internationalization as a linear correlate of the institution's quality, i.e. thinking that the school's internationalization efforts reflect directly in the institution's reputation;
c) the thought that there is a direct relation between the number of agreements with foreign institutions and the prestige of the school;
d) the idea that international accreditation is an exact measure of the school's internationalization, and of the school's quality;
e) confounding international branding / marketing of the school with institutional internationalization planning.

Some authors (e.g. De Wit, 2011; Brandenburg & De Wit, 2010) alert for the fact that "the what" and "why" of internationalization have been very much overtaken by the instrumental question "how". De Wit (2011) also point some other misconceptions about internationalization of higher education institutions, such as:

a) confounding internationalization with teaching English;
b) facing internationalization as simply promoting and engaging in studying abroad;
c) equating the teaching of international subjects as internationalization;
d) thinking that higher education is by itself international and lacking means to measure international and intercultural competencies;
e) taking internationalization as an end in itself.

Increasingly, we witness an increasing competition for international students and professors, the growth of cross-border programs, the increasing weight of for-profit higher education providers, and the emergence of countries like India and China in the global tertiary educational scene (De Wit, 2011). All of these phenomena reflect the challenges faced by higher education due to processes of increasing globalization.

2.6.3. Knowledge society

Broad social and economic changes that have occurred in the past decades have been reflected upon Higher Education. The movement towards a global economy and to the knowledge society poses several challenges to higher education institutions. At the educational level, a greater emphasis is being made in respect to the need to enhance the skills of the population, but also to the inevitability of updating those skills at a regular basis (Beerkens, 2008).

A global revolution is taking place in higher education that is comparable in range to the one that happened when the German research model extended its influence worldwide in the 19th century (Altbach, et al., 2009).

In our society, Universities continue to be major sources of knowledge creation and dissemination, as it is attested by their central role in debates regarding the new concepts of “knowledge society” and “knowledge economy” (Beerkens, 2008). What distinguishes the knowledge society from those that preceded it is the degree in which knowledge extended the capacity for the society to act upon itself, both at the institutional level and its relations to the natural environment (Bohome & Stehr, 1986).

At the core of the concept of the knowledge society is the idea that the new emphasis on

knowledge signals a profound transformation in the structure of the economy. The contemporary notion of the knowledge society emphasizes the ideas of openness and flexibility, and the role of the state as a facilitator, instead of a central planner (Beerkens, 2008).

Besides technological innovation, cheaper transportation costs have been leading to keen competition among labor markets all over the world. In western capitalist countries, a low-wage Fordist mass production model is giving place to an economy based on low-volume, high-value goods. This transformation on the productive model requires much more investment in qualification of the work force (Bathmaker, 2003).

In the new knowledge economy, employers typically require much more than specialized disciplinary skills. Among the set of competencies that are now commonly required we find personal and interpersonal skills, communication and negotiation abilities and teamwork capacity (Bathmaker, 2003). In fact, although the increased emphasis in knowledge as a factor of production in the economy translates in an increased salience of technical knowledge, there is a recent trend to re-value social skills and creativity.

Bell (1973) was one of the first authors to diffuse the term "post-industrial society", which carried a double meaning:

a) the sources of innovation are derived from research and development;
b) the larger proportion of the GNP and a large part of the labor market is in the knowledge field.

The emergence of knowledge society has also been very impacting in the models by which research is conducted by higher education institutions. A broadly disseminated conceptualization of the recent change that was happen to research is the so-called change from "Mode 1" to "Mode 2" of knowledge production (Gibbons et al., 1994).

Accordingly to Gibbons and collaborators, "Mode 1" has been used to disseminate a "Newtonian" / scientific perspective of making science into different fields of inquiry, therefore legitimating those fields, and assuring their compliance with what was considered the ideal scientific method. In the authors perspective, "Model 1" summarizes the cognitive and social norms that must be followed in the production and

diffusion of scientific knowledge. These cognitive and social norms determine what can be identified as a scientific problem, who can practice science and what practice can be viewed as "good science".

The former mode of knowledge production contrasts with what Gibbons and colleagues call "Mode 2". The authors propose that this new mode started to emerge from the mid 20th century and is characterized by being context-driven, problem-focused and trans-disciplinary.

Synthetically, "Mode 2" of knowledge production has the following five characteristics (Nowotny, Scott & Gibbons, 2001):

a) Knowledge is produced within the context of application (and not in "pure science" settings);
b) Knowledge is dramatically trans-disciplinary, and requires the mobilization of a wide range of practical methods and theoretical perspectives. It is not just multi-disciplinary, or inter-disciplinary, since it is not determined by pre-existing disciplines, nor does it lead necessary to the formation of new disciplines;
c) Knowledge is produced at a much greater diversity of places and the dynamics of knowledge production have been greatly transformed by the advances in information and communication technologies. Old hierarchies are disappearing and research communities have more open and broader frontiers;
d) The research process changed from being an "objective" investigation of the natural and social worlds, and became "reflexive", transforming into a dialogic process in which research actors and research subjects maintain a dialogue;
e) The last characteristic feature is quality control. Since the research community is now broader and open, "peers" can no longer be reliably identified. This is also a consequence of the trans-disciplinary nature of the research process that this mode of knowledge production entails. The proponents of "Mode 2" recognize that this last feature is "disturbing", but consider that there may be no clear and unchangeable criteria by which to determine quality, policy-makers and funding agencies have to manage multiple definitions of quality (assumingly complicating assessment by these entities).

Since "Mode 2" of knowledge production is more socially distributed, it reaches

individuals across a broader social spectrum. Gibbons and colleagues (2002) consider that socially distributed knowledge production points to the emergence of a global web whose number of inter-connections expands progressively as new sites of knowledge creation are incorporated into the web.

Gibbons and colleagues (2002) consider that in "Mode 2" communications are crucial, and that by then (2002) Mode 2 dynamics was assured not only by formal agreements and alliances, but also by informal networks based on efficient transportation and electronic communications.

However, even if the trans-disciplinary mode of knowledge production is becoming dominant, there seems to be a tendency for prizing quantitative (more "scientific") approaches in areas as diverse as political science, linguistics and history (Frank & Gabler, 2007). One way to understand this phenomenon may be interpreting it as a consequence of the trans-disciplinary nature of current research, and the need felt for those involved in trans-disciplinary research to find common grounds in which communication can be established between the many areas of expertise involved.

According to Preston (2004), along its history, the University has been able to resist powerful forces (e.g. the Church) wishing to subjugate it to their own purposes and the University has also been a source of stability in times of perceived radical transformations (such as the Industrial Revolution).

However, the same author considers that today's "turbo capitalism" (Preston, 2004, p. 149), presents a particular challenge for the University: if it rejects the values proposed by today's capitalist forces, the University may face financial strangulation, but Preston (2004) considers that the alternative of total submission to contemporary capitalist pressures may be far more pernicious, because it would tie the University to what the author describes as the same unsuitable framework that rules the current economic system, in which subjective chosen criteria are presented as objective truths.

The profound economic crisis that the World (and the University) is facing in the last years make the advertences made by Preston (2004) seem prophetic, near a decade later, after the fragility of the framework behind "turbo capitalism" being so dramatically exposed, at least in Europe.

One of the most important documents reviewing the recent trends in Higher Education today is the OECD report named "Tertiary Education for the Knowledge Society" (Santiago, Tremblay, Basri, & Arnal, 2008). The authors reviewed the situation of higher education in over twenty countries, and an outline of the report's conclusions is presented in the next paragraphs.

The sole title of the report is "per se" significant and informative: the present-day heterogeneity of higher education systems, organizations involved and target publics makes it necessary to broaden the traditional perspectives on higher education, and hence the report refers to "tertiary education", reflecting the diversity of institutions and programs.

One of the main common tendencies found by the OECD in the many countries analyzed were a very notorious expansion of tertiary education systems: all over the world, the number of students enrolled grew from 68 million students enrolled 1991 to 132 millions in 2004 (what represents almost a doubling in little more than a decade). The most significant increases were found in Asia and Sub Saharan Africa. By contrast, in North America and Western Europe the grow was below the average of all countries analyzed, although that phenomenon may be due to the large coverage already attained in these parts of the world.

Another major trend found in the Santiago, et al. (2008) OECD report was the diversification of provision in this sector of education, which takes many forms: since the emergence of new institution types and diversification of programs by already established institutions to the introduction of new modes of delivery. In many traditional Universities vocational studies have started to be ministered, and many new short cycle programs appeared in both old and new institutions, as a result of pressures of the labor market and of governments' development policies. The growth of the private sector of tertiary education is also an important component of this trend.

The authors also found major changes in the population who attended tertiary education. Not only has the number dramatically augmented, but the own composition of the student bodies changed: there are more non-traditional age (older) students, more women, and a greater heterogeneity in the student's social and economical background. A large number of these students are the first generation in their family to reach such a

higher level of education, and bring together a different perspective that affects their educational experience (Santiago, et al., 2008).

Funding of the tertiary education sectors was another important aspect highlighted in the OECD report. The state's allocation of financial resources to tertiary education has become scarcer and the sources of capital for the institutions have been greatly diversified. The funding procedures tend to obey to increasingly competitive processes, requiring both regular self- and external- assessment. In order to obtain funds, a greater emphasis is being given to the need of commercialize research produced by institutions and to establish or raise student's tuition fees (Santiago, et al, 2008).

The worldwide development of knowledge societies offers a unique chance for less developed countries to catch up with industrialized countries, taking advantage of technologies that allow a widespread dissemination of knowledge (Bindé, 2005). At the heart of the effort to build knowledge societies is the understanding that knowledge can be a decisive instrument of development, empowerment and capacity-building. The MIT OpenCourseWare (OCW) initiative's motto is precisely "unlocking knowledge, empowering minds", and this program was initiated to provide the dissemination of knowledge and collaboration among scholars around the world. Most importantly, MIT's initiative was followed by a number of other institutions making their courses available as open educational resources, available for use to students and educators all over the world.

Another important trend evidenced by the OECD 2008 study was the increasing focus on accountability and performance, which is salient in the fact that many countries have seen the development of formal quality assurance systems. Due to the expansion of tertiary education systems, their increased diversification and the need to legitimize the use of public money in its funding have required that the quality, efficiency and effectiveness of the programs and institutions should be demonstrated and verified, instead of taken for granted.

Santiago, et al. (2008) also found very compelling evidence that new forms of institutional governance are emerging, with professional managers being called to executive rolls in Tertiary Education Institutions.

The last trend that the OECD report signals is the one which is more interesting in the context of this study about Web 2.0 use in higher education, since the report highlights the importance that global networking, collaboration and mobility, activities in which new forms of electronic communication may have a particularly important role (Santiago, et al., 2008).

2.6.4. Information technology

Today, information and communication technologies have simplified scientific communication in an unprecedented way.

Higher Education Institutions (HEIs) are facing strong pressures to adjust their methods of knowledge creation, sharing and preservation (and even the way the knowledge evaluation process is conducted), due to the technological changes of the past years. Many of the major HEIs are already testing new forms of accomplishing their social mission. We can state, as examples, initiatives like the MIT *Opencourseware*, Berkeley's *Webcast.Berkeley* initiative or the Open University's (UK) *OpenLearn"*project, only to name a few leading schools that are adopting forms of communication that were unforeseen a mere decade ago.

The movement towards the globalization of education also gave rise to the Open Educational Resources movement, expressively pioneered by the above mentioned MIT's initiative, which was soon thereafter followed by hundreds of other similar initiatives. Just the "OpenCourseWare Consortium" gathers the resources of hundreds of institutions around the world.

Among the many examples of open educational resources we can mention "open textbooks" (Frydenberg & Matkin, 2007) which are very important instruments to address the problem of the educational gap in the developing countries.

Open educational resources have been leading to major changes in contents production and dissemination. Complementary, significant developments in e-book technology, both at hardware and at software levels, are also contributing for changes in the way students contact with learning materials (Koychev, Nikolov & Dicheva, 2009).

Another significant example of the impact of open educational resources is related to the building of open repository of research publications, like DSpace at the Massachusetts Institute of Technology (MIT) or the open repositories available from Portuguese Universities like Minho or Fernando Pessoa universities, just to name two of the many examples of this type of sources of academic materials freely available on the Internet today.

In a report for the United States' National Science Foundation, Atkins, et al. (2003) go to the point of speaking of a new way of making science they call "E-Science" in which researchers work together in settings that may be composed by both national and multinational teams of people and geographically distributed laboratories. These scientific teams are able to work efficiently by sharing an "e-infra-structure " composed by hardware, software, services, people and organization, which creates an environment in which global research teams can operate.

The generalized use of the Internet, and specially the World Wide Web, is only about a decade and a half (as of mid 2011), and yet the nature of communication on the Web has been deeply transformed recently, with the introduction of tools and services which allow for a much greater participation of people in the generation of online material. There is a new generation of students who are accustomed to these technologies and who use them to share knowledge and information outside the strict context of the traditional classroom. Navigating the Web, we can see people of all ages taking active roles in geographically disperse communities, collaborating and building knowledge through interaction and self-regulatory social dynamics.

The emergence of new technologies that enable people to create and modify information on the Internet has a potentially much deeper impact than can be realized from the separate analysis of the tools themselves.

The incorporation of new technological tools in education can be seen as a symbol of the adaptation of the university models of teaching and organization to the knowledge society (Beerkens, 2008).

However, Preston (2004) considers that greater care should be taken to debating what types of learning are compatible with the existing technological systems, and what are

simply not viable through these means.

Even if a new set of tools has the potential to dramatically change the way a organization operates, at first it is common to incorporate the new tools in the traditional dynamics of institutions. More than 40 years ago, McLuhan and Leonard (1967) could already predict that education was undergoing a profound transformation, due to the evolution of electronic communication technology. These authors realized, early on, that a new "global tribal village" was emerging and that education could be dramatically affected by the development of these new tools.

Some of the anticipated changes predicted by McLuhan and Leonard (1967) included:

- Flexibility on students organization of time;
- Learning as problem-solving in the context of multi-disciplinary projects and research tasks;
- Spatial re-organization of the classroom, to enhance student action and interaction;
- Blurring of distinctions between the "in school" and "out of school" environments;
- Merging of working and playing settings.

A person's own value system can also be deeply affected by the new information and communication technologies, since they allow for a much wider access to other cultures and different conceptions of the world, which can sometimes challenge and/or enrich the person's sense of identity (McNair, 1997).

One idea that has been making its path towards greater diffusion and acceptance among educators is that of "learning spaces". In fact, a very important question about contemporary higher education is centered around the notion of "place": given the fact that institutions are relying increasingly on the Web to support their teaching and learning activities, students are starting to view the university/polytechnic as a technologically mediated entity, and less as a physical place (Surry, Stefurak & Kowch, 2010).

The metaphor of "making a place" in a virtual environment has been advanced as a very powerful way to enhance the inclusion of social-cultural and perceptual qualities, to a level that may approximate, or in some cases even surpass comparable physical settings (Kalay, 2004).

However, even with the emergence of Web 2.0 tools and with the great evolution of information and communication technologies over the last decade, crucial issues emphasized by Preston (2004) maintain all there relevance today, such as authentication, security, identity.

Also, current technology is still far from allowing the same vital forms of human communication and interaction that are enabled when students and academic mentors are present in the same physical environment, an issue also emphasized by Preston (2004).

De Freitas and Conole (2010) emphasize five recent technological developments that those authors consider will likely impact education in a significant manner:

a) a trend towards networked and ubiquitous computing;

b) a tendency to move towards mobile and adaptative devices;

c) the development of devices sensible to context and user location;

d) the increasing possibilities to deliver rich learning experiences and environments through information technology;

e) the globalization of the technological infrastructure, which allows for easy and increasingly fluid interoperability.

In the context of the Lisbon Strategy and the Bologna Process, some experiences were made in what was called the "Virtual Erasmus" model, by which the existing Erasmus exchanging programs are extended using virtual mobility schemes (Beeck, Coen, & Pérez, 2006). "Virtual Erasmus" embedded transnational networked e-learning in which teachers and students collaborated. The model aimed at joint course development and joint learning activities as virtual integrated elements of blended learning. In such a model, students could benefit from a type of blended learning in which a significant part of the elected courses could be followed by electronic means.

In the transition to a knowledge society, higher education institutions are in the center of a process of deep institutional change. As discussed by Unsworth (2008), a major challenge that universities now face is their own reinvention as information

organizations. At their core, universities seek to create, preserve and convey knowledge, but they need to be efficient and effective in leveraging their own information resources.

Open and independent innovation platforms can be used to enhance the innovation processes within higher education by improving the knowledge management processes.

2.7. Chapter Summary

In this chapter, we intended to provide a panoramic account of the history and current state of European and Portuguese higher education.

We then reflected upon the major challenges that higher education is facing today, and confirmed that there is abundant literature emphasizing that information and communication technologies are at the heart of the profound organizational transformations that higher education has been through in the last decade.

Among the technological developments of the last years, the emergence of Web 2.0 is one of the most salient and debated issues, in the context of higher education. In the next chapter, we will explore in greater detail the influence that Web 2.0 is having in this field.

CHAPTER III - HIGHER EDUCATION AND THE WEB 2.0 CHALLENGE

3.1. Introduction

Although the term “Web 2.0” had been used before (e.g. DiNucci, 1999), its current meaning become popular after the first “Web 2.0 Conference” was hosted by O'Reilly Media and MediaLive, in 2003. According to O’Reilly (2005), the concept of “Web 2.0” refers to a revolution in the computing industry caused by the network becoming a platform.

It is difficult to define concisely what this concept means, since it covers such a wide range of applications, including Blogs, Mashups, Wikis, feeds to social bookmarking, social networking and media sharing sites. But although the term Web 2.0 has no unique definition, there is a general consensus that it applies to a broad set of functional characteristics, within the context of information and communication technology, which point not only to the increased possibilities of publication, but also to the encouragement and support of user participation, and sharing of digital artifacts (Conole & Alevizou, 2010).

Dabbagh and Reo (2011) argue that Web 2.0 is both a concept and a technology: when used as a concept, it denotes aspects such as social networking, openness, personalization and collaboration. Used to refer to a technology, “Web 2.0” relates to the qualitative changes that occurred in the way information on the World Wide Web is accessed, created and delivered (Dabbagh & Reo, 2011).

From all the characteristics of the diverse Web 2.0 applications, the one that unifies the concept, and that has more potential to impact Education, is the sociability nature of these tools: Web 2.0 is about supporting group dynamics and the establishment of digital networks among people. In this sense, the terms *Web 2.0* and *Social Software* could be confounded. But Web 2.0 goes beyond the original concept of Social Software in that a greater emphasis is given to new possibilities supplied to the individual in terms of self-expression and filtering, through collaborative remix ability (McLoughlin & Lee, 2007).

We can say that, in its essence, "Web 2.0" denotes a *participatory* Web. By lowering the barriers to participation, this concept goes beyond the idea of opening software code to developers: it states that content production of online information is opened to all users, who are allowed to re-use and *mash up* data as much as they want and need (O'Reilly, 2003).

The first generation of the World Wide Web was strongly linked to the idea of a Web page as an isolated entity, which worked as an information repository (O'Reilly, 2005). In reality, the inventor of the World Wide Web, Tim Berners-Lee, had already foreseen the potential of the Web to enable every individual to be a producer of online contents, and not only an information consumer (Berners-Lee, 1999).

However, the emergence of tools like Blogs or Wikis made the creation of contents much easier than before. The concept of Web 2.0 emphasizes the fact the user can now easily participate in the delivery of Web contents, taking advantage of tools like Blogs, Wikis, Podcasts, Social Tagging and Bookmarking, Facebook, and many others.

To support the notion of Web 2.0, O'Reilly defends that a new *architecture of participation* as emerged on the Web, involving a built-in ethic of cooperation, in which the service acts primarily as an intelligent "broker", connecting the edges to each other and harnessing the power of the users themselves. (O'Reilly, 2005).

In the last few years since the popularization of the concept of the Web 2.0, much has been written regarding how these kinds of tools are modifying online practices: the Web is been evolving from being a store of content and an information retrieval mechanism to a web that enables social mediation and the shared generation of content by users.

Rheingold (2008), states that participatory media (in which wikis, blogs, social bookmarking, *mashups* and video sharing are included), have three distinctive features:

1. *Many-to-many relationship*, where every person can not only receive, but also broadcast information, breaking the traditional asymmetry between broadcaster and audience that was the signature of predigital technologies.
2. *Power*, derived from the collaborative participation of many individuals.
3. *Wider, faster and cheap coordination of activities*, due to the use of information and communication technologies to amplify social networks.

Acording to Conole and Alevizou (2010), from the early to mid 2000s, higher education institutions started to develop policies respecting the use of technology to support their core activities.

With the widespread diffusion of Web 2.0 technologies, beginning around 2005, the information-focused use of ICT in higher education started to be extended to include the new informal communities and forms of communication allowed by Web 2.0 (Conole & Alevizou, 2010,).

3.2. Social Software, Web 2.0, Teaching and Learning

Participatory media, supported by Web 2.0 can greatly enhance traditional presence learning, by promoting collaborative attitudes and more active participation and autonomy within students (Morais, Beça, Santos & Batista, 2010).

These tools can bring new dynamics to the way learning is performed, potentiating the development of new forms of knowledge acquisition, usage and construction (Trinder, Guiller, Margaryan, Littlejohn, & Nicol, 2008).

In the context of higher education, Web 2.0 may enable both teachers and students to have a direct control over a vast set of communication tools, therefore blurring the distinction between the producer and the consumer of content.

Among the trends that are likely to have a significant impact on education De Freitas and Conole (2010) emphasized the following five:

1. Shift towards networked and ubiquitous technologies.

2. Increasing importance and applicability of mobile devices, which are becoming more and more rich and adaptable.

3. Consolidation of a globalized, distributed and interoperable technological infra-structure.

4. Emergence of context-sensitive and location-aware devices.

5. Existence and further development of enriched and diversified, and stimulating, learning environments

The availability of free and open educational resources, opencourseware and open software can also contribute to the promotion of a participatory learning culture in which learners build, explore, share and collaborate together online.

In recent years, there have been many voices arguing that Web 2.0 and social media could be enabling technologies for a process of "reinvention" of higher education institutions, since these kinds of technologies could be used to promote more collaborative, discursive and relational approaches to learning (e.g. Conole & Alevizou, 2010; Selwyn, 2007; Armstrong & Franklin, 2008; Dalsgaard, 2006). Particularly important is the way in which Web 2.0 is presented by these authors as having the potential to promote innovative approaches to student learning, and to teacher training and teaching practices, as well as to professional development.

In a study carried out in the United Kingdom, regarding the expectations of young students starting their courses at the higher education level, Hughes (2009) found that:

1. Students were highly influenced by the way schooling materials are delivered, and so it can be expected that changes in educational practices related to the use of new technological tools can have a significant impact.

2. The personal element in study, such as face-to-face contact, was very important to students.

3. There were some resistances to the use of imaging technology as a way to promote social contact in an academic context. In order to be persuaded to use these types of tools, students needed demonstration and some freedom to experiment.

4. Sometimes, the major obstacles to the use of Web 2.0 in the context of academic learning were purely technical, resulting from the institution's staff inability to make use of the freely available tools.

In another careful review of the use of Web 2.0 tools in learning settings, Redecker, Ala-

Mutka, Bacigalupo, Ferrari, & Punie (2009), verified that there is a need for structured guidelines related to the selection of the appropriate services, given student's previous experience and attitudes towards social computing, and their desired interaction patterns. These authors assert that tasks based on Web 2.0 tools should be relevant, transparent and targeted.

Redecker et al. consider that the role of the teacher has grown in importance (instead of diminishing) due to the need to provide coordination, moderation and mentorship on the open Web 2.0 environment: the teacher needs to guide and assist any student that may need it, which requires constant effort and attention.

According to Herrington and Herrington (2006), most higher education institutions insist in using a centre-staged model of teaching, in which discipline experts transmit theoretical knowledge that passive learners receive and consume. In a model of this type, collaboration is discouraged, and students who engage in collaborative learning strategies have to so outside the official lecture hall, as if they were carrying subversive or illicit methods in their learning. Many teachers follow a traditional approach to teaching because they are just reproducing the way they themselves were taught, ignoring recent theory and research on human learning. Traditionally, the University is a place where theory can be learnt devoid of its originating context. In many cases, this potentially leads to *superficial* learning of theoretical materials by the student (e.g. textbooks) who then regurgitates the information on exams (Herrington & Herrington, 2006).

The use of Web 2.0 technologies in the context of Higher Education could lead to the implementation of a model of learning centred on the concept of "Community of Practice" (Lave & Wenger, 1991), in which learners are seen as participants of a framework that has social structure, rather than being passive elements that acquire models of a static world.

In a Community of Practice, peers stimulate each other in enhancing performance and in participating in collective activities, while also promoting the building of ethical relationships between people involved.

Using Yahoo Answers as a concrete paradigmatic example of a typical Web 2.0 service, one important aspect deserves to be emphasized: the typical person who asks a question is actually facing a personal, educational or professional difficulty related to his/her life. Therefore, Yahoo Answers can arguably be considered a realization of the concept of *Community of Practice* (Lave & Wenger, 1991).

This example serves also to reinforce that what is at stake, in the case of the concept of Community of Practice, is more than just *learning* (and certainly much more than a didactic conception of learning as a measure of teaching effectiveness). Rather, the main focus is the relationship between learning *and* the whole social and personal spheres (Rodriguez-Illera, 2007). Community appears as the centre of social life, and the main reference framework for each individual. Learning is not a goal in itself, but rather one feature more on the full experience of participating on a Community of Practice.

An extended study of Yahoo Answers (and other similar Question and Answer communities) is provided, for example, by Rosenbaum and Shachaf, 2010).

The dynamics and exchanges that take place in virtual communities like Yahoo Answers also have clear resemblances with those that Hutchins (1995) considered to be typical of a *Learning Society*. The author popularized this term to denote the new kind of society in which the old limits on *where* and *when* knowledge could be transmitted no longer apply. In this society, the "human actor" must be put at the heart of the process of knowledge acquisition and communication.

"Collective Intelligence" (Levy, 1997) is another idea that, despite being around for more than a decade, is now giving rise to new insights on educational processes. Emergent phenomena, like *Wikis* (e.g.*Wikipedia*), are a good demonstration of the power of collaboration through technology.

3.3. Web 2.0 in Higher Education: Pedagogical Frameworks

There has been an increasing emphasis on the need to carefully scrutinise the pedagogical justification of the adoption of any new methods of teaching and assessing knowledge, dissecting their educational advantages and practical implications. For

example, there are persistent complaints about the use of information and communication technology in educational contexts without a solid psycho-pedagogical foundation (e.g. Attwell, 2004; Barone, 2005; Stager, 2005).

Even seemingly "obvious" assumptions, like taking for granted that students value the use of Web 2.0 tools in the context of their college education, have been disputed by some, based on empirical data. Kvavik (2005), for example, found that although students value the moderate use of technology in their classes (providing conveniences such as syllabi, class readings, online submission of assignments), they also ranked face-to-face interaction at the top of their list of educational preferences.

According to Conole and Alevizou (2010), one of the pedagogical approaches that best aligns with the use of Web 2.0 in educational practice is that of constructivism.

Over the last decades of the 20st century, new ideas in learning, oriented by constructivist principles (e.g. Vygotsky, 1978), have prompted many educators to research and implement more *authentic* (real world) learning environments, in which teaching and learning takes place in settings closer to real-life scenarios, and thus adjusting better to the concrete needs of students and society (e.g. McClellan, 1996; Cobb & Bowers, 1999).

Social-cognitive competences are being more valued each day, and they can also be developed through the use of the Internet (Monereo, 2005). Web 2.0 phenomena are a realm in which "traditional" social constructivist are appealing as interpretative frameworks that emphasises the negotiation and the co-construction of meaning with others (Bonk & Cunningham, 1998). Vygotsky (1978) had long advocated the social primacy of the learning process: the learner benefits from the support of a teacher or colleague who is at a higher level of development, in order to advance in her learning.

Psychologists such as Piaget (1960/1995) and Vygotsky (1978) emphasized the social nature of learning, particularly in situations in which learners are faced with challenges they cannot solve alone, without the resources of a group. *Discussion*, a process by which members of a group present their ideas to others and receive feedback, provides the cognitive scaffolding necessary for higher-level thinking (Vygotsky, 1978). This type of activity is inherent to many Web 2.0 tools, allowing us to expect major potential

impacts in Higher Education if these technologies are integrated in teaching practices at this level. A good example of a concrete, real world application of the somewhat abstract principles mentioned above can be seen in the community-driven website *Yahoo Answers*, where users can ask a question, and then receive answers from others. Everybody receives bonus for participating (both asking questions and answering them), but the person whose answer is considered the best receives more points: this ensures wide participation, since there's a tendency for new questions (and answers) to appear, and also tends to promote quality, since the best answer is given extra points.

Simply adding technology to previously existing activities in the classroom does not produce positive results in student learning, if the habitual teaching practices remain the same (Jonassen, 1996).

Many times, teachers are not at ease with the IT tools they use in their practice, and the integration of Web 2.0 tools in teaching and learning may require a modification on teaching strategies and methodologies (Hughes, 2009).

As a possible strategy to overcome the difficulties that some academic staff revealed regarding the academic use of Web 2.0, Hughes (2009) suggests that they could be addressed by harnessing the student's practical skills with those tools, and that student's should be involved in the process of making some Web 2.0 tools effective in their learning.

Clark (1994) argues that Education Media, *per se*, will never be determinant of student performance. The benefits of using a given technology in teaching only arises when a "wholehearted" approach is used, in which teachers fully take the technology into the centre of the educative process, and explore the full potential of the new tools in allowing challenging and creative activities. This also agrees with the Vygotskian perspective on teaching and learning: Vygotsky (1978) postulated that true education must come from life, and that the teacher must exemplify the relevance of the learning material by using it herself as a productive member of Society. Since the concept of Web 2.0 comprehends tools that allow individuals to participate in socially mediated activities, the relevance of Vygotsky's Social Constructivist ideas cannot be overstated.

On the light of Social Constructivism (Vygotsky, 1978), it can be predicted that, as the use of Web 2.0 enhances social interactions, it will have a profound impact on the course of development of students: These are IT tools that are expected to exert a radical change in the way in which people perceive both the world and themselves. For example, the development of cognitive structures depends largely on the ability of *cognitive decentration*, which can be exemplified by being able to cooperate with others, and to argue and counter-argue in Blogs, or in the making of a Wiki.

With the availability of Web 2.0 tools, publishing information becomes easy, and several studies (and the empirical experience of many teachers) have demonstrated that when the student knows that his/her work will be available on the Internet, they do it with much greater interest and effort (Cruz & Carvalho, 2006; Eça, 1998). This effect is even more enhanced if there are channels through which the student can receive direct commentary on his/her work (e.g. via a Blog).

According to Atkin (1997), a fundamental role of the teacher is to recognize the needs of each learner, intervene when necessary to indicate strategies to maximize learning. This author states that it is important that the teacher recognizes that effective learning requires active construction of meaning by the learner and open negotiation about the learning experiences. Atkin (1997) suggests that a teacher should act as a tutor, rather than a "*sage on the stage*". Instruction is a process by which explicit guidance is given to the student, but if the necessary conditions are present, the teacher can guide students into working more collaboratively: in fact, the social context of which the student is part shapes the whole dynamics of the instructional process.

The participatory, dynamic and collaborative nature of Web 2.0 is where the promise of the new tools resides. The move toward read/write connective technologies is changing the way in which goods and services are being produced (Tapscott & Williams, 2006). In Education this change can take the form of a style of interaction in which students can alternate with their teachers in the role of being active and leading the processes of learning and knowledge construction (Roberts, 2005).

Collaborative learning involves the making of meaning in the context of joint activity. This learning is not merely acquired through interaction: it consists *of* the interactions that occur between participants (Stahl, Koschmann, & Suthers, 2006).

Learning happens in a variety of ways, from presence lectures to online activities. While online in “traditional” virtual environments provided by LMS's like Sakai or Blackboard, there is a sort of “black veil” (Amelung, Laffey, & Turner, 2007) between the students themselves and between them and the teacher: this happens because all the participants have limited knowledge about what is happening around the online course or project. They all just have access to the words written by each other, and do not see others working. This prevents much of the incidental learning derived from the observation of others doing their work, and also constrains the motivation to keep learning in the context of a shared social experience.

In order to maintain a minimal level of engagement, instructors may impose a fixed number of posts to a discussion board. This has the perverse effect of students adapting their efforts to meet the minimal requirements and never becoming truly engaged in the activity. Many expert instructors try to emphasize the collaborative nature of learning while using LMS's, but these systems tend to lack the kind of cues that are important to motivate the students and not rich enough to enable *activity to shape learning*, through social interaction (Amelung et al, 2007).

Instead, the use of Web 2.0 tools and services can contribute to the establishment of alternative environments for informal learning (Selwyn, 2008). Though they were not specifically designed within an educational framework, Web 2.0 services are pervasive (if unauthorized) elements of ICT in Education, and the use of these tools by the students is definitely outside the University's institutional control. The new dynamics introduced by Web 2.0 is promoting active debate on whether learning spaces and structures shouldn't be fundamentally changed.

3.4. Potential Uses of Specific Web 2.0 Tools in Higher Education

Web 2.0 can have an important role in the democratization of higher education, and its effective use can promote the engaging of new audiences and the widening of participation beyond the walls of the “Ivory Tower” (Priego, 2011).

In this section, the potential academic use of some specific Web 2.0 tools will be

presented. Web 2.0 and social software technology is not limited to the tools that are mentioned in this section, but those selected here are meant to be representative of the kinds of services that have emerged or gained popularity on the web during the last few years, and that motivated the creation and widely adoption of the term "Web 2.0". It is important to notice that many of the technologies that we will mention are commonly used in conjunction with each other, or are incorporated in more traditional Web services with the goal of expanding their efficacy, usability and/or popularity.

The combined use of weblogs, wikis, social bookmarking (tagging) and syndication, for example, can promote enhanced dynamism on the communication between the elements of a learning community (teachers, students, people from the social context where the learning is taking place).

3.4.1. Facebook (and other social networking services)

At its inception, the initial publics targeted by Facebook were college and high school students. After achieving "almost ubiquity" (Lampe, Ellison and Steinfield, 2008, p. 721) on US university campuses, it was thereafter extended to workplaces.

Today, the use of Facebook is widely diffused today all over the world, and in many diverse sectors of the global population. According to the September 22, 2011 of the Los Angeles Times newspaper, there are more than 800 million active users of this social networking service.

The use of Facebook ranges from Heads of State selecting it to deliver opinions about national (and international) issues, to common citizens taking advantage of the networking effects of this service to organize events and protests.

The interest in the potential uses of social networking services in higher education has received much attention over the last years (e.g. Mazman & Usluel, 2010 ; Ebner, Lienhardt, Rohs, & Meyer, 2010; Selwyn, 2009; Lampe, Ellison, & Steinfield, 2008).

According to Cachia (2008), social networking services can be defined as internet-based social spaces which promote communication, collaboration and sharing of information

across networks of online contacts.

During the university years, friendship is particularly important and valued by students (West, Lewis, & Currie, 2009), and social networking services are designed to facilitate communication between people.

Using an online survey with first year undergraduates at a UK university, Madge, Meek, Wellens, and Hooley (2009) found that students perceived Facebook to be mostly important for social reasons, although sometimes it was used informally for learning purposes.

However, Schroeder and Greenbowe (2009) found that when they introduced Facebook in the context of a chemistry class, with the purpose of providing an alternative to WebCT (a property virtual learning environment), student participation become significantly more dynamic.

Maloney (2007) considers that the conversational features of social networking services mirror proven models of learning, in the sense that they promote collaboration and allow users to take participatory roles.

Muñoz and Tower (2009) propose several ways in which Facebook may be integrated on a given course:

1. Building a profile page: the authors suggest that the profile can be about the instructor, and that the profile page can be used to communicate with the students, using Facebook, or any other online services (e.g. e-mail). This would be the simplest and more basic use of Facebook in the context of a course.

2. Creating a group page for the class: in this case, a separate Facebook page would be created for the course. Given that the page is course specific, the interactions that take place through it will tend to be related to relevant aspects of that course. In this way, Students would be able to communicate with their peers and to discuss topics regarding the course. Teachers, on the other hand, would be able to use the page to make course-related announcements or to remind students about events and deadlines.

3. Using Facebook as a replacement / mirror of “webcourse boards”: this potential use

of Facebook, presented by Muñoz and Towner (2009, p. 7), is a very far reaching one, since the authors state that Facebook as the required functionality to replace web-based institutional e-learning systems. Since Facebook provides features such as discussion boards, instant messaging, and link sharing, at the functional level, it has the necessary features required to constitute a candidate to the replacement of institutional e-learning platforms.

4. Extending functionality through Facebook applications: the flexibility of Facebook allows its extension by downloading applications from the Internet. Through applications, Facebook can gain new functionalities, and provide new features that might be relevant for a course.

Selwyn (2009) conducted a study with 909 undergraduate students in a UK university, in which a qualitative analysis of the Facebook "Wall" was performed. The author discovered that much of the academic-related use of Facebook was concerned with aspects like "post-hoc" critiquing of their learning experiences , the exchange of information regarding teaching and assessments, or seeking moral support.

According to Selwyn (2009), the use of Facebook provides a space where students can work student identity issues, role-conflicts with academic staff, as well as a relatively closed "backstage" were academic conventions and expectations can be worked through.

3.4.2. Blogs

When thinking of the impact of social software in education, *weblogs* (blogs) are one kind of tool that readily comes to mind. As Bryant (2006) points out, the first wave of teacher and student *blogging* is now informing a second wave of adoption, in which blogs are promoted as the most simple and effective form of personal portfolio, or as tools of academic exploration. Those who have been using blogs for some time are keen to share their experiences about what works and does not work, contrasting with the posture of traditional software vendors who were always trying to sell a "wonderful"

(and many times expensive) product.

Blogging allows a conversational sense-making within a virtual social network, and this is one aspect of it that keeps people engaged and motivated (Bryant, 2006): it is not just a way for a person to write his/her own thoughts for personal reflection. Blogs have been used extensively by young people as a means to express their joy, sadness and revolt, very often incorporating images and photographs in the text. Besides being used as an agenda, or a diary, the blog can take the function of a mural painting, or a "wall journal" where people can express their opinion about events on their immediate or far surroundings (Sousa et al, 2007).

Tools like *Google Blogger* or *Livejournal* are free services that allow blogs to be created through very simple steps. Search engines soon recognized blogs as a potential market niche, and specialized blog indexation services emerged (e.g. *Technorati*). Syndication and tagging, mentioned in the previous sections, are also essential for the blogosphere dynamics. Another important contribution to guarantee the authoring recognition of original contents published in blogs was the creation of the *Internet Blog Serial Number* (IBSN) that fulfills the same purpose that ISBN (*International Standard Book Number*) has in relation to books.

When the words of a blogger are read, and when others enter the dialog, the blogger is no more a passive element observing the Internet, and becomes a creative actor on the web. Blogs can even enjoy significant popularity: for example, Sifry (2007) found that among the 100 most popular websites on the Internet, 23 were blogs. Blogs make possible a bottom-up movement that challenges the traditional role of the single (or few) opinion-maker(s): today, every person can have a voice, and a potential audience.

In Universities, Faculty has been blogging for some time, using a variety of formats: from chronological disposed course syllabi to presentations of their lab results.

When used in an educational context, as a means to support a learning process, blogs may by labeled "*edublogs*". Although a blog can be created and managed solely by the teacher, and used in as *instructional* (traditional) way, they can also be used collaboratively, either by allowing teachers and students to work in common projects, or by giving the possibility to each student to have his/her own blog, that the whole world

can see (including his/her teacher and colleagues, who can all act as tutors in a scaffolding process).

3.4.3. Twitter (and other microblogging services)

Twitter combines features from texting, microblogging, instant messaging, and social networking (Dabbagh & Reo, 2011). One of the important characteristics of Twitter is its adequacy to mobile platforms, from smart phones to laptops.

Although Facebook is undisputedly the most used social networking service, some studies revealed that educators perceive Twitter as having strong potential for use in the classroom (e.g. Grosseck & Holetescu, 2009; Ebner, Lienhardt, Rohs, & Meyer, 2010; Schroeder, Minocha, & Schneider, 2010).

One of the important features of Twitter is that it provides continuous micro-feedback, since it enables individual followers to reply to messages posted online.

Junco, Heibergert, and Loken (2010) conducted an experiment about the effect of the use of Twitter and student engagement and grades. The study comprised a sample of 125 higher education students, of which 70 were assigned to the experimental group (used Twitter in academic activities), and 50 were assigned to the control group (did not used Twitter).

The authors found that the experimental group (students which used Twitter) had a significant greater increase in the levels of engagement when compared with the control group *and* that the students belonging to the experimental group also had higher grades than students in the control group (Junco, et al., 2010).

Services like Twitter require that the person who is following a given source of information to become an active participant, and not just either a producer or a consumer of information.

Priego (2011) states that the training that academics receive in managing data streams and in making informed appraisals of the sources is perfectly suited to take advantage of

the communication possibilities provided by social media. However, the same author emphasizes that Twitter may contribute for the development of better listening strategies and for the learning of adequate forms to make public reactions.

Twitter may be used to foster interaction, and to promote active learning, by enhancing the possibilities for students to think and to reflect on a given academic topic (Educause, 2007).

In the context of an academic conference, for example, Twitter provides a means for the attendees to share their thoughts and experiences with each other and with those who are not in the audience (Educause, 2007).

3.4.4. YouTube (and other media sharing services)

According to Snelson (2011), YouTube has become the most popular video-sharing service available on the Internet. By late 2010, YouTube was the 4th largest Web site in the world, and it received more than 100 million visitors each month (Liu, 2010).

Over the last years, many higher education institutions established a presence on YouTube, first by creating specific YouTube "channels" and, more recently, taking advantage of the features offered by "YouTube EDU", which allows the organization of the contents produced by colleges and universities (Snelson, 2011).

Recently, Google launched "YouTube for Schools", which allows institutions to have a greater control over the videos which students have access to, but at the same time offering enormous quantities of free educational videos, provided by educational institutions, TED, PBS, and other YouTube partners, such as the Khan Academy.

YouTube allows educators and learners to share valuable learning video materials at no cost, which has been allowing the spread of knowledge at a phenomenal rate (Liu, 2010).

3.4.5. Wikis

Despite the enormous popularity of some wikis, like Wikipedia, the vast majority of wikis are being used in closed communities, and private realms (Bryant, 2006).

Using a biological framework, wikis can be seen as evolutionary landscape, in which content is being permanently exposed to environmental pressures and where mutations are represented by the modifications introduced in the previous version of the document (Dron, 2006): one can even reconstruct the "*phylogeny*" of the wiki entry by consulting the revisions' historic.

Used in an educational context, wikis represent powerful enabling tools, allowing teachers and students to easily explore areas of knowledge, and developing only as much as they need for their learning tasks. Wikis allow the building of a structure upon which groups of individuals have the freedom to build on each other's contributions, and thus creating resources in a truly collaborative way.

In a wiki, all users can manage, erase or modify the content of each entry, in a fast and interactive way. The contents of a wiki tend to be in perpetual construction, and the previous versions of the online material are kept in an historical register.

3.4.6. Podcasts

The impact of podcasting in education is huge. Many Universities, notably in the United States, are now distributing iPods and other *mp3* players to their students, and the impact of podcasts in college-level learning is now being the object of several ongoing studies (Lee & Chan, 2007). Although recorded audio, as a medium, has been used for many years now in Distance Education, the Internet, and more recently Web 2.0 syndication through RSS, has allowed an explosion on digital audio delivery all over the world. The cost of producing and of hearing podcasts is usually very low, and educational podcasting is being used to reach remote publics all over the world and to transform isolated learning experiences into real online community connections. With

tools like *Apple iTunes* at the disposal of people and Institutions, we witness a ever growing number of highly reputed Universities (e.g. Open University (in UK), Berkley, Harvard, Yale) making course-specific podcasts and putting them on the Internet easily accessible not only to their students, but to the whole world. This constitutes a significant example of the transformations that are taking place in Higher Education and in society at large, in terms of openness and dissemination of knowledge.

3.4.7. Tagging

A concept that is at the heart of social software is that of "*tagging*". Tags are applied freely by those accessing photos (e.g. *Flickr*), web sites (e.g. *del.icio.us*), blogs (e.g. *Technorati*), etc. This is a kind of social bookmarking activity that allows people to annotate and collect their favorite web links within an open online environment.

Tagging is a process of implicit negotiation between people about the words that best describe a given online resource. It is also a means of breaking the traditional asymmetry that has existed between predigital broadcasting media and its audience (Rheingold, 2008).

Through the use of tags, resources can be easily distributed and shared, in both public and private domains. A person accessing a social bookmarking service can choose whether to search information by keyword (tag), by a person's or object's name, classification scheme (folk taxonomy, or "*folkosonomy*") or popularity (Boulos & Wheeler, 2007). Tags may also be used to create tag clouds, which are a form of conceptual map, visually depicting the contents of a given website.

Some parallelism between tags in tag clouds and evolutionary systems can be made: for example, within an evolutionary context, fitness of a tag can be derived from its popularity.

Social bookmarking websites, like *del.icio.us* can produce more relevant search results than Google alone, because the resources found have already been selected and classified by other people, with similar interests. In fact, the usefulness of these sites is proportional to the number of people that use them, tagging resources, mashing it up,

and remixing information. This contrasts with traditional institutional and governmental environments, in which the policy of information management is all around managing scarce resources.

3.4.8. Syndication through RSS and Atom

Really Simple Syndication (RSS) and Atom are a very important interface exposed by social software. Through RSS, a static resource created by a student or a teacher can become a dynamic *part* of information objects created by other people. Syndication feeds can be used to receive updates from blogs, newspapers, databases, paper announcements, among other sources.

Using the syndication facilities of RSS, students and teachers gain a greater control over the way information is aggregated and accessed, in order to best serve the learning activity at hand (Boulos & Wheeler, 2007). A RSS feed can be used, for example, to subscribe to a regular podcast that is then downloaded automatically when the new episode is available.

Content aggregation applications have become increasingly transparent and tools like Blogger are making the task of content submission easier each day. The term "*blogosphere*" was coined to denote the virtual environments that result from interlinking blog contents through syndication technologies.

The proliferation of micro-formats and syndication proved that interoperability does not require centralized control. There are issues around security and privacy that derive from the open nature of syndication, but we think these questions are better addressed through education, rather than coercive control.

Since students can choose what feeds to subscribe, they can create their own, personalized, networks. Syndication promotes the formation of loosely connected communities, in which a person can participate in networks of people from all around the world. Through Atom or RSS feeds, a student can participate in discussions that are far beyond the limits of any set of discussion topics in a Forum within a LMS.

3.4.9. Traditional Learning Management Systems (LMS's)

Learning management systems (LMS's) are the most visible elements of the institutional side of the digital frontiers associated with higher education LMS's have been available for many years now, and they have allowed the integration of geographically disperse learners and teachers (McLoughlin & Lee, 2007). Two of the best known and widespread of LMS's are Moodle and, to a lesser extent, Sakai (just to mention open-source LMS's)

A LMS presents itself to a user as a centralized website, *managed* by people who are given special administration *privileges*, who can easily follow every step each user makes. This functioning model resembles a lot the traditional classroom model in where people are assembled together on a given space with the clearly defined objective of learning. LMS's have been adapting their functionalities to incorporate Web 2.0 features like blogs, wikis, *podcasts.* Even so, students have become accustomed to be producers of content in environments that are much richer, and that allow much more freedom and personal expression, than any LMS can ever deliver. Being *managed* systems, LMS's are poorly compatible with the chaotic nature of learning, and by their own design philosophy tend to impose structures on content and on interaction that people are becoming unaccustomed, with all the new Web 2.0 at their disposal. The current generation of students, who seek greater autonomy and connectivity tend to be dissatisfied with the use of traditional LMS's (McLoughlin & Lee, 2007), because despite these tools enable the expression of personal views on a given course or topic, they are still close to the classroom metaphor, and are not open to the personalization that is possible when using Web 2.0 services. The functionalities *inside* LMS's appear within the context of a protected environment provided by the school's Information System, and thus still dependent on the decisions and control of administrators and teachers.

3.5. Critical Issues about Web 2.0 and Higher Education

Technology has a disruptive influence on organizations, and normally it contributes to organizational change, rather than to *status quo* maintenance (Weigel, 2002).

Much more than facilitating access to content, the Internet provides the student with the great benefit of enabling him/her to control his/her learning experience in a variety of dimensions (Anderson, 2005). These dimensions include time (communication can be asynchronous), space (learning can be *desterritorialized*), media (due to the availability of several tools and resources, the student can choose from where to obtain her/his information) and content (ICT now allows the student to produce information, liberating him/her from the role of passive consumer).

It seems that the next stage of the World Wide Web development will be related with the representation of meanings and the strengthening of the connections between knowledge, in such a way that the experience of internet usage will become (even) more useful, relevant and enjoyable (Davis, 2008).

But already, present Web 2.0 technology is having a transformative impact in the way people access learning, and it is slowly changing people's perception regarding the role of higher education institutions as lifelong learning providers (Dabbagh & Reo, 2011).

Currently, students come into the classroom with a plethora of technological resources, from wireless laptops to powerful "smart phones", which are capable to access the institution's learning platforms, as well as all the resources available in the Web.

There is a new culture emerging from the use of participatory media: these are not just enabling tools, but they are really changing the way our culture operates (Jenkins, Clinton, Purushotma, Robinson, & Weigel, 2006). Anderson (2003), for example, argues that the model by which cohort students interact asynchronously, through text, with a teacher and other students may not be a cost-effective one, and that that type of interaction could now be replaced by models that favor student-student and student-content interactions.

However, as Dabbagh and Reo (2011) remark, the use that the students make of these tools represents the true challenge for educators interested in harvesting the pedagogical potential of Web 2.0 in the classroom.

Students using tools like wikis and blogs have the chance to work independently, without being subject to any form of recognized authority, but Waycott et al. (2010) express worries about what these authors perceive as the potential change of the rules and standards of academic writing.

Already back in 2005, a Pew Report (Pew, 2005) found that 82% of undergraduate students in the United States spent some significant amount of time online. However, the same study also revealed that in that only 33% of US teenagers shared their creative works on the Internet. These data seem to be relatively stable, and have been steady in the past years: in a more recent study, done in a completely different country (South Africa), Brown and Czerniewicz (2008), verified that little had changed in the way students use ICT in their learning: most of the time they were online was spent in information seeking activities. This is somewhat surprising, given the rise of Web 2.0 tools in recent years, but Brown and Czerniewicz did found that the use of social software by students is not as popular as using Web search engines or instant messaging programs. They also found that there was a difference between the use that undergraduate and graduate students made of online tools: while the first preferred more scaffolded activities, the former were more prone to use more research-oriented tools (Brown & Czerniewicz, 2008).

HEIs should not assume that more technology is necessarily better (Roberts, 2005). For instance, in a campus where wireless communication has been implemented, its main use may be outside the academic realm. In order to take advantage of this technology to promote collaboration and harness collective intelligence, the whole community of learners and teachers must work together in creating an adequate architecture of participation.

In a pioneering study about the use of Web 2.0 in the context of Portuguese higher education, Coutinho (2008) used an electronic questionnaire to gathered data from 1811 persons from an academic community, comprising students (both undergraduate and graduate) and professors (which comprised 23% of the sample). Through this study, the

author found that (Coutinho, 2008):

1. Despite the concept of Web 2.0 was known by the academic community, there were some defining Web 2.0 tools that teachers and students weren't aware.

2. Some tools were very well known, whereas others (such as social bookmarking) were almost unknown.

3. Some tools appeared to be clearly familiar, but used solely for personal purposes (such as blogs).

4. In respect for Web 2.0 use in the classroom, the author discovered that a significant part of the higher education community is still very far apart from this new web paradigm.

5. Even if not using Web 2.0 for pedagogical purposes, the academic community studied by Coutinho (2008) believed in the educational potential of Web 2.0 tools.

As a possible strategy to overcome the difficulties that some academic staff revealed regarding the academic use of Web 2.0, Hughes (2009) suggests that they could be addressed by harnessing the student's practical skills with those tools, and that student's should be involved in the process of making some Web 2.0 tools effective in their learning.

There are some institutional challenges related to the inclusion of Web 2.0 within academic activity. Strawbridge (2010) synthesised some of those issues, and also summarized some possible solutions. For example, regarding data protection issues, this author asserts that institutions may be liable for any personal data breach of an external Web 2.0 service provider, especially if the usage of that service is made compulsory by the Institution. In order to minimize this risk, this author suggests a careful selection of services, accompanied from making the service usage optional, and allowing students to self-register in the service (so that each student can control what information he/she provides).

Given that most Web 2.0 services are out of the school's control, many HEI refrain its academic use because of legal or organizational worries. There are also frequently

raised questions about data protection and copyright issues, and the collaborative nature of Web 2.0 creates issues of responsibility and ownership.

The matter of institutional control is a difficult one, since it can contaminate the communication environment of a course or discussion topic (Strawbridge gives the example of an offending post which tutors / professors or institutional officials may find difficult to remove). To address this issue, which is complicated by the data protection issues mentioned before, the author recommends the clear definition of take-down policies and efficient signalling of inappropriate contents (Strawbridge, 2010).

In respect to copyright issues, Strawbridge (2010) considers it important for students to understand that it may be very difficult to identify or attribute the author(s) of a collaborative work, and also that intellectual propriety infringements are very easily detected in the open environment of Web 2.0.

ICT promotes the blurring of boundaries between "high" and "low" cultural forms, and the mixture of genres in content production, leading to the emergence of terms like "edutainment" or "infotainment" (Notley & Tacchi, 2004). But, as student authoring of materials through Web 2.0 tools increases, not all remarks about the use of these tools in HE have been positive (Kakutani, 2010).

The openness inherent to Web 2.0 tools may also contribute to enhance the communication between the academic community and the broader social and economical tissues where the universities and polytechnics are embedded.

For example, Web 2.0 comprises tools that can be used to open new avenues of cooperation between industry and higher education institutions (Nikolov, 2010). The "University 2.0" model has emerged as a framework for universities to accommodate to the new networked information economy and to the social computing phenomena. This author defines University 2.0 as a "research and entrepreneurial university which integrates Web 2.0 technologies and applications in all university activities, including ones with all knowledge intensive stakeholders, and implements the features of the Enterprise 2.0" (Nikolov, 2009, p.5).

Virtual learning environments based on Web 2.0 applications and services can provide opportunities for faculty, student and companies to cooperate in a continuous ("24/7")

fashion (Nikolov, 2009).

Old monopolies that have been operating in the traditional industrial economy are now facing serious challenges from the fact that innovation is becoming more collaborative, distributed and open (Tapscott, 2006). Even big companies like IBM or Oracle are increasingly adopting the “Enterprise 2.0” model (McAfee, 2006), in which companies use social software platforms to take advantage of the opportunities for company improvements in areas such as collaboration, knowledge sharing, using collective intelligence and conjoint discovery.

In the present day labour market, there is a need for a dynamic and adaptable workforce, but employers and governments now realize that in many cases the learning outcomes they need from university graduates are lacking (Herrington & Herrington, 2006). Nations, employers and governments require graduates who are able to build communities, and to communicate in innovative ways, in the realm of their profession.

The ubiquity of Web 2.0 tools in schools, at work, and at home may have a profound impact in the realization of the lifelong learning agenda, allowing the establishment of Learning Networks: networks of people and organizations that create, share, support and study learning resources ('units of learning') in specific knowledge domains. (Kopler & Sloep, 2003).

Looking into the future, for the period between 2010 and 2015, Johnson, Levine, & Smith (2009) identified four major trends regarding the adoption of technology in higher education:

1. Abundance of online resources and relationships, appealing to the reflection about the role of the educator, as a coach, and as someone who helps the student making sense of the online information (as well as help in credentialing that information).

2. Emphasis on personalized, informal learning, based on enabling technologies that provide ubiquitous, just-in-time, and augmented forms of learning.

3. Increasing importance of cloud computing, that challenges institutional control of the IT infrastructure.

4. Student work involves ever more collaborative aspects, what opens the doors to potentially more collaboration at the intra- and inter- institutional levels.

Web 2.0 tools can contribute to a type of lifelong learning well suited to the characteristics of older students and the needs of society as well: these technologies allow students to participate in activities they enjoy, and learning may then come as a by-product of participation. (Mason, 2006).

3.6. Chapter summary

One of the core challenges regarding the adoption of Web 2.0 in Higher Education is the balance that must be made between the necessary conservative part of Education, which is necessary to preserve past human effort and talent, as also traditional skills and knowledge legacy, and the possibilities that technology introduces in terms of students' self expression and co-construction of knowledge.

Web 2.0 services allow the harnessing of the power of groups. In order to take advantage of the network effects of these tools in Higher Education, open, participatory architectures for ICT systems are required. Active, participative individuals are not directly derived from the ownership of a personal computer, or even from having access to the Internet and to Web 2.0 technologies. It is important that students may be allowed and encouraged to produce their own content.

Social networking technologies have the potential to enhance the dynamics of communication between life, work and school, thus creating meaningful educational experiences, adapted to both students' expectations and Information Society's requirements, taking into account that we are now in a true global society, and thus it is important that higher education institutions provide the knowledge to develop a global citizenship. This also may lead to "whole-hearted" approach to higher education, so valued by influential pedagogical frameworks such as social constructivism (Vygotsky, 1978).

The existence of a participatory community requires people to use means of expression in effective and impacting ways (Rheingold, 2008). In this respect, education can play a vital role, by equipping today's students with the cultural tools they need to recognize the links between the possibility to publish online and the power of individuals in a democratic society.

CHAPTER IV - ADOPTION OF WEB 2.0 IN HIGHER EDUCATION

4.1. Introduction

Explaining the complexity of human behavior is a very difficult task. Technology can be conceived as being a constituent part of human nature, situated between the realms of the mental and the material, and between culture and biology (Cole & Derry, 2005).

In order to study the complex relationship between people and technology one cannot adopt simplistic and deterministic interpretations, and must be open to take into account all the complexities that the social construction of these relationships involves (Mominó & Menseses, 2008).

In a broader sense, a technology is comprised of a set of tools that are deployed as components of a social practice (Cole & Derry, 2005).

Arguably the most enduring debate in the area of Information Systems is related to the nature of the relationship between Information Systems and Organizations, which in fact is an extension of the persisting discussion between agency and structure in Sociology and in Psychology (Baillette & Kimble, 2008).

According to Baillette and Kimble (2008), from the 1950s to the late 1980s, there were vivid debates between different polarized conceptions of information systems and their relations to people and organizations. Some authors were defending ideas based on technological determinism considering that technology was the key factor in organizational change, where others were arguing in the opposite side, stating that the effect a given technology had depended solely on people's actions in relation to that technology. However, since the late 1980s and early 1990s new less deterministic and polarized ideas began to emerge. This debate continues to this day, and although it is relatively undisputed that there exists of a link between information systems and organizational change, there is little agreement about the nature of that change and about its underlying mechanisms (Baillette & Kimble, 2008).

In the next sections, after discussing the key concepts of appropriation and affordances, we present a set of theoretical frameworks and models that are commonly used in the Information Systems research literature to explain and/or predict technology acceptance,

adoption and appropriation.

4.2. Processes of Web 2.0 Appropriation in Higher Education

There is no unique definition of technology appropriation, but several authors use this concept to refer to the integration of technology in people's daily activities, bringing advantages for both the person and the organizational environments in which she/he works or learns (e.g. Baillette & Kimble, 2008; Isaac, Leclercq, & Horts, 2006).

According to Baillette and Kimble (2008), the concept of appropriation is very rich and multilayered, and can be explored to provide a way for the examination of evolving ideas about the relations between the triad: a) information systems, b) organizations, and c) people working (or learning) in those organizations.

Cole and Derry (2005) consider that an important distinction must be made between *technology-as-designed* and *technology-in-use*: the former refers to tools as they were developed and marketed, and the latter is related to how technology is embedded in people's routines and daily practices. This distinction can be traced way back in the theory of technology (and art): Dewey (1916, as cited by Cole & Derry, 2005), for example, stated that tools (and works of art) are things extracted from the natural world and put in the context of some human activity.

There seems to be a permanent tension between those who create new technologies and novice users who try to accommodate those tools to their own lives, and rarely sharing the idealized vision of their applicability with their creators.

While the creator of a technical object may be tempted to create a framework that prescribes the use of that object, the user is him-/her-self an autonomous and creative actor who invents a use for that object (Perriault, 1989).

When a new technological product is introduced, the user can adopt a wide range of behaviors towards it, from plain lack of interest (and corresponding *non-appropriation*) through full acceptance (and thus *appropriation*). In between, a person can initially find a product interesting, and start a process of appropriation, but then rejecting it at some

point (this path corresponds to a form of *disappropriation*) (Carroll, Howard, Vetere, Peck & Murphy, 2002).

In studying the appropriation of new technological innovations it is important to consider what conditions lead to technology acceptance. Innovation diffusion, adoption and acceptance are dynamic and multi-faceted (Usluel & Mazman, 2009).

Innovation requires communication, enthusiasm and commitment from the agents involved in the creative process. Although widely disseminated, ICT is yet to fulfill its promise of total diffusion into society (Schumarova & Swatman, 2006). Many new products are adopted by the narrow market fringe called "the innovators", but it remains a challenge to extend end-user uptake into the wider "early-adopters" group (Rogers, 2003).

Appropriation involves more than just mastering: whereas *mastering* a tool involves acquiring the skills necessary to use it, *appropriating it* goes beyond that and includes also the development of competence to use that tool in a social context. In fact, appropriation is a process that starts long before the actual use of an object and prolongs well after the routinisation of that usage (Vaujany, 2005).

There is abundant literature in the domain of Cultural Studies discussing how objects and ideas are appropriated, and the link between design and real use of the object is not always so direct and foreseeable as one might think.

Stolterman (2001), for example, discusses how the distinction between the user and the designer becomes blurred at the time of practical use of the object, as the sole act of using it is already a modification of its design.

Another example is given by Moran (2002), who describes how handbags are modified by their users in the context of their practical needs and personal options. Some authors, adopting a Cognitive Psychology perspective, see appropriation as a process that allows a person to "rebalance" their internal cognitive structures after changes in the (working / learning) environment in which they are living, or to assimilate new information from that environment (Baillette & Kimble, 2008). This use of the term "appropriation" makes it very near, semantically, of the Piagetian concept of "adaptation" (e.g. Piaget & Inhelder, 1992.

According to Rogoff (1995), appropriation is a form of *internalization*, because it is not just a matter of a person knowing how to use the technology at ease, but rather to take ownership of something that hadn't previously belonged to that person.

Appropriation is also a process that takes place on different social levels, from the level of the individual user through the larger socio-cultural environment (Overdijk & van Diggelen, 2006).

While *appropriating* a technology, participants become more and more proficient in the use of a set of tools in the context of a social practice (Jonsson, 2004).

The process of appropriation begins with people trying out a technology, shaping it to the individual's or the group's needs and then making it an integral part of their lives (Carroll et al., 2002). This process goes well beyond using a tool to solve a specific task: appropriation decisions are determined by environmental variables and cultural factors and the whole lifestyle of the person influences the appropriation dynamics. Technology itself is shaped by the social world from where it emerges. The meaning of the Internet, for example, depends on the cultural context where it is used.

In a study on how the younger population *appropriates* technology, Carroll, Howard, Vetere, Peck and Murphy (2001) found three major issues associated with the use of technology by this group:

1. A sense of identity, or belonging: even from less sophisticated means, like SMS, young people extract important feedback from their peers, and the possession of a mobile phone number is a very important factor in social inclusion and in maintaining social links. There seems to be a hierarchy of proximity, from friends with which there is frequent contact through SMS, to people met through chat sessions.

2. Power management: for example, a person can set his/her own chat group, and thus control who can participate in a chat session, or decide when to chat, by blocking or unblocking the group at will.

3. Fragmentation management: the Internet helps young people to establish some cohesion to their lives, what has become very important since the geographical mobility of recent years and also the widening of the social arena to the whole world, allowed by

the Internet itself. ICT allows young people to form distinct virtual social groups, with who to interact independently from the others (for example, maintaining virtual communities of family, friends, professional or hobbyist interests).

Young people around the world have been eager adopters of social networking services, video and web publishing, instant messaging and online multiplayer games. These phenomena are revealing of the strong influence that digital media have in people (Rheingold, 2008). The fact that they are also *not* prompted by adults is also very significant.

Group studies with people from age eighteen and up reveals a generation critical of online contents, dissatisfied with politics, and instead worried in conforming to peer norms and following celebrity (e.g. Livingstone, Couldry, & Markham, 2008). It is important, nevertheless, not to follow on the common mistake of considering young people a uniform mass: many studies on phenomena related to youth and childhood tend to consider these groups as somewhat homogeneous, and composed by passive and non-autonomous individuals who are *becoming*, and not yet *being* (Mominó & Meneses, 2008).

According to (Carroll, et al., 2001), appropriation emerges from the interplay between the person's needs and desires, the social context and technology itself.

The most powerful *attractors* that Carroll et al (2001) found in the process of appropriation of technology by young people were:

1. *Convenience*: for example being able to set a phone to vibrate in too noisy or too quiet environments).

2. U*tility*: for instance, they like their phones to be small enough to fit their pockets, but not so small they cannot easily write SMS in them).

3. F*ashion*: characteristics like the color or the design of computers, pen drives or mobile phones are very relevant among young people).

On the other hand, the most potent *repellents* to the appropriation of technology that these authors found were (Carroll et al, 2001):

1. Cost: manifested in the inability to pay phone or internet bills

2. Difficulties of use and of learning.

3. Unsolicited material, such as "spam" in e-mail.

From such attractors/repellents relationship it is possible to state that repellents almost act as restrictions for their attractors counterparts, as we may say that convenience is limited by cost; utility must conform with easy to use and learn; and fashion need to be simple and affordable for people to adhere to.

In a broader sense, a deep link between *appropriation* and *participation* can be established, because appropriation extends to the realms of human culture (and not just technology), and is a set of phenomena in which people transform their perceived responsibility for activities in their surroundings and their understanding of the environment in which they live (Rogoff, 1995).

In Social Networking services, like *Facebook*, *Hi5* or *MySpace*, people are not just media consumers: the adoption, seek, create and appropriate forms of participation in cultural production. Due to the perceived power of the Internet, and also because of the emergence of new technologies that make individual expression easier and more compelling, there is a growing group of people seeking to master the tools that enable them to be both creative producers and consumers of their own culture.

The term "*new media*" (e.g. Lister, Dovey, Giddings, Grant & Kelly, 2003) was coined to denote the major change that is taking place in content production, distribution and use. Although traditionally media refers to material products of institutions and organizations, "*new media*" infers something much less settled or identified. Behind the use of the adjective "new", there is the conception that a clear break away from the "old media" has occurred: the "old" communication tools were characterized by a *top*-down approach, whereas the "new" are conceived as being much more democratic and open to

individual expression..

Notley and Tacchi (2004) emphasize that statements about the *revolutionary nature* of the Internet, resemble those that have already been made in the past, when new technologies were introduced: radio, for example, has gone through a similar path, being early developed by the military, and then taking off at the hand of a minority of civil enthusiasts, and so on. Also, just as happened to radio, we have been witnessing subversions to the empowerment and liberation promises of the Internet (Notley & Tacchi, 2004).

Hartley (2004), for example, traces the history of the relationship between the producer and its audience, and the types of production of meaning that each historical stage of this relationship entails. According to this author, in pre-modern times meaning was considered "divine", and deposited in sacred books, like the Bible: the text expressed what its supernatural producer said it did. With the Industrial Revolution and the Enlightenment, meaning started to be attributed to the texts themselves (and their authors). Since the Second World War, there's been an egalitarian shift, and meaning became associated with the interpretation that each person in the audience makes of a given text (Hartley, 2004).

In the context of educational technology, the term "affordance" has been used to refer to the possibilities that Web 2.0 technologies offer regarding their pedagogical use, in higher education (McLoughlin & Lee, 2008; Waycott et al., 2010).

In Education, the identification of specific pedagogical affordances of a given technology assumes a major importance, since this is a relevant aspect in the demonstration of the surplus value resulting from using that technology, versus not using it (Burden & Atkinson, 2008). The learner's own view about the tasks a given Web 2.0 tool allows determines the affordances offered by that tool (McLoughlin & Lee, 2008).

Based on extensive data resulting from direct discussion with higher education lecturers, one online survey and also the proceedings of a roundtable event, Waycott et al. (2010) identified five major affordances of Web 2.0 authoring in higher education:

1. Open publishing, resulting from the possibility of using blogs, wikis or social

networking sites to reach a wide (eventually anonymous) audience. The authors found that this affordance promoted the sense of authenticity of the task, and created opportunities for cooperative learning and for student critical skill's development. However, they also noticed that in some cases the best students would delay online posting of their work, because they were afraid that other might copy it.

2. New communication styles and texts, which are closely related to the previous affordance (wide audience publishing), but also derives from intrinsic features of Web 2.0 tools (e.g. Blogs) that tend to promote informal communication, thus allowing for alternative ways of expressing thoughts and interests. The downside of this affordance was that some teachers complained about increased difficulty in assessing the work of their students, when non-academic standards were used.
3. Expression of personal identity and experience: students' online identities may differ from the one manifested physically in the classroom context, what may enhance their expressiveness, by removing some social constraints and also by allowing participation in ways in which the student can share more of his/her "real world" experiences. However, the authors assert that problems might arise if online identity was made so free to the point of becoming anonymous. In order to effectively use this affordance, while also avoiding the problems of anonymity, Waycott et al. (2010) mention the example of a teacher who allowed students to freely choose their online names, but had to provide their student number related to the name chosen to the teacher, so that the student could enjoy from some identity flexibility but still remain accountable to his/her contributions to the collaborative work done with Web 2.0 tools.
4. Co-creation and collaboration, is an affordance that is at the heart of what has made Web 2.0 to be a concept by itself. Wikipedia is the regular example of how collective intelligence can be harnessed using wikis. Waycott et al. (2010) noticed however that lecturers considered it to be very important to select tools which allowed for the whole history of collaboration to be retained, since it might happen that the work of students who were the first to make a contribution could be completely lost by more recent editions of other students.
5. Content management, is the last Web 2.0 affordance that Waycott et al. (2010) underline is respect to the findings of their study. The authors remark that contents published by students in Web 2.0 environments whose control is outside the institution walls has the tendency to remain available for everyone (including future

students' employers), far beyond the final deadline given by lecturers for work completion. The converse can also happen, such as when the collective work of a class is moved to a place in the web where the original authors don't have further access to it. Those are consequences of the openness provided by Web 2.0.

Several theoretical models have been suggested for understanding the adoption of Web 2.0 in higher education institutions (and other types of organizations).

In the next section, a general description of some of those models (the ones that were particularly important in the context of our empirical research) is presented.

4.3. Models for Web 2.0 Adoption in Higher Education

4.3.1 Diffusion of Innovation Theory

Diffusion of Innovation Theory is used with the goal of understanding how new concepts and ideas gain widespread adoption.

Diffusion of an innovation was defined by Rogers (2003) as the process through which members of a social system receive that innovation. An innovation is something (an idea, a practice, or an object) that is perceived as being "new" by a person, or other unit of adoption (Rogers, 2003).

As a primary social process, diffusion takes place through interpersonal communication, and thus individual attributes are important in the innovation dynamics.

In this model, what is important is not objective newness, but the perception of the idea, practice, or object as new. It is this subjective form of "new" that determines the reaction of the adopting unit (usually an individual).

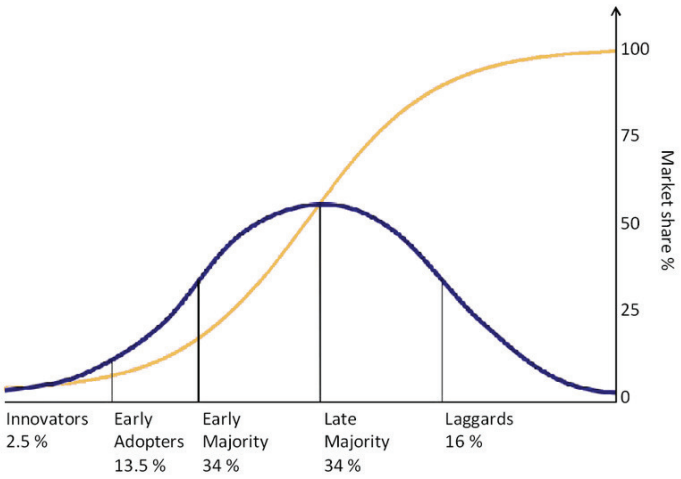

Figure 4.1. Diffusion of Innovations According to Rogers (2003).

In Portuguese Universities, it is possible to identify some institutionalized pedagogical practices thorough which a relatively small number of teachers tries to explore the benefits and potentials of some ICT tools (Fonseca & Gomes, 2007). While this has happened with the adoption of LMS's environments like Sakai or Moodle, today these platforms have finally entered mainstream use in Secondary and Higher Education institutions. But now the same phenomena, based on early adopters that anticipate and promote subsequent massive institutional use, can plausibly be happening in respect to the introduction of Web 2.0 tools in educational practice, given the relative novelty of these tools and the typical adoption dynamics observed in the past, and described by Diffusion of Innovation Theory.

According to Rogers (2003), the decision to adopt an innovation is best described by a process composed of five steps (depicted in Figure 4.2):

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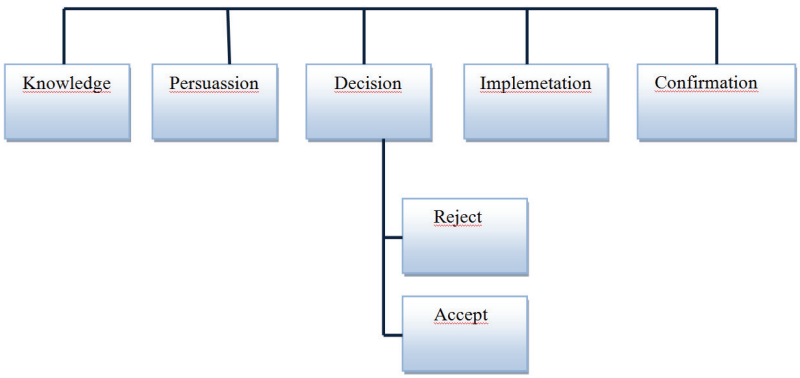

Figure 4.2. The five stages in the Decision Innovation Process. Source: Rogers (2003)

1. The first step in that process is knowledge (requiring awareness of the innovation and partially understanding it).

2. The second step is called persuasion, and it is in this stage that attitudes toward the innovation develop.

3. After the preceding stages, the person (or unit of adoption) makes a decision, of adopting, or not adopting the innovation.

4. If the person or unit of adoption decides to implement the innovation, it will make use of the innovation, utilizing it (implementation phase).

5. After the implementation phase, the innovation still has to be confirmed by the group in which it is experimented, and it may be the case that after a tentative implementation phase, the group may revert to past practices, rejecting the innovation.

In studying Web 2.0 technology diffusion in higher education, many different dimensions must be taken into consideration, such as students, teachers, technology access, efficacy of users, resources, social dimensions, and many others (Usluel & Mazman, 2009).

Diffusion of Innovation Theory has been criticized for not being useful as a predictive framework (e.g. Straub, 2009). However, it enriches our theoretical perception of the field of technology appropriation.

In relation to Diffusion of Innovation Theory, there is an additional factor that was decisive for its inclusion as a theoretical referential in this thesis: Diffusion of Innovations is one of the theoretical frameworks at the base of other models that will be used, and which have proven to have good predictive capacity were based in Diffusion of Innovation Theory (among others), such as the Theory of Acceptance Model (TAM; Davis, 1989), or the Unified Theory of the Acceptance and Use of Technology (UTAUT; Venkatesh, Morris, Davis, & Davis, 2003) .

4.3.2. Theory of Reasoned Action (TRA)

Extensive empirical results have shown that it is easier to predict "behavioral aggregates" (i.e. behavioral tendencies measured by repeating observations in different occasions) than specific, contextual, behaviors (Ajzen,1991). However, simply using the principle of "aggregation" is not a solution, since specific behaviors in specific situations remain unpredictable, as well as this approach doesn't explain behavioral variability across situations (Ajzen, 1991).

The main goal of research that takes part from the aggregation principle is to demonstrate that general attitudes and personality traits are implicated in human behavior, even if their influence can only been measured when taking broad (aggregates) samples from that behavior (Ajzen, 1991).

The theory of reasoned action (TRA) was formulated by two social psychologists, Fishbein and Ajzen (1975), with the goal of explaining consciously intended behavior (Lin, 2005). It originated from studies in the field of attitudes, when researchers tried to relate attitudes to behavioral intentions and actual behaviors. Until TRA came along, traditional attitude-behavior research was finding only weak correlations between attitude measures and volitional behaviors (Hale, Householder & Green, 2003).

The key theoretical constructs of the theory are: a) attitudes [A]; b) subjective norms

[SN]; c) behavioral intention [BI] (Fishbein & Ajzen, 1975; 1981).

Basing on Ajzen (1991), each of the constructs of TRA can be defined as follows:

- Attitudes: set of believes regarding a specific behavior weighted by personal evaluations of those believes;
- Subjective norms: influence that other people (like peers or superiors) have in the person's behavioral intentions
- Behavioral Intention: strong predictor of actual behavior which is a function of the two previous constructs.

In order to clarify the relations between the components of TRA, the literature on TRA has made common the following expression, which depicts the fact that behavioral Intention (BI) depends on: a) attitudes towards that behavior (ATT); and b) subjective norms (SN):

$$BI=ATT+SN$$

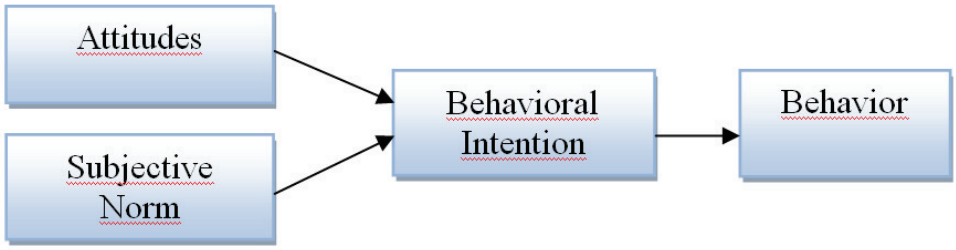

Figure 4.3. Theory of Reasoned Action (TRA). Source: Fishbein, & Ajzen, (1975).

This formula might be translated into this textual form: if a person evaluates a certain behavior as positive (attitude / A), and if they find that significant others want them to perform that behavior (subjective norms / SN), this will result in a higher motivation (behavioral intention / BI), and therefore the person will be more likely to actually performing that behavior.

It is clear that a person's intention to perform a given behavior is a central factor on TRA. In this way, the theory tries to include the motivational aspects that may influence behavior. In general, and quite intuitively, the stronger the intention to take on a behavior, the more likely the person will perform it (Ajzen, 1991).

In spite of having shown good explanatory power in domains in which volitional control is paramount, TRA had difficulties in situations where this was not the case (Lin, 2005), such as whenever a person might have the intention to execute a behavior, yet has doubts regarding that behavior being under his/her control (for instance, a teacher may feel "forced" to use a certain Web 2.0 tool or, on the contrary, may think that he/she has total freedom to use a given technology in a course if she/he wishes).

Because of these limitations, TRA works best when it is applied to situations in which the person's behavior is under his/her control (or is perceived as such).

4.3.3. Theory of Planned Behavior (TPB)

In order to extend TRA to include non-volitional conditions, Ajzen (1985; 1991) proposed the Theory of Planned Behavior, in which "perceived behavioral control" is added to the theoretical framework.

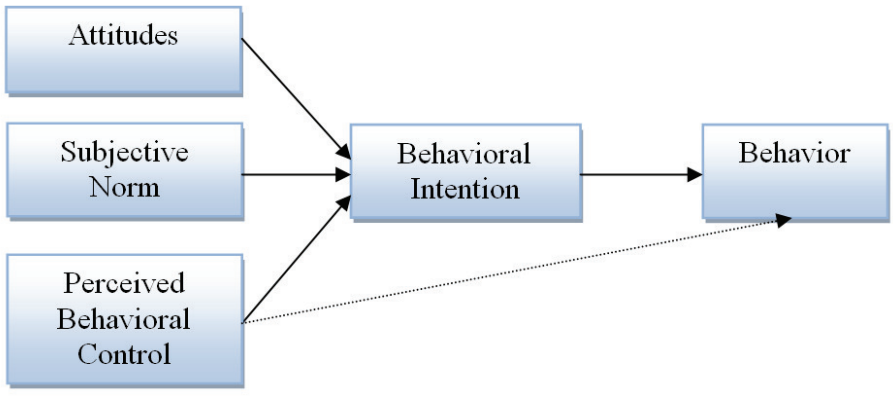

Figure 4.4. Theory of Planned Behavior (TPB). Source: Ajzen (1991)

Perceived behavioral control denotes the person's assessment of her/his own capabilities and resources required to perform a behavior. Stated in another way, perceived behavioral control may be defined as the importance that a person attributes to his/her available skills, resources and opportunities in relation to achieving a certain outcome (Ajzen, 1991; Lin, 2005). This variable has received much attention in models designed to predict health behaviors based on social cognition theories (cf. Armitage & Conner, 2000).

It is clear that actual behavior control (represented by effectively available resources like time, money, or skills) is important to predict a person's behavior.

However, psychologically it is of greater interest the issue of how perceived (rather than actual) behavioral control has on intentions and in actions (Ajzen, 1991).

It is important to notice that, despite perceived behavioral control is arguably more interest than actual control in formulating psychological models of technology adoption, there is a subjacent assumption in TPB model that PBC accurately depicts actual (volitional) control. As Armitage and Conner (1991) point out, given the old known psychological phenomena of "illusions of control" (e.g. Langer, 1975), it appears likely that PBC will more often than not be an inaccurate measure of actual control.

According to Ajzen (1991), this concept of perceived behavioral control was originated from self-efficacy theory derived from the systematic research program of Bandura and his collaborators (e.g. Bandura, Adams & Beyer, 1977; Bandura, Adams, Hardy & Howells, 1980).

The theory of planned behavior frames the concept of self-efficacy in a more general perspective, which encloses the relations among believes, attitudes, intentions, and behavior (Ajzen, 1991).

Throughout the addition of PBC, it was intended to enable the theory to predict behaviors that were not completely under volitional control (Ajzen, 1991), contrary to TRA which could only be applied to situations in which behaviors were solely dependent on volitional control, and thus relatively straightforward. In this sense, Ajzen (1991, p. 185) states that "The addition of perceived behavioral control should become increasingly useful as volitional control over behavior decreases".

Ajzen (1991) defends that the strength of the relationship between PCB and intentions depends of the context of the situation or the type of behavior, and indirect evidences have been found regarding this claim (see Armitage & Conner, 2001), but so does the weight of the links between attitudes and intentions, or between subjective norms and intentions.

Due to lack of empirical evidence supporting the interaction between PBC and intentions on predicting behavior, which Ajzen (1991) found after performing a meta-analysis of TPB research, the author proposed that a direct relationship between PBC and behavior would more accurately fit the available data.

Therefore, in conditions in which behavioral intention alone does not explain much of the variability in behavior (i.e. when volitional control is not sufficient to explain a phenomenon), PBC should be independently predictive of behavior (Armitage & Conner, 2001).

4.3.4. Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) was first purposed by Davis (1989) and is based on both TRA and TPB (Benbasat & Barki, 2007).

TAM has become very influential in research about technology adoption in the last decades (Lee, Kozar, & Larsen l, 2003; Benbasat & Barki, 2007; Hamre, 2008).

Hirschheim (2007) estimated that about 10% of all papers published on information systems journals had at least some support from TAM. Recently, some attempts have been made to summarize research based on TAM. (e.g. Lee et al., 2003; King & He, 2006; Schepers & Wetzels, 2007).

TAM continues to focus on behavioral intention (BI) as the antecedent of behavior (B), but introduces two changes in the TRA model based on the assumption that attitude (A) directly influences BI.

The first significant difference between TAM and TRA/TPB models is the exclusion

subjective norms (SN), as an important construct.

Another difference between TAM and TRA/TBP is the inclusion in TAM of two new constructs: perceived usefulness (PU) and perceived ease of use (PEU).

Synthetically, PU and PEU, according to TAM, are the primary constructs that affect a person's attitude ("feeling") towards a technological tool, which directly impacts the person's intention of using that tool. This intention then correlates with actual use.

Davis (1989, p. 320) defines perceived usefulness as "the degree to which a person believes that using a particular system would enhance his or her job performance".

Perceived ease of use is defined by Davis (1989, p. 320) as "the degree to which a person believes that using a particular system would be free of effort".

Essentially, TAM adjusts TRA to the context of information systems (Hamre, 2008).

The model has received both empirical validation (e.g. Lee et al., 2003) and empirical invalidation (e.g. Amoako-Gyampah & Salam, 2004). Most significantly, however, extensive meta-analysis, as the one provided by Schepers and Wetzels (2007), which included sixty-three studies, revealed that TAM is a very efficient and effective model to measure behavioral intention.

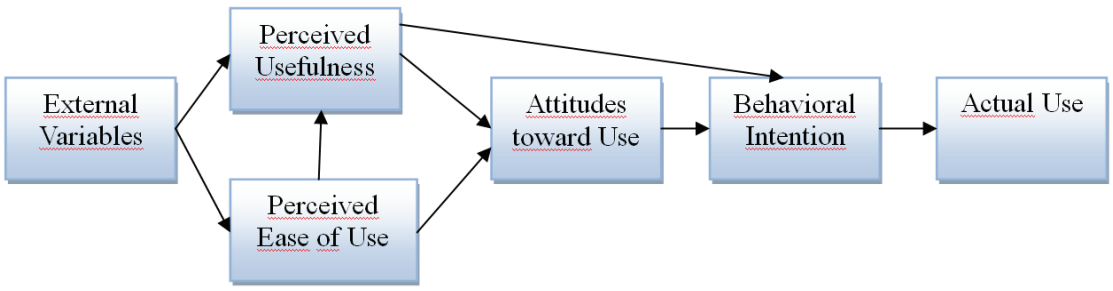

Figure 4.5. Technology Acceptance Model (TAM). Source: Davis (1989).

Hamre (2008) points out some interesting findings that have emerged from several of

the summary literature articles regarding TAM: for instance, research has been finding strong correlations between PU and BI, and between PU and PEU. However, the correlation between PEU and BI has been found to be weak. Therefore, in cases in which it might be convenient to omit one of the constructs (e.g. if trying to build a short survey), PU should remain, instead of PEU. Also, as Hamre (2008) emphasizes, this findings also reveal that perceived ease of use is a strong factor to take into account when trying to influencing the perceived usefulness of a given technology.

In several meta-analysis made regarding TAM, another common finding is that researchers often include additional constructs to their models (beyond those provided by TAM), what may be indicative of weaknesses on the model (Hamre, 2008). Some of the constructs included were subjective norm and types of user (student vs non-student).

From their summary study, with more than one-hundred publications, Lee et al. (2003) concluded that researchers have been focusing too much attention to replicating the original TAM model, introducing only light minor adjustments.

However, while it might be true that TAM might have preventing researchers to follow other empirical and theoretical paths, it also provided research on information systems with a parsimonious theory with rather good predictive capabilities (Lee et al., 2003; Benbasat and Barki, 2007; Hamre, 2008).

By associating behavior with attitudes and believes, the literature related to TAM provides sound predictions about system usage (Wixom & Todd, 2005).

The original TAM model (Davis, 1989) has been extended in some of the large number of research studies in which it was used. According to Wixom and Todd (2005), there can be identified three primary ways in which TAM has been extended (Figure 4.6):

A. By introducing external variables that function as antecedents or moderators to perceived usefulness and to perceived ease of use.
B.By inserting additional or alternative belief factors (derived, for example, from Diffusion of Innovation theory).
C.By introducing constructs from related models (such as self-efficacy, subjective norm, or perceived behavioral control.

The good predictive properties of TAM, the parsimony of this model, its flexibility, and the existence of sound guidelines regarding its extension (e.g. Taylor & Todd, 1995a; Wixom & Todd, 2005), make the use of TAM very compelling, in association with external factors and dimensions from other models and theoretical frameworks.

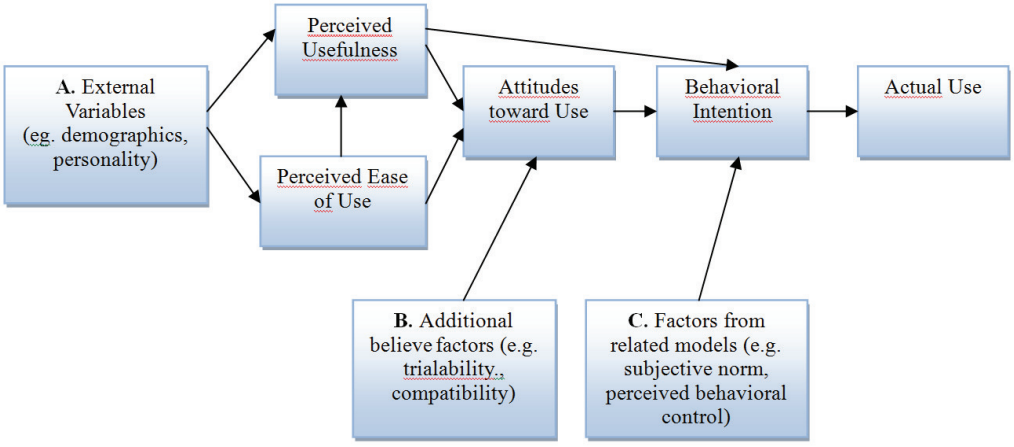

Figure 4.6. Popular TAM extensions. Source: Adapted from Wixom and Todd (2005).

4.3.5. Combined Technology Acceptance Model / Theory of Planned Behavior

By reviewing the literature, Taylor and Todd (1995a) found that information systems' usage models typically focused on: 1) already deployed, in-use, systems; 2) systems to which people were already familiar with. Given those findings, the authors reflected upon whether existing TAM models were predictive of the behavior of inexperienced users and (most importantly) whether both experienced and inexperienced users had similar determinants predictors regarding IT usage.

This model is usually designated as Combined Technology Acceptance Model and Theory of Planned Behavior (C-TAM-TPB; Taylor & Todd, 1995a), since it incorporates predictors derived from TPB (attitude toward behavior, subjective norm, and perceived behavioral control) with the TAM construct of perceived usefulness. Taylor and Todd (1995a) also refer to this model as "Augmented TAM" (p. 562).

In terms of the classification of proposed by Wixom and Todd (1995), presented at the end of the previous section, C-TAM-TPB can be seen a "type C" extension to TAM (i.e. a derivation of the original model by adding factors from related models: TPB, in this case).

Figure 4.7 provides a schematic representation of C-TAM-TPB.

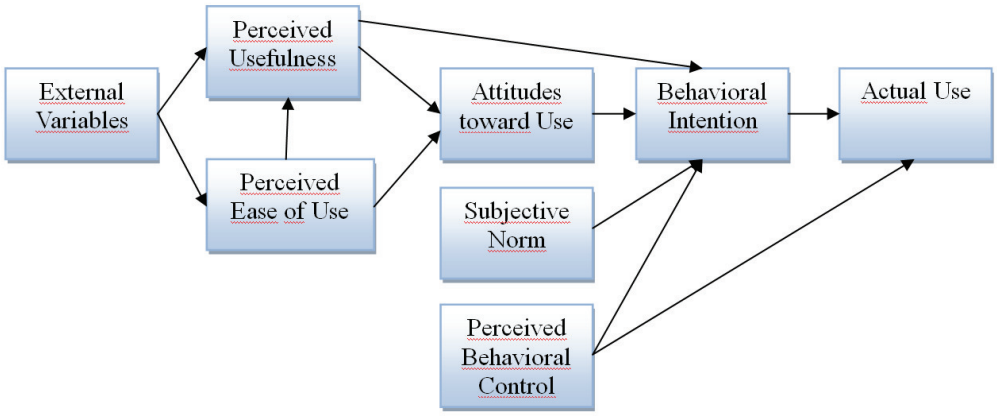

Figure 4.7- Combined TAM-TPB (C-TAM-TPB). Source: Taylor & Todd (1995a)

Specifically, in the C-TAM-TPB model, Taylor and Todd (1995a) hypothesized that:

1- Subjective norms (SN) should have greater influence on intentions (BI) when users have no previous experience with the technology, because in that situation people are more prone to rely on others' reactions when forming their intentions.

2- Believes of perceived usefulness (PU) and attitudes correlate more strongly with behavioral intention (BI), and then behavior (AU), when people had prior experience with a technological tool.

However, the authors did not found a significant link between prior experience and the relationship between subjective norm and behavioral intention, nor was there a significant relationship between perceived usefulness and attitudes.

The authors (Taylor & Todd, 1995a) did found a significant relationship between perceived usefulness (PU) and behavioral intention (BI).

4.3.6. Decomposed theory of Planned Behavior (DTPB)

The Decomposed Theory of Planned Behavior (DTPB; Taylor & Todd, 1995b) was created as an extension to TPB, which was already an improvement over TRA.

The model also received inspiration from other sources, namely the diffusion of innovation field, incorporating the DOI constructs "relative advantage", "complexity" and "compatibility". The model provides a framework through which the relations among these three innovation constructs and the adoption decision process could be understood (Taylor & Todd, 1995b).

DTPB provides a rich account of "social norms" and "perceived behavioral control", by decomposing this constructs into more narrow dimensions. In this way, DTPB constitutes a comprehensive alternative to understand the participation of factors like attitudes, subjective norms and perceived behavioral control on people's intentions of using technology (Tan & Teo, 2000), and Web 2.0 in particular.

Taylor and Todd (1995b) compared DTPB with TRA and TPB as predictive models of (consumer) behavior, through structural equation modeling, coming to the conclusion that while simpler TRA and TPB models had predictive capabilities, the DTPB was better at explaining behavior.

When the strengths and weaknesses of TAM, TPB and DTPB were compared, Taylor and Todd (1995b) concluded that all the three models could successfully fit the empirical data, being thus comparable in explaining technology usage behavior. The predictive power of the pure TPB model was roughly identical to TAM. However, while the DTPB model fitted the empirical data just as well as the pure TPB one, DTPB

showed better predictive power relative to both TPB and TAM models. Also, when considering behavioral intentions, the results showed that TPB and DTPB had greater explanatory power than TAM.

The similarities and differences between DTPB and TAM models were synthesized by *Al-Qeisi* (2009) in the following manner:

Similarities:

- Attitudes are included in both models, although decomposed differently in each one.

- In DTPB, attitudes are influenced by: relative advantage, compatibility and complexity, whereas for TAM attitude depends on perceived usefulness (similar to relative advantage) and perceived ease of use (contrary to complexity)

Differences:

- While in TAM perceived usefulness directly affects BI, in DTPB BI is only directly affected by attitudes.

- The focus of TAM is on guiding the design of IT systems, while DTPB includes those design factors but emphasizes normative control, with the preoccupation of working with those factors to enhance information systems' implementation.

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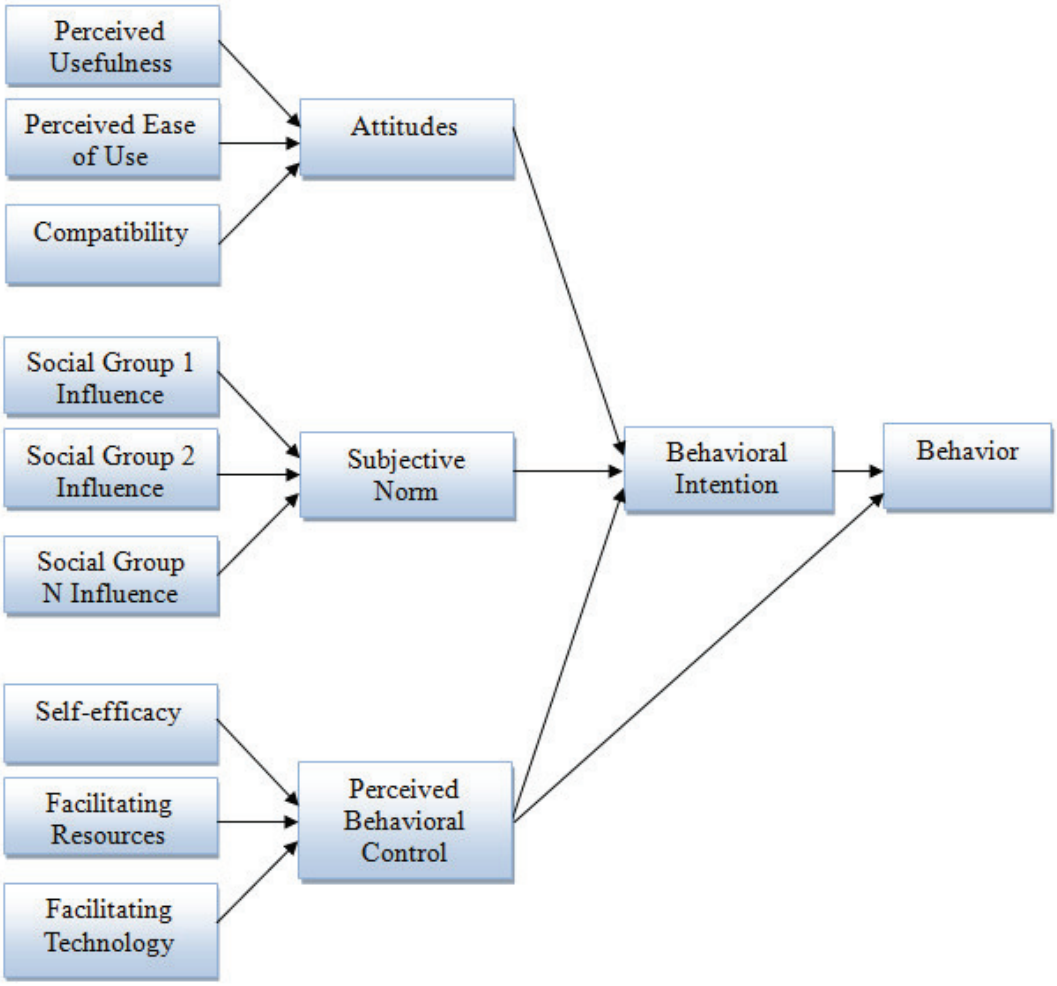

Figure 4.8. Decomposed TPB (DTPB). Source: Taylor & Todd (1995b)

Taylor and Todd (1995b) also concluded that by making the believe constructs unidimensional, DTPB provided more diagnostic value than pure TPB, thus providing greater insight into the factors influencing IT usage and identifying believes that can be targeted when the goal is to influence the usage of an information system.

4.3.7. Unified Theory of Acceptance and Use of Technology (UTAUT)

The Unified Theory of Acceptance and Use of Technology resulted from a unification effort done by Venkatesh, Morris, Davis, and Davis (2003). The authors' main goal was to enhance the predictive capabilities of each of the most commonly used models in Information Systems research, by capitalizing on their best features.

Venkatesh et al. (2003) considered it necessary to review and synthesize the major models in order to advance towards a more holistic and unified view of user acceptance.

The UTAUT model was capable of explaining near 70 percent of the variance observed regarding intention to use technology, while each of the eight individual models from which UTAUT was derived explained from 17 to 53 percent of that variance.

Since it retains the properties which allow it to be empirically-validated, the UTAUT overcomes significant limitations from previous frameworks, allowing a richer analysis of technology use and acceptance within complex organizations (for example, accounting for the different cases in which the use of a technological tool is mandatory or voluntary).

Venkatesh et al. stated that researchers typically choose constructs across models, or use a whole "favorite" model, while ignoring the contributions that could be attained from existing alternative models.

However, UTAUT is not without its critics and many authors found it necessary to include external variables and theories in order to complement and enrich this model (Williams, Rana, Dwivedi, & Lal, 2011).

The relative complexity and the less parsimonious nature of UTAUT in relation to TAM, and other models of technology acceptance have been emphasized on the literature (e.g. Bagozzi, 2007; van Raaij, & Schepers, 2008).

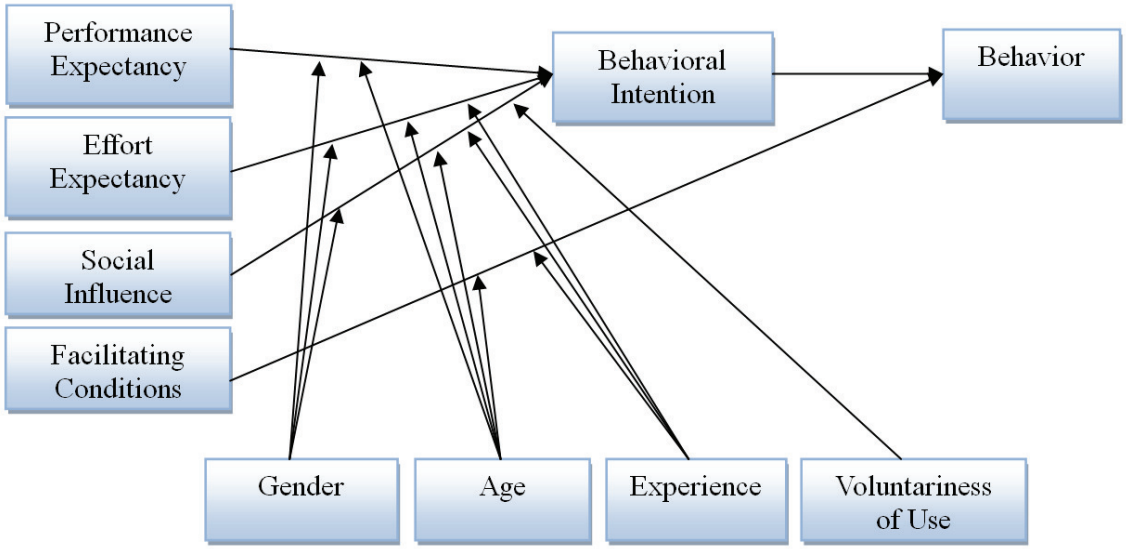

Figure 4.9. UTAUT Research Model. Source: Venkatesh et al. (2003)

Table 4.1. Summarizes the several adoption and acceptance models that were presented in this section.

Table 4.1. Summary of technology adoption and acceptance models

Name (Acronym)	Author(s)
Diffusion of Innovation Theory (DOI)	Rogers (2003)
Theory of Reasoned Action (TRA)	Fishbein and Ajzen (1975)
Theory of Planned Behavior (TPB)	Ajzen (1991)
Technology Acceptance Model (TAM)	Davis (1989)
Combined Technology Acceptance Model / Theory of Planned Behavior (C-TAM-TPB)	Taylor & Todd (1995a)
Decomposed theory of Planned Behavior (DTPB)	Taylor & Todd (1995b)
Unified Theory of Acceptance and Use of Technology (UTAUT)	Venkatesh et al. (2003)

4.4. Chapter Summary

In this chapter, a selection of common frameworks and models used in Information Systems Research was presented. As was debated, all of these models have their strong points and their disadvantages (e.g. the comprehensiveness of UTAUT is achieved by losing the parsimony of TAM).

An in depth and comprehensive understanding of Web 2.0 adoption and appropriation in higher education can be accomplished by combining the perspectives provided by the presented frameworks into complementary and/or holistic views.

Such an integrative and eclectic approach is followed in the studies conducted in the context of our research regarding the adoption of Web 2.0 by faculty and higher education students, as will be detailed in Chapters 6, 7, and 8.

CHAPTER V - DETAILED REVIEW OF SELECTED PREVIOUS STUDIES

5.1. Introduction

In the extensive review of the literature concerning the relations between Web 2.0 technology and higher education, there was a set of studies and papers which became particularly important for this thesis research.

Although we propose an independent model for students' adoption of Web 2.0 (based on TAM; Davis, 1989), and, in the case of faculty, we use a derivation of TPB (Ajzen, 1991) to study not only Web 2.0 adoption in general, but also the adoption of specific Web 2.0 tools (Facebook and Blogs), the pioneering papers by Ajjan and Hartshorne (2008) and Hartshorne and Ajjan (2009) were important guidelines, and the results obtained by these authors constitute an important referential for comparing and cross-validate our own results.

In what is regarded as the *seminal* work of Mazman and Usluel (2010), also detailed in this chapter, it was particularly important because it contains the formulation of a model for Facebook academic use. The model proposed in this thesis for the incorporation of psychological variables in explaining the academic use of Facebook derives from the original model proposed by Mazman and Usluel, although we explored some slight variations at the core relations of the model, and introduced the new set of variables related to the psychological dimensions in which we were interested.

Through the study by Gangadharbatla (2008), we became aware of the work of Luhtanen and Crocker (1992), and decided to also include a measure of collective self-esteem in our set of empirical instruments. The study by Gangadharbatla was important because it explores the interplay between collective self-esteem and a set of other variables (which, although different from the ones included in our study, were concerned with psychological aspects such as the need to belong).

The final study detailed separately in this chapter is the one conducted by Ellison, Steinfield, and Lampe (2007) that, although centered around the concept of social capital (a variable not included in our study), also explores the relations between Facebook use, self-esteem and satisfaction with life (these three variables *were* included

in our two studies regarding the student population: one about general Web 2.0 adoption, and the other concerning Facebook academic use).

The detailed description of the empirical instruments used in the context of this thesis will be provided in Chapters 7 and 8, as well as its construction process and psychometric properties, but in order to further clarify our option for including a detailed description of the set of studies covered in this chapter it is important to emphasize that, in the case of our study with the student population, among the fourteen instruments used: a) one was a survey which resulted from adapting the instrument used by Hartshorne and Ajjan (2009), b) three were Portuguese translations of the three scales built by Mazman and Usluel (2010) for modeling Facebook academic use, c) one was a measure of collective self-esteem derived from Luhtanen and Crocker (1992) original scale (described in Gangadharbatla, 2008), and d) one was a translated version of the Facebook Intensity Scale (developed by Ellison, Steinfield, & Lampe, 2007).

Thus, the following sections of this chapter will be concerned with this specific subset of the literature which was particularly important for our study of the relations between Web 2.0 and higher education.

5.2. Ajjan and Hartshorne's Models of Web 2.0 Adoption

In this section we reflect on the previous work of Haya Ajjan and Richard Hartshorne (Ajjan & Hartshorne, 2008) from the University of North Carolina, in the United States, regarding the adoption of Web 2.0 by faculty.

As stated in the introduction to this chapter, the contact with the work of these authors was particularly important, because through it Ajjan and Harshorne demonstrated how some models used in the frontier between Information Systems research and Psychology could be applied to the study of the impact of Web 2.0 in Higher Education.

5.2.1. The (D)TPB Model of Web 2.0 Adoption by Faculty

The Ajjan and Hartshorne (2008) model was based in the derivation of the Theory of Planned Behavior [TPB] (Ajzen, 1991) called Decomposed Theory of Planned Behavior [DTPB] (Taylor & Todd, 1995b). Schemas depicting these frameworks were presented in the previous chapter.

Although the study of adoption and acceptance of technological innovations is a relatively mature field (Venkatesh et al., 2003), Ajjan and Hartshorne (2008) were innovative in testing one largely spread model (DTPB; Taylor & Todd, 1995b) to the study of adoption of Web 2.0 in academic environments.

The main objective of Ajjan and Hartshorne (2008) research was to study faculty's awareness of the advantages of Web 2.0 to supplement in-class learning and to assess faculty's decisions to adopt these tools.

With their study and through the use of the DTPB framework, the authors tried to answer two research questions:

1- Are faculty members aware of the benefits of using Web 2.0 technology to supplement traditional classroom instruction?

2- What factors predict best faculty's decision to adopt Web 2.0 technology to supplement traditional classroom instruction?

To answer these questions, Ajjan and Hartshorne (2008) built a survey that was adapted from previous studies about technology adoption (e.g. Baylor & Ritchie, 2002, as cited by Ajjan & Hartshorne, 2008, and also read in the literature review for this thesis).

Their sample was composed of 136 university professors of one large United States University, varied in academic rank, gender and age.

The first part of Ajjan and Hartshorne (2008) survey, mainly concerned with the study's first research question, was composed by a set of items through which the perceptions that professors had of specific Web 2.0 was assessed. The data collected with this part of

the instrument revealed that some faculty members could find Web 2.0 technologies useful. For instance, more than half of the respondents declared that they thought Blogs and Social Networks could increase student-student interaction, and almost a half (46%) declared that they perceived the integration of blogs in their teaching activities as easy (Ajjan & Hartshorne, 2008; Ajjan, Hartshorne & Ferdig, 2009).

The survey also contemplated questions to assess the degree of usage of a set of Web 2.0 tools. It is important to notice the fact that the majority of professors in Ajjan and Hartshorne (2008) sample did not use, nor planned to use Web 2.0 tools at all, and that only a very small minority (less than 5%) declared that frequently used Blogs, Wikis, Social Networking or Social Bookmarking.

It is important to compare these findings. As Ajjan and Hartshorne (2008) noticed, while a considerable proportion of professors thought specific Web 2.0 could bring several benefits to their students, few actually chose to use it.

The instrument's additional items were conceived to address the constructs of DTPB. This part of the survey was especially committed to answering the study's second research question (of which factors are more predictive of Web 2.0 usage in teaching).

The five core constructs of the (non-decomposed) TPB (Ajzen, 1991) were defined, in this context, as follows (Ajjan and Hartshorne, 2008):

1. Attitude: in this context is defined as "the faculty desirability to use Web 2.0 to support in-class learning." (p. 74). The TPB framework predicts that attitude has a positive effect on behavioral intention (hypothesis 1, "H1" in Figure 5.1).

2. Subjective norms: regarding faculty use of Web 2.0, "reflect the faculty's perception of whether their behavior is encouraged and accepted within their circle of influence." (p.74). Predicted by TPB to positively affect behavioral intention (hypothesis 2, "H2" in Figure 5.1).

3. Perceived behavioral control: is "the faculty belief regarding the resources and self-confidence in their ability to perform the behavior." (p. 74). Also, predicted to exert a positive effect on behavioral intention (hypothesis 3, "H3" in Figure 5.1).

4. Behavioral intention: this constructs is positively influenced by the first three presented above (attitude, subjective norms and perceived behavioral control). Within the TPB (Azjen, 1991), behavioral intention is considered to be the most important predictor of whether a person will decide to actually execute the behavior. In the model of Ajjan and Hartshorne (2008), behavioral intention is the intention of using Web 2.0 to supplement in-class learning". Hypothesis 4 ("H4" in Figure 5.1) states that behavioral intention will have a significant positive link with behavior.

5. Behavior: in this case, the actual usage of "Web 2.0 to supplement in-class learning" (p.74).

The definitions that Ajjan and Hartshorne (2008) made of the supplementary constructs necessary to decompose attitude, subjective norms and perceived behavioral control, and thus applying the DTPB framework (Taylor & Todd, 1995b) are presented in Table 5.1.

The first four research hypothesis of Ajjan and Hartshorne (2008) were related to the relations between the original constructs of TPB (Ajzen, 1991), before their decomposition into DTPB (as suggested later by Taylor & Todd, 1995b). Figure 5.1 represents the original TPB model, and also contains the representation of the first 4 hypothesis made by Ajjan and Hartshorne (2008) regarding the relations between attitude, subjective norm, perceived behavioral control, behavioral intention and actual behavior.

Decomposing attitude, social norm and perceived behavioral control into the constructs proposed by DTPB (Taylor & Todd, 1995b), the following predictions were made, regarding faculty Web 2.0 adoption, based on this theoretical framework:

- Attitude towards usage of Web 2.0 is expected to be influenced positively by perceived usefulness (hypothesis 5a), perceived ease of use (hypothesis 5b) and compatibility (hypothesis 5c). This hypothesis is represented by (H5a, H5b, and H5c in Table 5.2).

- Subjective norm is predicted to by positively affected by superior, peer and student influences to use Web 2.0: hypothesis 6a, 6b, and 6c, respectively (H6a, H6b, and H6c

in Table 5.2).

- Perceived behavioral control in regard to Web 2.0 usage is positively linked to self-efficacy (hypothesis 7a), and to two types of facilitating conditions: those related to the existence of required resources (hypothesis 7b) and those related to technology (hypothesis 7c). These hypotheses are represented by H7a, H7b and H7c in Table 5.2.

Table 5.1. (D)TPB Constructs of Ajjan and Hartshorne model of Web 2.0 adoption by faculty

TPB construct	Components (DTPB)	Definition (Web 2.0 adoption by Faculty)
Attitude	Perceived Usefulness	Degree of believe that faculty members have that Web 2.0 will make them more effective in the classroom.
	Perceived Ease of Use	Degree of believe that faculty members have that using Web 2.0 tools will be effortless
	Compatibility	Degree of believe that faculty members have that Web 2.0 tools will be compatible with their professional responsibilities
Subjective Norm	Student Influence	Students' influence to use Web 2.0
	Peer Influence	Colleagues' influence to use Web 2.0
	Superior Influence	Superiors' Influence to use Web 2.0
Perceived Behavioral Control	Self-Efficacy	A faculty member's judgment of their own capabilities to use Web 2.0 tools to support their in-class learning environment
	Facilitating Conditions – Resources	Perceived availability of resources such as time and money, regarding usage of Web 2.0 tools
	Facilitating Conditions – Technology	Perceived availability of necessary technological resources for usage of Web 2.0 tools

All the research hypothesis were tested by the use of path analysis (Wright, 1921), through which the authors tried to isolate real effects from spurious ones, and also to estimate the linkage between variables.

For hypothesis 1 through 4, regarding the relation between constructs common between TPB and DTPB, the results were the following (Ajjan and Hartshorne, 2008):

- Hypothesis 1 (H1), relation between Attitude and Behavioral Intention: this hypothesis was confirmed (β=0.830, t=12.334, p<0.001).

- Hypothesis 2 (H2), relation between Subjective Norms and Behavioral Intention. The hypothesis was not confirmed. Path analysis failed to find any significant impact of subjective norms on behavioral intention (β=-0.060, t=-0.952, p>=0.05).

- Hypothesis 3 (H3), relation between Perceived Behavioral Control and Behavioral Intention. This hypothesis was confirmed, though it did not received such a strong support from the empirical data as hypothesis 1 (H1) (β=0.128, t=2.218, p<0.05).

- Hypothesis 4 (H4), regarding the relation between behavioral intention to use Web 2.0 and actual usage Web 2.0 tools, was also confirmed. The model encountered a very significant effect between these two constructs (β=0.666, t=9.991, p<0.001).

The corresponding non-decomposed TPB model depicting these results is presented on Figure 5.1.

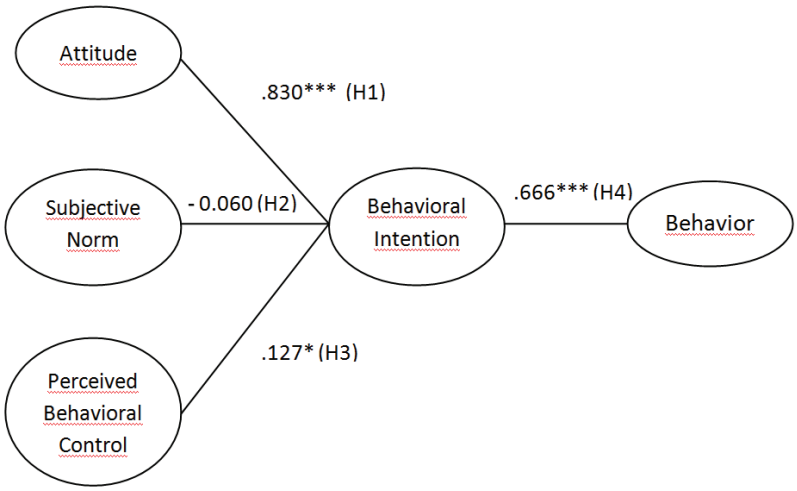

Figure 5.1. TPB-related hypotheses in Ajjan & Hartshorne (2008) study (faculty population)

From the classic TPB model, several others can be derived, based on existing literature (e.g. the Combined Technology Acceptance Model and Theory of Planned Behavior, or C-TAM-TPB, presented by Taylor & Todd, 1995a). Ajjan and Hartshorne (2008) opted to use the DTPB (Taylor & Todd, 1995b), asserting that this framework allows for a better understanding of the factors that influence the adoption of new technology, and also because DTPB has better explanatory power than TPB (as demonstrated by Taylor & Todd, 1995b).

The relation between the TPB constructs and their decomposed factors are synthesized in Table 5.2.

Attitude was especially influenced by perceived usefulness, while also receiving positive influences from perceived ease of use and of compatibility. Together, these tree factors accounted for near 80% of the variance in attitude (adjusted R^2; Ajjan & Hartshorne, 2008).

Subjective norm was very significantly influenced by student and superior influence, and not as much by the influence of peers (although peer influence was also positive and significant). Together, this three sources of influence accounted for 63.2 % of the variance, as measured by the adjusted R^2.

Finally, perceived behavioral control received very significant positive influences from self-efficacy, but the model failed to find significant positive influences of any of the two types of facilitating conditions: technology and resources. Taken together, the three factors in which perceived behavioral control was decomposed accounted for 52.2 % of the variance found for this construct (adjusted R^2).

As a consequence of including the variables of DTPB, the survey also addresses constructs related to the original TPB and can easily be adapted for gathering data relevant to other models of technology adoption, such as TAM (Davis, 1989).

Table 5.2. Relation between TPB constructs and their DTPB components – Ajjan and Hartshorne (2008) study with the faculty population

TPB construct	Components (DTPB)	Significant Positive Relation? (Hypothesis)
Attitude	Perceived Usefulness	**Yes /** Hypothesis **5a** (β=0.615, t=7.604, p<0.001)
	Perceived Ease of Use	**Yes /** Hypothesis **5b** (β=0.144, t=2.125, p<0.05)
	Compatibility	**Yes /** Hypothesis **5c** (β=0.190, t=2.546, p<0.05)
Subjective Norm	Student Influence	**Yes /** Hypothesis **6a** (β=0.356, t=5.235, p<0.001)
	Peer Influence	**Yes /** Hypothesis **6b** (β=0.205, t=2.344, p<0.05)
	Superior Influence	**Yes /** Hypothesis **6c** (β=0.396, t=5.114, p<0.001)
Perceived Behavioral Control	Self-Efficacy	**Yes /** Hypothesis **7a** (β=0.518, t=6.125, p<0.001)
	Facilitating Conditions – Resources	**No /** Hypothesis **7b**
	Facilitating Conditions – Technology	**No /** Hypothesis **7c**

5.2.2. The (D)TPB Model of Web 2.0 Adoption by Students

The study carried out by Hartshorne and Ajjan (2009) regarding students' decisions to adopt Web 2.0 tools followed the line of research that these authors had previously

made in their study about faculty adoption of Web 2.0 (Ajjan & Hartshorne, 2008), analyzed in the previous section.

In fact, one of the recommendations for future research that was made by the authors in their paper regarding faculty and Web 2.0 was to apply the same theoretical framework to understand and predict the intentions and behaviors of students regarding this kind of tools (Ajjan & Hartshorne, 2008), and the authors made an integrative analysis of both these studies on the chapter of a book printed recently (Ajjan, Hartshorne & Ferdig, 2009).

Since our own empirical set of instruments regarding psychological dimensions of Web 2.0 adoption by HE students included a survey whose items were mainly derived from the one used by Hartshorne and Ajjan (2009), in this section we present the main constructs of the framework used by these authors, which are those of the TPB (Ajzen, 1991), with the modifications suggested by the DTPB (Taylor & Todd, 1995b), and adapted to the context of Web 2.0 adoption.

Just as it happens with the model that Ajjan and Hartshorne (2008) proposed for faculty adoption of Web 2.0, the decision that these authors made of using the DTPB for studying Web 2.0 adoption by students implies that the constructs of the original TPB are included in their theoretical framework. This is important, because the DTPB is just one of the many derivations that can be made from TPB, and we have chosen to use an alternative framework of interpretation, as will be discussed in the empirical part of this thesis.

Within the framework proposed to interpret students' adoption of Web 2.0, the core constructs of TPB (Ajzen, 1991) are defined contextually in the following manner (Hartshorne & Ajjan, 2009):

1. Attitude: in this context is defined as "students' desire to use Web 2.0 technologies to support their in-class learning" (p. 187). Students' attitude towards Web 2.0 usage is expected to have a significant positive influence on behavioral intentions (hypothesis 1, "H1" in Figure 5.2).

2. Subjective norms: in the context of Web 2.0 adoption by students, this core-TPB construct is defined as "students' perceptions of how their circle of referents views their

behavior" (p. 187). It is expected that subjective norms should have a significant positive effect on behavioral intentions (hypothesis 2, "H2" in Figure 5.2).

3. Perceived behavioral control: is "refers to students feeling of control regarding the availability of resources to use Web 2.0 applications and their self confidence to use it" (p. 188). On light of TPB, this construct is the third that is also expected to positively affect behavioral intentions (hypothesis 3, "H3" in Figure 5.2).

4. Behavioral intention: Hypothesis 4 ("H4" in Figure 5.2) states that "Students' behavioral intention to use Web 2.0 is expected to positively affect behavior" (p. 188). This prediction is based on the fact that according to the TPB (Ajzen, 1991), behavioral intention is the most important predictor of actual behavior.

5. Behavior: In the context of Hartshorne & Ajjan (2009) study, behavior is the actual usage of "Web 2.0 applications" by students "to support their in-class learning" (p. 186).

The schema depicting this core constructs and their interrelations on light of the TPB (Ajzen, 1991) can be found on Figure 5.2 (the general constructs of TPB were used in both the faculty and the student models of Web 2.0 adoption).

In order to enrich their model about students' adoption of Web 2.0, Hartshorne and Ajjan (2009) decided to follow Taylor and Todd (1995b)'s proposal to decompose the three beliefs based on TPB (attitude, subjective norm and perceived behavioral control).

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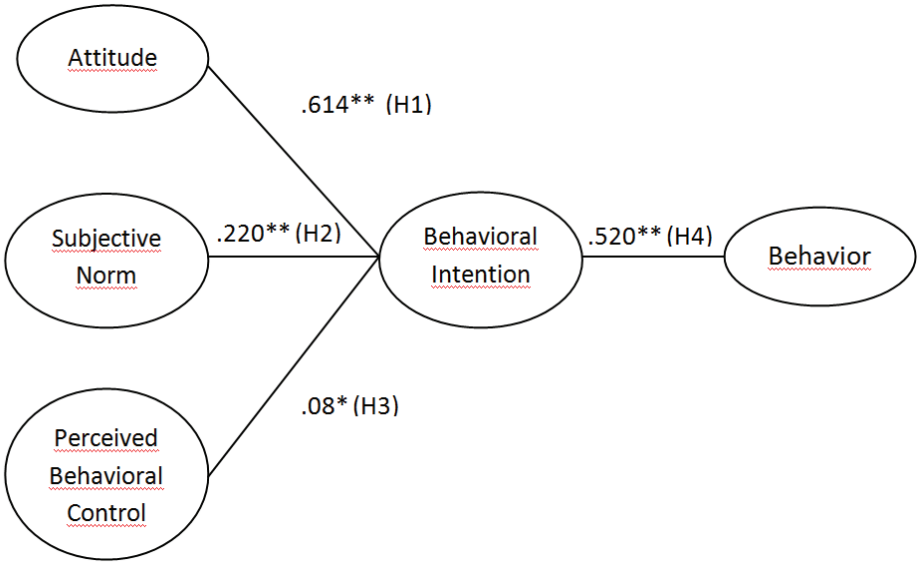

Figure 5.2. TPB-related hypotheses in Hartshorne & Ajjan (2009) study (student population)

The definitions of the additional constructs necessary to make the decomposition of each of the TPB believes (Ajzen, 1991), and thus forming a DTPB model (Taylor & Todd, 1995b) are summarily presented on Table 5.3. Since the framework used in this study is the same that was used in Ajjan and Hartshorne (2008) study with faculty, the schematic representation of the DTPB model is very similar, although with the slight difference of the "subjective norms" being decomposed in only two other constructs, instead of three, as was the case with the model regarding faculty (the "superior influence" is part of the faculty model of Web 2.0 adoption, but is not integrated in corresponding student model).

As was the case in their previous study about faculty adoption of Web 2.0 (Ajjan & Harshorne, 2008), the first four hypothesis concerned the core constructs common to both the original TPB (Ajzen, 1991) and the DTPB (Taylor & Todd, 1995b) frameworks.

Table 5.3. (D)TPB Constructs of Hartshorne and Ajjan (2009) model of Web 2.0 adoption by Students

TPB construct	Components (DTPB)	Definition (Web 2.0 adoption by Students)
Attitude	Perceived Usefulness	Degree of believe that students have that Web 2.0 technologies will help them learn better
	Perceived Ease of Use	Degree of believe that students have that using Web 2.0 tools will be free of effort
	Compatibility	Degree of believe that students have that Web 2.0 tools will be compatible with their individual needs
Subjective Norm	Peer Influence	Fellow students' influence to use Web 2.0
	Superior Influence	Faculty's influence to use Web 2.0
Perceived Behavioral Control	Self-Efficacy	A student's judgment of her/his own capabilities to use Web 2.0 tools to support their in-class learning
	Facilitating Conditions – Resources	Perceived availability of resources, such as time, regarding usage of Web 2.0 tools
	Facilitating Conditions – Technology	Perceived availability of necessary technological resources for usage of Web 2.0 tools

Carrying the decomposition of the TPB beliefs (Ajzen, 1991) into the constructs of the DTPB (Taylor & Todd, 1995b), a set of three further hypotheses was formulated by Hartshorne and Ajjan (2009):

- Students' attitude towards usage of Web 2.0 is expected to be positively influenced by perceived usefulness, perceived ease of use, and compatibility (hypothesis 5).

- Subjective norm is predicted to be positively affected by faculty and by student peers' influences to use Web 2.0: hypothesis 6.

- Perceived behavioral control in regard to students' use of Web 2.0 is positively linked to students' self-efficacy, and to resources and technology availability. This is the seventh and last research hypothesis in the Hartshorne and Ajjan (2009) study.

As in their previous study regarding faculty adoption of Web 2.0, in order to test all the research hypotheses, and to separate real from spurious effects, Hartshorne and Ajjan (2009) made use of the path analysis procedures suggested by Wright (1921). Through

this statistical set of statistical procedures, Hartshorne and Ajjan (2009) were able to estimate the significance and the strength of the relations between the variables.

For the TPB sub-part of their model, represented by hypotheses 1, 2, 3, and 4, the empirical findings were the following (Hartshorne & Ajjan, 2009):

- Hypothesis 1 (H1), relation between Attitude and Behavioral Intention: this hypothesis was confirmed by path analysis (β=0.614, t=15.614, p<0.01).

- Hypothesis 2 (H2), relation between Subjective Norms and Behavioral Intention. Contrary to the corresponding finding in the study regarding faculty's Web 2.0 adoption, this hypothesis was confirmed. Results show a positive and significant influence of subjective norms on behavioral intention (β=0.220, t=5.899, p<0.01).

- Hypothesis 3 (H3), relation between Perceived Behavioral Control and Behavioral Intention. The hypothesis was confirmed, but the effect of perceived behavioral control on behavioral intention was very small, even if statistically significant (β=0.080, t=2.025, p<0.05).

- Hypothesis 4 (H4), about behavioral intention to use Web 2.0 influencing actual usage of Web 2.0 tools, was also confirmed (β=0.520, t=12.144, p<0.01).

The graphical representation depicting the results of testing hypothesis 1 to 4 is presented on Figure 5.2. This schema corresponds to the original TPB model (Ajzen, 1991).

Among the several options supported by the literature to enrich the analysis provided by the TPB model, Hartshorne and Ajjan (2009) chosen to use the DTPB (proposed by Taylor & Todd, 1995b). This option is supported by empirical research which finds that the construct decomposition suggested by the DTPB framework permits achieving better predictive validity and explanatory power, in relation to the original TPB framework.

Table 5.4 synthesizes the results obtained by Hartshorne and Ajjan (2009), while testing not only the four hypotheses regarding TPB (Ajzen, 1991) constructs, but also the authors' application of the DTPB (Taylor & Todd, 1995b) to the study of adoption of

Web 2.0 by higher education students (hypotheses 5, 6 and 7, described in the next paragraphs).

The variance obtained in the variable measuring attitude was explained in 74.6% by the three factors in which this construct was decomposed (adjusted R^2). All of the three factors had a positive significant effect on attitude towards Web 2.0 technologies: perceived usefulness (β=0.472, t=10.463, p<0.01), perceived ease of use (β=0.287, t=6.758, p<0.01) and compatibility (β=0.200, t=5.863, p<0.01). Hypothesis 5, which predicted a positive influence of these decomposed factors on attitude, was therefore confirmed (Hartshorne & Ajjan, 2009).

The two factors in which the subjective norm construct was decomposed explained 71.4% of the variance observed in the variable measuring it (adjusted R^2). Research hypothesis 6 was confirmed (Hartshorne & Ajjan, 2009), since there were positive significant influences on subjective norms from both peer (β=0.205, t=6.378, p<0.01) and superior (β=0.719, t=22.363, p<0.01) influences.

Lastly, perceived behavioral control's variance was explained in 64.6% (adjusted R^2) by self efficacy and facilitating conditions (resources and technology). Although facilitating conditions – technology was found not to influence perceived behavioral control (β=0.081, t=1.551, *ns*), self-efficacy and facilitating conditions - resources did have a positive and significance influence in perceived behavioral control: self-efficacy (β=0.576, t=11.419, p<0.01) and facilitating conditions - resources (β=0.204, t=4.019, p<0.01). Hypotheses 7 was, as such, partially confirmed.

5.2.3. Summary of DTPB-based Findings by Ajjan, Hartshorne, and Ferdig

A combined analysis of the results from the Ajjan and Hartshorne (2008) research, regarding faculty decisions to use Web 2.0, and the Hartshorne and Ajjan (2009) study, targeting the student population on the same theme, were compiled in Ajjan, Hartshorne and Ferdig (2009).

A very important finding reported in Ajjan et al. (2009) is that both students and faculty have the idea that Web 2.0 tools can be pedagogically beneficial (from promoting writing abilities to enhance student satisfaction with a course). However, students were clearly more comfortable with all of the Web 2.0 tools analyzed, even the ones which student and faculty used with similar intensity. Students had particularly higher comfort-level relative to faculty in the case of social network applications (Ajjan et al., 2009).

The results also indicated that while some faculty perceived Web 2.0 as having potential pedagogical benefits, only a small minority use them to supplement their in-class instruction. Similarly, students, in their vast majority, declared they were not using (or planning to use) Web 2.0 to supplement their in-class learning, or using Web 2.0 technology only occasionally (Ajjan et al., 2009).

As was expected from TPB (Ajzen, 1991) and from DTPB (Taylor & Todd, 1995b), behavioral intention to use Web 2.0 was a very strong predictor of actual usage of this type of technology, for both faculty and students (Ajjan et al., 2009).

Attitudes, subjective norms and perceived behavioral control are predicted to influence behavioral intention (by both the TPB and the DTPB frameworks). However, Ajjan et al. (2009) report that attitudes and perceived behavioral control were found to be strong determinants of behavioral intention, but the authors also refer that subjective norms only were valid predictors of behavioral intention in the case of the student population. For faculty, subjective norms failed to demonstrate a significant positive influence in behavioral intention which the authors suggest to a possible indicator of the autonomy perceived by faculty members.

Still according to Ajjan et al. (2009), ease of use, perceived usefulness and compatibility were found to be key determinants of Web 2.0 usage, for both faculty and students. Subjective norms were influence by three reference groups, in the case of faculty (peers, students and superiors) and by two reference groups, in the case of students (peers and superiors). Self-efficacy was found to have a positive influence on both students and faculty perceived behavioral control, but regarding facilitating conditions (technology and resources), they were not found to be good predictors of perceived behavioral control, for neither population, except in the case of facilitating conditions – resources in the student population.

Table 5.4. Relation between TPB constructs and their DTPB components (Hartshorne & Ajjan, 2009) – Student population

TPB construct	Components (DTPB)	Significant Positive Relation? (Hypothesis)
Attitude	Perceived Usefulness	**Yes** / Hypothesis **5** (β=0.472, t=10.463, p<0.01)
	Perceived Ease of Use	**Yes** / Hypothesis **5** (β=0.287, t=6.758, p<0.01)
	Compatibility	**Yes** / Hypothesis **5** (β=0.200, t=5.863, p<0.01)
Subjective Norm	Peer Influence	**Yes** / Hypothesis **6** (β=0.205, t=6.378, p<0.01)
	Superior Influence	**Yes** / Hypothesis **6** (β=0.719, t=22.363, p<0.01)
Perceived Behavioral Control	Self-Efficacy	**Yes** / Hypothesis **7** (β=0.576, t=11.419, p<0.01)
	Facilitating Conditions – Resources	**Yes** / Hypothesis **7** (β=0.204, t=4.019, p<0.01)
	Facilitating Conditions – Technology	**No** / Hypothesis **7**

5.3. Mazman and Usluel's Educational Usage of Facebook Model

In 2010, Sacide Mazman and Yasemin Usluel, from Hacattepe University, in Turkey, built a structural model with the goal of explaining how Facebook could be used for educational purposes.

A Portuguese adaptation of the original Turkish version of the scales used for building this model (Mazman & Usluel, 2010) is part of the empirical contribution of this thesis, and a detailed analysis of its individual items and of scales' dimensions and sub-

dimensions can be found in Chapter 8, Section 8.2.2.4, both for the original and the translated versions of the three scales.

Mazman and Usluel (2010) data collection was based on an online survey composed of four sections, each one summarily described on Table 5.5.

Through their online instrument, the authors were able to collect accurate data from more than six-hundred participants. Importantly, not only the survey was carried online, but also the link to it was *spread through Facebook*: people could spread the survey link to their Facebook "friends" if they wish to do so.

Table 5.5. Structure of the Mazman and Usluel (2010) online Survey regarding Facebook Educational Use

Section	Contents
1st	Demographic information (gender, age, educational level) and data regarding intensity of Facebook use (frequency and length of usage)
2nd	Twelve items in 5-point Likert scale concerning purposes of Facebook usage
3rd	Eleven item in 10-point Likert scales regarding Facebook educational usage
4th	Twenty-three items in 10-point Likert scale about Facebook adoption on the educational context

The authors' sample was composed mostly of higher education students (70%), but there was a significant number of participants not belonging to this group. About three-quarters of the participants (74%) belonged to the 18-25 age group (Mazman & Usluel, 2010).

In terms of the temporal duration of the data gathering phase, the authors refer that their survey was online for about one month.

In the Mazman and Usluel (2010) research model, there were three latent variables, measuring the following constructs:

1- Adoption, incorporating constructs from several available models and theories, from frameworks more focused on individuals' internal decision process (Theory of Planned

Behavior, Ajzen, 1991; Technology Acceptance Model, Davis, 1989) to others regarding how the media features are important to the diffusion of innovations (Diffusion of Innovations Theory; Rogers, 2003).

2- Purpose, a construct that takes into account the fact that different people, with different interests, and at different contexts and time, make distinct uses of Facebook.

The literature research done by Mazman and Usluel regarding the construct of "purposes of Facebook usage" included the findings by Ellison et al. (2007) that Facebook could be useful for work-related activity, since it facilitates the maintenance of previous professional acquaintances and promotes the creation of new relationships that may be useful professionally. The authors also drove from Lockyer and Patterson (2008) case study research which found that Facebook could be used to support formal education environments, leading to positive learning experiences and outcomes for the students in their study.

3- Educational use, which was a particularly important construct in the model, as Mazman and Usluel perceived a gap in research regarding the reasons and the ways Facebook might be incorporated into educational contexts. Studies such as those of Ajjan and Hartshorne (2008) and of Lockyer and Patterson (2008), taken into account by Mazman and Usluel, emphasized the potential that social network sites had for education. Mazman and Usluel also acknowledged the suggestion made by Lee and McLoughlin (2008), that social networks may be seen as pedagogical tools, because they may be used for educative relevant aspects, such as collaborative information/knowledge creation, sharing, discovery, and aggregation.

While testing their model of educational usage of Facebook, Mazman and Usluel (2010) made "educational usage" to depend directly from "purpose" and indirectly from Facebook "adoption" (Figure 5.3).

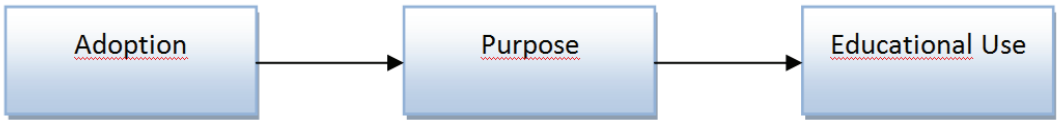

Figure 5.3.. Relationship between adoption, purpose and educational use of Facebook in the Mazman and Usluel (2010) model

5.3.1. Factors related to Facebook Adoption

In the Mazman and Usluel (2010) research model of Educational Usage of Facebook, the latent variable "adoption" depends on a set of five enabling factors: usefulness, ease of use, social influence, facilitating conditions and community identification. Figure 5.4 depicts the proposed relation between adoption and these constructs in Mazman and Usluel's model.

The usefulness concept was brought by the authors from the Technology Acceptance Model (Davis, 1989) and the Diffusion of Innovation Theory (Rogers, 2003).

In the context of TAM, (perceived) usefulness is a construct defined as the degree to which an individual believes that using the system will help him or her to attain gains in job performance (Davis, 1989).

In Diffusion of Innovation Theory this construct appears under the name "relative advantage", and it is considered a crucial predictor of a technological tool's acceptance and diffusion. It is conceived as the degree of improvement of an innovation over the previous generation (Rogers, 2003).

The authors studied the hypothesis (H1) that usefulness, defined according the models presented, would have a significant influence on FB adoption. The results strongly support this hypothesis (cf. Figure 5.4, H1). In fact, usefulness was found to be the most important factor in predicting Facebook adoption, and therefore, consistent with

research regarding adoption and acceptance of an innovation in a system (e.g. van Raaij & Schepers, 2008), the authors of the model suggest that perceived usefulness is one of the main reasons behind the rapid adoption of Facebook.

In the context of their study regarding FB, Mazman and Usluel (2010, p. 446) define "ease of use" as "using Facebook features easily and managing the overall Facebook content without much effort", closely adopting the definition used in TAM by Davis (1989), and the complexity construct used in DOI theory (which has the same theoretical meaning, but is measured in reverse, i.e. "how hard" the system is to use; Rogers, 2003).

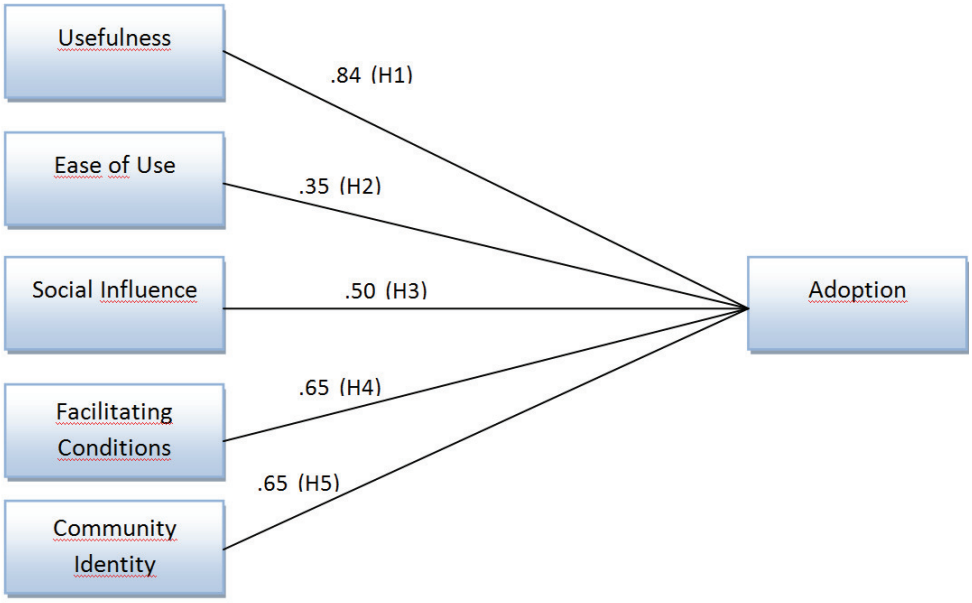

Figure 5.4. Factors impacting Facebook adoption (β values, p<0.05; Mazman & Usluel, 2010)

Regarding this construct, the authors tested the hypothesis that ease of use had a significant impact on adoption of Facebook. Results showed that, while there was a positive significant relationship between ease of use and Facebook adoption, this factor was the less predictive of the set of five foretelling factors of adoption included in the model (Figure 5.4, H2; Mazman & Usluel, 2010).

In Mazman and Usluel's model, the concept of social influence is derived from the

similar construct present in TPB (Ajzen, 1991; Fishbein & Ajzen, 1975), and in UTAUT (Venkatesh et al., 2003). It is formulated as a person's "perception of how his or her significant others will react upon performing a behavior, in our case, joining this new social environment (Facebook)" (Mazman & Usluel, 2010, p. 446).

Since Facebook is used for social activities, Mazman and Usluel anticipated that social norm should have a significant influence on people's usage of this tool. This expectation was confirmed by the authors, as can be verified by the positive relation between social influence and Facebook adoption (Figure 5.4, H3).

In the model proposed by Mazman and Usluel, facilitating conditions are defined as in the UTAUT framework. Thus, this concept refers to objective factors that are agreed by a set o people to make using some technological tool easier, to improve support in case of user's difficulties, and allowing the user to easily control the environment according to what he/she wishes (Vankantesh et al., 2003).

The research hypothesis was that FB adoption is significantly influenced by facilitating conditions (Mazman & Usluel, 2010). This hypothesis was confirmed by the authors, as can be attested by a path coefficient of 0.65 linking "adoption" of Facebook to the variable measuring this construct (Figure 5.4, H4)

Like other social network environments, Facebook allows the creation of "groups", through which people with shared interests and needs may share ideas and resources, and work collaboratively.

Mazman and Usluel (2010) decided to include this construct in the model of Educational Usage of Facebook based on studies that demonstrated that the identification of a person with a group, i.e. his/her sense of "belonging", was an important factor determining that person's motivation to participate in virtual communities (Dholakia, Bagozzi, & Pearo, 2004, as cited by Mazman & Usluel, 2010, and also reviewed on the literature research for this thesis).

As such, in the context of the Educational Usage of Facebook Model, community identity is defined as "feeling of belonging to groups in Facebook by joining to these groups, sharing and collaborating with others in groups" (Mazman & Usluel, 2010, p. 447). The model predicts (H5) that FB adoption would be very influenced by

community identity. The empirical findings (Figure 5.4, H5) corroborated this hypothesis, with a statistically significant path coefficient value of 0.65 (Mazman & Usluel, 2010).

5.3.2. Factors related to Purposes of Facebook Usage

As a social network, Facebook can be used for mundane activities (like playing games and having fun), for socializing (which may include professional networking) and for collaborative work.

Based on previous empirical research that emphasized this panoply of purposes for Facebook usage, (e.g. Stutzman, 2006, as cited by Mazman & Usluel, 2010; Ellison et al., 2007), the Educational Usage of Facebook Model states that the latent variable "purpose" is influenced by three observed variables: "social relations", "work related" and "daily activity" (Mazman & Usluel, 2010).

A partial view of the model, isolating the variables that directly relate to the latent variable "purpose" is depicted in Figure 5.5.

Mazman and Usluel (2010) assert that social relations are a fundamental dimension of Facebook, and give some examples of what is meant with this construct by referring activities such as making new friends, or communicating with previously made acquaintances.

The model predicts that "social relations will have a significant influence on purposes of Facebook usage" (Mazman & Usluel, 2010, p. 447). We can see, in Figure 5.5, this expectation was confirmed, with this factor being the most salient of the set of three factors regarding Facebook usage purpose (Figure 5.5; H6).

The distinctive importance of this factor was considered linked to Facebook being perceived as a social utility to maintain existing relations and make new friends.

Given the fact that Facebook can be used for professional purposes, enhancing collaborative work and sharing of materials and ideas, Mazman and Usluel (2010, p.

447) predict that "work related purposes will have a significant influence on Facebook usage". This prediction was confirmed, although this relationship was not as strong as others within the model, presenting a path coefficient of 0.41 (Figure 5.5; H7).

The Educational Usage of Facebook Model predicts that "daily activities will have a significant influence on purposes of Facebook usage" (Mazman & Usluel, 2010, p. 447).

Examples of what the authors considered "daily activities" are: wasting time, obtain information regarding happenings in one's social circle, having fun and playing games.

The findings indicated a path coefficient of 0.52, between the two variables measuring these constructs (Figure 5.5; H8).

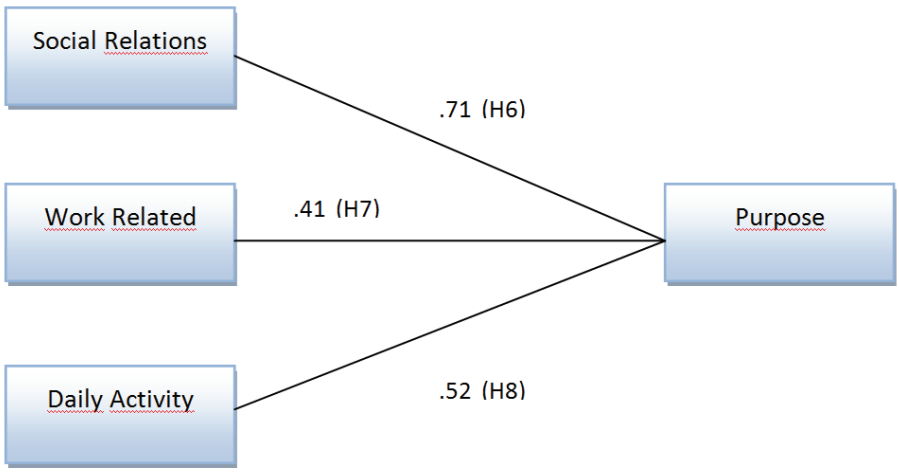

Figure 5.5. Factors related with Facebook use purposes (β values, p<0.05; Mazman & Usluel, 2010)

5.3.3. Factors related to Educational Use of Facebook

In recent years, a number of studies have been carried which confirmed the potential of Facebook, and other social networks, as educational tools. Among the studies reviewed by Mazman and Usluel (2010), we can find the empirical works carried out by Ajjan and Hartshorne (2008) and by Lockyer & Patterson (2008), which revealed how social

networks sites may enhance people collaboration, critical thinking and communication. The findings of Lee and McLoughlin (2008) in their paper regarding Web 2.0 affordances and their potential to promote student-centered learning are also taken into consideration in the formulation of this core construct of the Educational Usage of Facebook model.

Thus, and departing from current literature on this topic, Mazman and Usluel (2010) decompose the construct of "educational usage" into three topics: communication, collaboration and resource/material sharing. A graphic representation of this part of the model is depicted in Figure 5.6.

Since Facebook may be used to enhance the communication at both interpersonal and at the institutional level (e.g. providing information regarding departmental matters), Mazman and Usluel's model predicts that (H9): "Communication will have a significant influence on educational usage of Facebook" (Mazman & Usluel, 2010, p. 447). As can be verified by inspecting Figure 5.6, this hypothesis was confirmed.

Facebook promotes the creation of groups and communities, thus opening opportunities for collaborative learning. The Educational Usage of Facebook model predicts that (H10): "collaboration will have a significant influence on educational usage of Facebook" (Mazman & Usluel, 2010, p. 447). When this prediction was put to test with empirical data it was confirmed by the authors (as depicted in Figure 5.6).

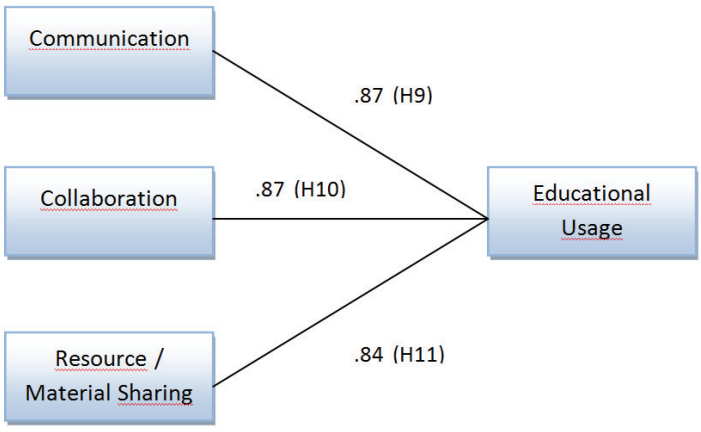

Figure 5.6. Factors of educational use of Facebook (β values, p<0.05; Mazman & Usluel, 2010)

Since Facebook is also used as a platform for the exchange of a vast panoply of information resources and materials (from video to links to external resources), Mazman and Usluel (2010) define “Educational usage of Facebook for resource and material sharing “ as “activities such as exchanging multimedia resources, videos, audio materials, animated videos, resources and documents” (p. 448).

The model predicts that sharing resources and materials would have a significant influence on the educational usage of Facebook. This hypothesis (H11) was also confirmed, as depicted on Figure 5.6 (Mazman & Usluel, 2010).

5.3.4. Relations between latent variables in the model

In the Educational Usage of Facebook model, adoption is considered to have a close relation with purposes of Facebook usage. As examples, Mazman and Usluel (2010) mention two cases in which this the manifestation of this relation can be encountered:

1. If a person perceives some tool easy to use, He/she is more prone to adopt that tool in his/her daily activity.

2. Adoption may result from social pressure from both faculty and other peer-students, leading to identification with various communities represented online.

Thus, the authors predict their model will reveal that (H12) “Facebook adoption will have a significant and positive relation with purposes of Facebook usage” (Mazman & Usluel, 2010, p. 448). Actually, the empirical results supported their prediction (Figure 5.7).

Social dimensions of Facebook and its features as a media affect the global educational context, if the assumption that implicit learning is attained by Facebook usage (Mazman & Usluel, 2010). Thus, the authors formulated the hypothesis (H13) that “Facebook adoption mediated by the purposes of Facebook usage would have a significant and positive relationship with educational usage of Facebook” (Mazman & Usluel, 2010, p. 448). Support was obtained from the empirical test of this hypothesis (Figure 5.7).

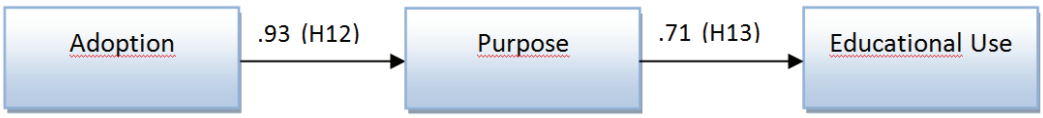

Figure 5.7. Relationship between adoption, purpose and educational use of Facebook (β values, p<0.05; Mazman & Usluel, 2010)

In summary, the main empirical findings resulted from the empirical tests made by Mazman and Usluel (2010) to test their research model regarding the educational usage of Facebook can be summarized as follows:

- The model's latent variable "adoption" was found to have significant positive relationships with all the five factors used to predict it: usefulness, ease of use, social influence, facilitating conditions, and community identity (confirming research hypothesis 1 to 5).

- Of all the five factors used to predict adoption, "usefulness" was the one whose path coefficient was the strongest (β=0.84).

- The weakest of the five factors used to predict adoption was "ease of use", with a path coefficient of β=0.35.

- The second latent variable in the model, "purpose", was found to have positive relationships with all the three model's variables measuring constructs related to it: social relations, work related, daily activity.

- Of the three observed variables directly related to the latent variable "purpose", the one that proved to be more influential was "social relations" (β=0.71).

- The third latent variable, "educational use", was revealed to have very strong positive relationships with the observed variables related to it in the model (path coefficients of about 0.85 and above), but Mazman and Usluel advert for the fact that those three

measures had almost equal distributions, which may be related to them measuring about the same aspects.

5.4. Gangadharbatla's Study on Collective Self-Esteem and Attitudes toward Social Networking Sites

While reviewing the literature about psychological dimensions of Web 2.0 adoption and use in Higher Education, we came across the concept of collective self-esteem [CSE] (Luhtanen & Crocker, 1992) used in the context of the study by Gangadharbatla (2008), in which this construct had been integrated.

In our research regarding psychological dimensions of students' adoption of Web 2.0 (Study B), we decided to include a measure of collective self-esteem, as will be further explained in Chapter 8 (Section 8.2.2.5).

Although in our own study we relate collective self-esteem to a different set of variables, we find it useful and informative summarize Gangadharbatla (2008) main research procedures and findings.

Thus, in the next paragraphs we present the main findings from Gangadharbatla (2008) paper, entitled "Facebook Me: Collective Self-Esteem, Need to Belong, and Internet Self-Efficacy as Predictors of the iGeneration's Attitudes toward Social Networking Sites".

As is apparent from the paper's title, Gangadharbatla (2008) studied the effects of other variables (besides collective self-esteem) on attitudes toward Social Networking Sites, namely: *internet self-efficacy, need for cognition,* and *need to belong*.

Collective self-esteem is an evaluative component of the persons' self-concept built from his/her knowledge of being a member of social groups (Luhtanen, & Crocker, 1992; Gangadharbatla 2008)

For the measurement of collective self-esteem, Gangadharbatla (2008) used the 16-item scale created by Luhtanen and Crocker (1992), which includes the four sub-scales: a)

membership self-esteem, b) private self-esteem, c) public self-esteem, and d) importance to self.

Internet self-efficacy was defined, in the context of Gangadharbatla (2008) study, as the confidence that people have in their ability to successfully understand, navigate, and evaluate content online (Daugherty, Eastin, and Gangadharbatla 2005, as cited by Gangadharbatla 2008). “Self-efficacy”, a concept firstly proposed by Bandura (1977) and appropriated in many research contexts, is a construct that is frequently present in models of psychological dimensions of technology adoption and use. For example, it is one of the factors in which perceived behavioral control was decomposed in the DTPB framework (Taylor & Todd, 1995b). This variable was assessed through items in the instrument that were related to aspects like the frequency with which the person logged into his/her social networking sites accounts, the number of social networking sites to which she/he had sign in, and the number of hours a week the person spent on those sites.

Regarding *need for cognition*, Gangadharbatla (2008) used this construct as defined by (Cacioppo, Petty, and Kao 1984, p. 1, cited in Gangadharbatla, 2008, p. 3) as “individual's tendency to engage in and enjoy effortful cognitive endeavors”. Based on the literature, the author states that need for cognition can predict behavior such as people’s willingness to use systems and applications with complex interfaces (Carenini, 2001, as cited by Gangadharbatla, 2008). This construct was measured by including variables that received data from seven Likert scale items, with statements such as, "I prefer complex to simple problems", or "Thinking is not my idea of fun" (Gangadharbatla, 2008, p. 5).

Need to belong was defined as a “fundamental human motivation that is something all human beings possess (...) to form and maintain at least a minimum quantity of lasting, positive, and significantinterpersonal relationships" (Baumeister and Leary 1995, p. 497, as cited in Gangadharbatla, 2008, p. 3). The author included this construct in the model because he perceived social networking sites as providers of an environment in which people may address this fundamental need, and also puts the hypothesis that people’s attitudes toward social networking sites may be strongly explain for this variable. This variable was assessed through a seven-item Likert scale that includes statements such as, "I want other people to accept me," "I do not like being alone," and

"I try hard to stay in touch with my friends" (Gangadharbatla, 2008, p. 5).

The two main research questions addressed in the Gangadharbatla (2008) were related to the nature of the relation between the four variables: a) internet self-efficacy, b) need for cognition, c) need to belong, and c) collective self-esteem and:

1- college students' *attitudes* toward social networking sites;

2- college students' *willingness to join* social networking sites.

Gangadharbatla (2008 data was collected from a sample of 237 undergraduate students from the same large Texas University, in the United States (44% men, 56% women, and almost all within the 18-30 age group), with a 65-item instrument comprised almost totally of closed-ended answers (only one open-ended question was included). The authors preferred to use pen-and-pencil version of the survey, instead of putting it online, in order to avoid excluding students that might not have access to the Internet (Gangadharbatla, 2008).

In order to answer to his two research questions, the author conducted two series of multiple regression analysis: one in which attitude toward social networking sites was used as dependent variable, and the other in which the dependent variable was willingness to join those types of sites. The predictor variables for both cases were: a) internet self-efficacy, b) need for cognition, c) need to belong, and d) collective self-esteem (Gangadharbatla, 2008).

The results revealed a positive effect of internet self efficacy, need to belong and collective self esteem on both attitude toward social networking sites and willingness to join these sites. However, there was no significant positive effect from need for cognition in neither attitude toward nor willingness to join social networking sites (Gangadharbatla, 2008). The schematic representation of Figure 5.8 depicts these findings.

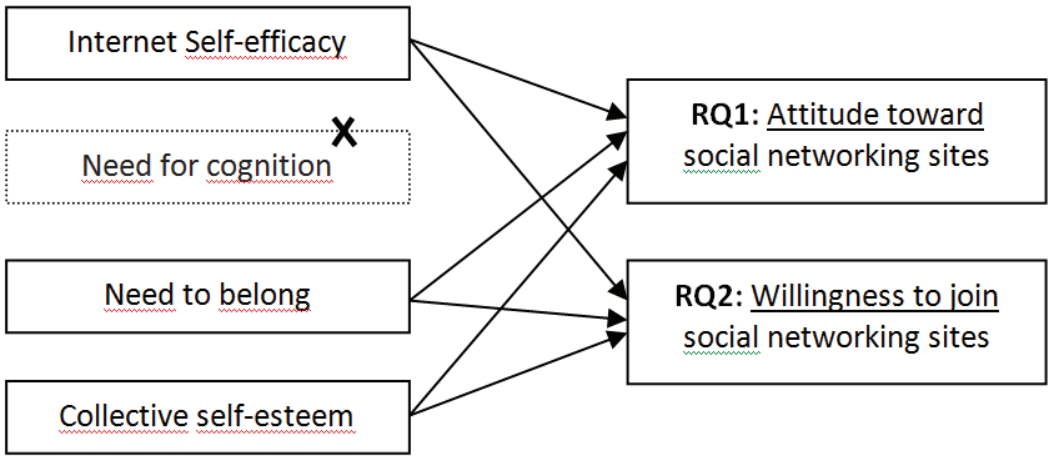

Figure 5.8. Relation between the four predictor variables and the two constructs related to each of the two research questions in Gangadharbatla (2008) study.

Gangadharbatla (2008) makes a last step on the statistical treatment of his empirical data. The author explored the possibility that attitude toward social networking sites may act as a mediator variable between internet self efficacy, need to belong and collective self esteem, and willingness to join those sites. This conceptualization is depicted in Figure 5.9.

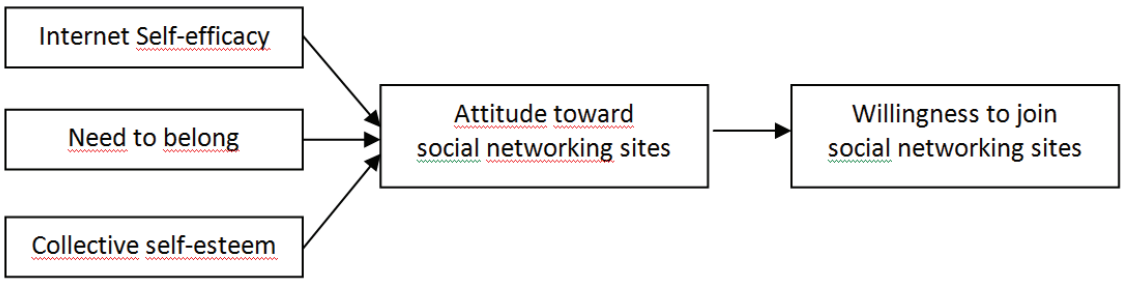

Figure 5.9. Mediation role of attitudes between internet self-efficacy, need to belong and collective self-esteem, and willingness to joint social networking sites (Gangadharbatla, 2008).

Through the use of further multiple regression analysis, Gangadharbatla (2008) discovered that attitude completely mediates the effects of self efficacy and of need to belong in willingness to join social networking sites. However, attitudes mediation effect between collective self esteem and willingness to join social networking sites was only partial, indicating that collective self esteem may relate directly to behavior (joining a social networking site), irrespective of a person's attitude towards that behavior.

5.5. Ellison, et al. Study on Self-esteem, Satisfaction with Life, Social Capital and Facebook Usage

While investigating the literature for studies which related measures of psychological well being with Web 2.0 usage, we came across Ellison, Steinfield, and Lampe (2007) paper describing these authors research on the influence of Facebook usage and the formation of *social capital*.

Social capital can be broadly defined as the resources accumulated by establishing social relations (Ellison et al., 2007).

What was particularly appealing in Ellison, et al. (2007) study, was the inclusion of variables measuring psychological aspects such as "self-esteem" and "satisfaction with academic life".

In this section we briefly present the main findings relating those psychological variables to the use of Facebook and to the construct of social capital.

There are several reasons for which this specific study deserves a more detailed attention:

1. It is one of the few reported studies that relate psychological measures of well being (in this case, self-esteem and satisfaction with life) with the usage of Web 2.0 technology (in this case, Facebook).

2. One of the instruments developed by the authors of this paper, the Facebook Intensity

Scale [FBI] (Ellison et al., 2007), was adapted for Portuguese by us, in the context of the empirical work for this thesis (for use in the context of our study B, pertaining psychological aspects of Web 2.0 usage by higher education students).

3. The social capital construct seems very promising to explore, in the context of the research about social networking sites such Facebook. Although we do not use direct measures of social capital in any of our two empirical studies, we do assess variables such as satisfaction with social support and a survey regarding academic experiences which, although exploring several other dimensions regarding students' academic experiences, includes a sub-dimension related to interpersonal experiences. Therefore, it is informative to look at the treatment that Ellison, et al. (2007) gave to social construct variable, and to inspect their main findings about the relation of this construct with the measures of psychological well being that are also important in our own research.

The main focus of our interest, in analyzing this work of Ellison and her colleagues, is the integration of the psychological variables self-esteem and satisfaction with life in their study, and the findings that these authors' obtained regarding these variables.

Nevertheless, it is important to understand the social capital construct, which was central to the Ellison, et al. (2007) research, in order to understand the participation of self-esteem and satisfaction with life in these authors' findings.

Thus, the study contemplated three dimensions of social capital:

1. Bridging social capital, referring to the network of "weak ties": loose connections, may provide useful information but normally not emotional support (proposed by Putman, 2000).

2. Bounding social capital, depicting strong emotional ties, typical of close friendships and family (also advanced by Putman, 2000).

3. Maintained social capital, related with the ability to keep valuable social connections along a persons' life (proposed by Ellison, et al., 2007).

The authors' sample was composed of 286 undergraduate students from one university (Michigan State University). The representativeness of the sample in relation to the

undergraduate population of this particular school was considered satisfactory (Ellison, et al., 2007).

To collect their data, the authors used an online survey whose composition and sub-divisions are presented on Table 5.6.

Table 5.6. Measures included in Ellison, et al. (2007) study

Measure	Part of Online Survey	Information collected
Facebook-related	Facebook Intensity Scale [FBI] (Ellison, et al., 2007)	Intensity of Facebook usage, including number of Facebook friends and time spent on Facebook
	Items about Facebook Usage	Facebook profiles and perceptions of who had view them
	Meet new people vs. connecting with existing offline contacts	Data differentiating this two possible goals of Facebook usage
Psychological Well-Being	Rosenberg Self-esteem Scale [RSES] (Rosenberg, 1989)	Person's level of self-esteem
	Satisfaction with Life Scale [SWLS] (Diener, Suh, & Oishi, 1997)	Person's satisfaction with life (slightly adapted to academic context by Ellison, et al., 2007)
Social Capital	Bridging Social Capital Scale (Ellison, et al., 2007)	Bridging social capital ("weak", non-emotional ties)
	Bounding Social Capital Scale (Ellison, et al., 2007)	Bounding social capital ("tightly-knit", close ties)
	Maintained Social Capital Scale (Ellison, et al., 2007)	Ability to keep valuable connections through life

The research hypotheses advanced by Ellison and her colleagues were that (Ellison et al., 2007):

1. The intensity of Facebook use would be positively associated with individuals' perceived bridging, bounding, and maintained social capital.

2. The intensity of Facebook use and bridging social capital would depend on the degree of the person's self-esteem, or of the person's satisfaction with life.

3. The intensity of Facebook use and bonding social capital would depend on the degree

of the person's self-esteem, or of her/his satisfaction with life.

Regarding the psychological variables that were included in this study, it is fundamentally important to retain the following findings (Ellison, et al., 2007):

1. Students reporting lower levels of satisfaction with academic life, and that at the same time used less Facebook, were found to have much lower bridging social capital in relation to those with equally low satisfaction with academic life but who used Facebook more intensely.

2. The same finding applied to self-esteem: those with lower self-esteem and who used less Facebook reported much lower social capital, than those with equally lower self-esteem but who used Facebook more intensely.

3. Conversely, students with high satisfaction with life and high self-esteem showed much smaller differences in bridging social capital, in relation to the intensity with which they reported using Facebook.

4. Self-esteem, satisfaction with academic life, and intensity of Facebook use also predicted bounding social capital, although the model only accounted for 22% of the variance (versus 46% in the case of bridging social capital). Thus, Facebook appears to be less useful for maintaining and creating this type of social capital (Ellison, et al., 2007).

In the context of our research, this study by Ellison et al. (2007) was particularly important because it demonstrated the relevance of variables related to psychological well-being (self-esteem and satisfaction with life) to understand the influence of a specific Web 2.0 tool (Facebook) in other important aspects of students' lives: in this case their ability to gather important resources through the establishment of social relations (social capital).

Although in our study we use different methods and research models from those adopted by Ellison et al. (2007), and also although we do not include the concept of

"social capital" in our study with the student population (Study B / Chapter 8), our interest in studying students' "academic experiences" (including personal, interpersonal, career, study, and institutional dimensions), and in relating these experiences with both the use of Web 2.0 tools and with a wide number of psychological variables (which include self-esteem and satisfaction with life), was greatly inspired by the seminal work of these authors.

5.6. Chapter Summary

This chapter provided a detailed review of five recent studies which were particularly important for our research, either because they were based in similar theoretical frameworks (e.g. TPB; Ajzen, 1991), or because they explored the inter-relations among variables which were specifically relevant for our study, given our research objectives.

CHAPTER VI - PRESENTATION OF THE EMPIRICAL RESEARCH

6.1. Introduction

In this chapter, an overall perspective of the empirical research conducted for this thesis is provided. The objectives, research questions and hypotheses concerning the studies that were performed are described.

The detailed account of the research methods (participants, materials and procedures), and of the results obtained, is left for the specific chapter concerning each of the studies: Chapter 7 details the study with the faculty population, and Chapter 8 details the research performed in the student population.

The research here overviewed sought to provide a perspective of adoption and appropriation of Web 2.0 in higher education, inspired by theoretical concepts and frameworks traditionally used in Psychology (such as the Theory of Planned Behavior [TPB; Ajzen, 1991]), or that are specific to Information Systems Research but were at least partially influenced by previously existing models in Psychology (such as the Technology Acceptance Model [TAM; Davis, 1989], whose roots were presented in Chapter 4). At the core of these models, we find constructs such as "attitudes", "behavioral intentions", or "perceived behavioral control", which is revealing of the importance that these psychological variables have in theoretical frameworks largely used in Information Systems Research.

Reinforcing our interest in the psychological dimensions of Web 2.0 adoption and appropriation in higher education, the study conducted in the student population (Study B) involved the gathering of information related to an extensive set of psychological variables. These variables were thereafter used to extend a model of Web 2.0 acceptance based on TAM, as well as to enrich a model of the academic use of Facebook derived from the one originally proposed by Mazman and Usluel (2010).

Existing theoretical frameworks, such as TPB, TAM, or the model for academic use of Facebook proposed by Mazman and Usluel (and discussed on section 5.3 of chapter 5) were used with two interrelated purposes:

1. To substantiate the formulation of a *subset* of the studies' research hypothesis: the

remaining hypotheses presented in this chapter were derived from our review of the existing literature (e.g. the studies detailed in depth in Chapter 5, among many others), and from the intention of proposing models capable of taking into account the psychological dimensions that our readings suggested as important, and/or that were adequate to describe individuals' attitudes and intentions regarding the use of specific Web 2.0 tools in their academic activities.

2. To inform the architecture of the *initial versions* of models concerning Web 2.0 adoption by: (a) faculty, and (b) higher education students. After testing the *full set* of our research hypothesis, *modified, final versions* of the models were presented, which adjusted optimally to the data and results obtained from our fieldwork.

In order to study the adoption and appropriation of Web 2.0 in the context of higher education, two studies were conducted.

One study involved the *faculty population* (Study A), and comprised three sub-studies: one related to general Web 2.0 use by faculty, in the context of their teaching activities (Study A1) and two others regarding the specific use of Facebook and Blogs for in faculty teaching activities (Studies A2 and A3, respectively).

The second study concerned the *student population* (Study B). This study was further sub-divided into Study B1, regarding adoption and appropriation of Web 2.0 (in general), and Study B2, specifically concerning the academic use of one particular Web 2.0 tool which has gain much salience in recent years: Facebook.

These studies were national in scope, and reflect the specific Portuguese reality regarding the adoption of Web 2.0 in higher education. This choice was determined by both practical and methodological aspects. The specificities of the study regarding the student population (Study B), and the nature of many of the instruments used on that study (psychological scales previously validated for the Portuguese population), were particularly determinant for our selection of a national scope for our research.

Detailed descriptions of the studies will be given in subsequent chapters: chapter 7 concerns Study A (adoption of Web 2.0 by faculty), and chapter 8 details Study B (adoption of Web 2.0 by students).

A summary of the results obtained in both studies is provided in Chapter 9, in the form of answers for the concrete research questions that are presented in this chapter.

6.2. Objectives and research questions

6.2.1. Global objectives and common research questions to both studies

The two studies that were conducted had two main broad objectives. The first was to clarify the extent in which faculty and students perceived Web 2.0 tools as having an important role in teaching and in learning in the context of higher education. The second consisted in studying the influence of a set of psychological variables on higher education students' attitudes and intentions towards the academic use of Web 2.0, in general, and Facebook, in particular.

The research sought to provide answers to a specific set of questions. The first two questions are broader in scope, and encompass both studies (student and faculty populations). They are enunciated as:

Research Question 1: *Is the availability of Web 2.0 tools having a significant impact on teaching and learning activities in the context of higher education.*

Research Question 2: *What benefits do faculty and students perceive from the use of Web 2.0 tools to support teaching and learning in higher education?*

In the next sections, we present additional research questions, which are particular to each of the studies that were undertaken in the context of our investigation.

6.2.2. Research questions regarding Study A – Faculty and Web 2.0

Study A, respecting the adoption of Web 2.0 tools by faculty, in the context of their teaching activities, sought the following three questions:

Research Question 3: *What factors best predict faculty's decision to adopt Web 2.0 tools to supplement their classroom instruction?*

Research Question 4: *What factors best predict faculty's decision to adopt Facebook in order to supplement their classroom instruction?*

Research Question 5: *What factors best predict faculty's decision to adopt Blogs in order to supplement their classroom instruction?*

The answers for these questions were obtained through three different sub-studies: sub-studies A1, A2, and A2 sought to answer research questions 3, 4, and 5, respectively.

6.2.3. Research questions regarding Study B – Students and Web 2.0

Study B comprises two sub-studies: one concerning the academic use of Web 2.0, in general (Study B1), and the other regarding the academic use of Facebook (Study B2).

In respect to Study B1, we first begin by seeking answers to a question which has already been addressed in past research (Hartshorne & Ajjan, 2009). However, besides the construct interrelations proposed by the Theory of Planned Behavior explored by those authors, we also investigated the relations proposed by the Technology Acceptance Model (TAM; Davis, 1989). Therefore, our sixth research question was the following:

Research Question 6: *What factors, among those proposed by the Theory of Planned Behavior (Ajzen, 1991) and the Technology Acceptance Model (Davis, 1989), best predict students' decision to adopt Web 2.0 tools, to supplement their in-class learning?*

Our interest in employing TAM to address this question was based on the fact that the existing literature (e.g. Malhotra & Galletta, 1999; Wixom & Todd, 2005; Park, 2009) provides sound guidelines about how to extend TAM by including external variables, including psychological factors, whose influence we are interested in exploring.

This combination of the TPB and TAM frameworks was not unprecedented in the literature on Information Systems Research: for instance, Taylor and Todd (1995a) proposed a model which combined both frameworks (the Combined Technology Acceptance Model – Theory of Planned Behavior [C-TAM-TPB], discussed in Chapter 4).

Given the sociability nature of Web 2.0 (McLoughlin & Lee, 2007), it is expected that its use will influence, and be influenced, by a rich set of psychological factors.

Some pioneering studies have addressed the interplay between Web 2.0 and psychological variables such as collective self-esteem, personal self-esteem, and satisfaction with academic life. The studies by Gangadharbatla (2008) and by Ellison, et al. (2007) are examples of investigations following this direction (both these studies were detailed in Chapter 5).

We sought to build a model in which concepts traditionally used in theories of technology acceptance (such as TAM) would be complemented with a group of relevant psychological variables, selected from the existing literature.

Therefore, besides the factors contemplated by the well known models of technology adoption (TPB and TAM), we were interested in studying the extent in which a set of psychological variables influenced students' adoption of Web 2.0 for supplementing their in-class learning. These variables were : a) personal self-esteem, b) collective self-esteem, c) self-concept, d) general self-efficacy, e) satisfaction with social support, f) satisfaction with academic life, g) several dimensions of academic experiences (interpersonal, career, institutional, personal and course satisfaction), and h) self-perceptions of academic and intellectual competence.

The reasons for the inclusion of the psychological variables enumerated above were partially based on the relevance that was found for them in the past by other researchers (e.g. collective self-esteem was studied previously by Gangadharbatla, 2008, and

personal self-esteem and satisfaction with academic life were addressed in the study by Ellison et al, 2007).

The inclusion of other variables, such as academic experiences, or satisfaction with social support, was dictated by our curiosity in exploring the influence of these factors in the educational use of Web 2.0 tools by higher education students, given the sociability nature of those tools (McLoughlin & Lee, 2007).

The seventh question of our investigation was thus enunciated as follows:

Research Question 7: *In what extent the studied psychological variables influence students' attitudes and intentions regarding the use Web 2.0 to supplement their in-class learning?*

The combination of the answers to questions 6 and 7 allowed the building of a model comprising a set of factors which influenced students' adoption of Web 2.0, which included not only variables traditionally studied in models of technology acceptance, but also a group of psychological variables which have been separately suggested (directly or indirectly) by recent literature, but that were never grouped under the same model.

After studying the factors which are related to the educational uses that students make of Web 2.0 (in general), the next research question concerned the factors that were predictive of students' adoption of Facebook for educational purposes (Study B2).

The research question that was intended to be answer in Study B2 was:

Research Question 8: *What factors, including the studied psychological variables, best predict students' decision to adopt Facebook in order to supplement their classroom instruction?*

In order to answer to this research question, we used (as a starting point) a model whose core architecture was inspired by the one recently proposed by Mazman and Usluel (2010), detailed in Chapter 5, and then we explored forms of incorporating the effects of the studied psychological variables in that model.

Through this procedure, it was possible to provide an integrative model in which the

effects of the relevant psychological variables (to predict students' decision to use Facebook for educational purposes) were depicted.

6.3. Research hypotheses regarding Study A

6.3.1. Hypotheses regarding sub-study A1 (Faculty and Web 2.0)

Although the model used to test the research hypotheses related to sub-study A1 was derived from the Theory of Planned Behavior (TPB; Ajzen, 1991), it contained a slight modification: the construct that is called, in the context of TPB as "perceived behavioral control" (Ajzen, 1991), was replaced by that of "self-efficacy".

The concept of "perceived behavioral control", originated from self-efficacy theory, proposed by Bandura (1977), which came from social cognitive theory (Ajzen, 1991).

According to Taylor & Todd, 1995a, self-efficacy is one of the components of perceived behavioral control. Also, theoretically "self-efficacy" is a very relevant variable in a study concerning psychological dimensions of Web 2.0 adoption and, by including this construct in the core TPB framework, we sought to retain the parsimony of that model without losing the chance to explore this psychological variable.

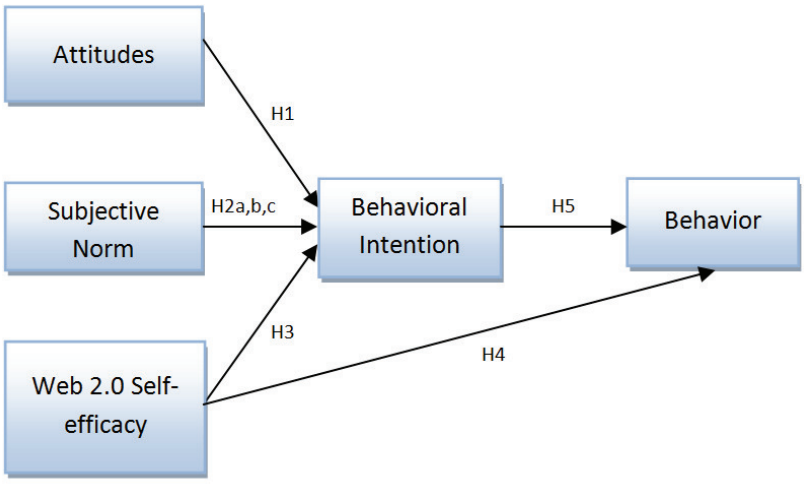

Figure 6.1. Model for testing hypotheses H1 to H5 (derived from TPB, Ajzen, 1991)

Figure 6.1 depicts the research hypotheses investigated in the context of this sub-study. Each hypothesis was enunciated as follows:

Hypothesis 1 (H1): *Faculty's attitude towards Web 2.0 has a significant positive effect on behavioral intention of using Web 2.0 tools in their teaching activities.*

Hypothesis 2 (H2): *Subjective Norm has a significant positive effect on faculty's intention to use Web 2.0 in their teaching activities*

> **H2a:** *Peers' Subjective Norm has a significant positive effect on faculty's intention to use Web 2.0 in their teaching activities.*
>
> **H2b:** *Superiors' Subjective Norm has a significant positive effect on faculty's intention to use Web 2.0 in their teaching activities.*
>
> **H2c:** *Students' Subjective Norm has a significant positive effect on faculty's intention to use Web 2.0 in their teaching activities.*

Hypothesis 3 (H3): *Web 2.0 self-efficacy has a significant positive effect on faculty's intention to use Web 2.0 in their teaching activities.*

Hypothesis 4 (H4): *Web 2.0 self-efficacy has a significant positive effect on faculty's actual usage of Web 2.0 in their teaching activities.*

Hypothesis 5 (H5): *Intention to use Web 2.0 has a significant positive effect on Faculty's actual use of Web 2.0 tools to supplement their teaching activities.*

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6.3.2. Hypotheses regarding sub-study A2 (Faculty and Facebook)

Sub-study A2 uses the exact same rationale described for Sub-study A1, only focusing in one specific Web 2.0 tool: Facebook.

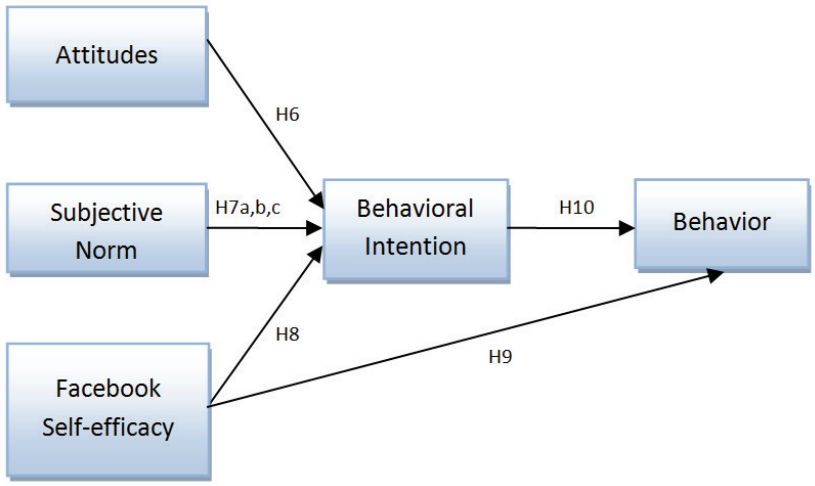

Figure 6.2. Model for testing hypotheses H6 to H10 (derived from TPB, Ajzen, 1991)

Figure 6.2 provides a representation of the research hypotheses concerning Sub-study A2.The hypotheses of this sub-study were enunciated in the following manner:

Hypothesis 6 (H6): *Faculty's attitude towards Facebook has a significant positive effect on behavioral intention of using this tool in their teaching activities.*

Hypothesis 7 (H7): *Subjective Norm has a significant positive effect on faculty's intention to use Facebook in their teaching activities*

H7a: *Peers' Subjective Norm has a significant positive effect on faculty's intention to use Facebook in their teaching activities.*

H7b: *Superiors' Subjective Norm has a significant positive effect on faculty's intention to use Facebook in their teaching activities.*

H7c: *Students' Subjective Norm has a significant positive effect on faculty's intention to use Facebook in their teaching activities.*

Hypothesis 8 (H8): *Facebook self-efficacy has a significant positive effect on faculty's intention to use Facebook in their teaching activities.*

Hypothesis 9 (H9): *Facebook self-efficacy has a significant positive effect on faculty's actual usage of Facebook in their teaching activities.*

Hypothesis 10 (H10): *Intention to use Facebook has a significant positive effect on Faculty's actual use of Facebook to supplement their teaching activities.*

6.3.3. Hypotheses regarding sub-study A3 (Faculty and Blogs)

The theoretical base for the derivation of the hypotheses of this sub-study was the same that was used in Sub-studies A1 and A2. Figure 6.3.depicts the research hypotheses used in Sub-study A3.

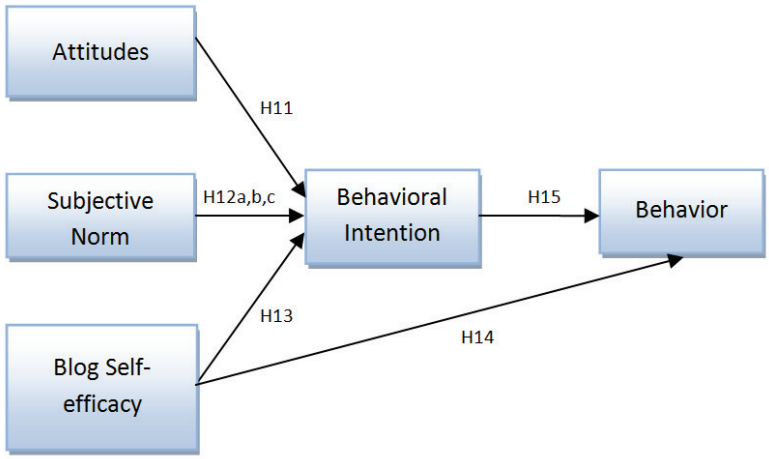

Figure 6.3. Model for testing hypotheses H11 to H15 (derived from TPB, Ajzen, 1991)

Therefore, taking into account the relations proposed by the Theory of Planned

Behavior (Ajzen, 1991), with the slight modification regarding the substitution of "perceived behavioral control" by "self-efficacy", the hypotheses of Sub-study A3 were enunciated as:

Hypothesis 11 (H11): *Faculty's attitude towards Blogs has a significant positive effect on behavioral intention of using these tools in their teaching activities.*

Hypothesis 12 (H12): *Subjective Norm has a significant positive effect on faculty's intention to use Blogs in their teaching activities*

H12a: *Peers' Subjective Norm has a significant positive effect on faculty's intention to use Blogs in their teaching activities.*

H12b: *Superiors' Subjective Norm has a significant positive effect on faculty's intention to use Blogs in their teaching activities.*

H12c: *Students' Subjective Norm has a significant positive effect on faculty's intention to use Blogs in their teaching activities.*

Hypothesis 13 (H13): *Blog self-efficacy has a significant positive effect on faculty's intention to use Blogs in their teaching activities.*

Hypothesis 14 (H14): *Blog self-efficacy has a significant positive effect on faculty's actual usage of Blogs in their teaching activities.*

Hypothesis 15 (H15): *Intention to use Blogs has a significant positive effect on Faculty's actual use of Blogs to supplement their teaching activities.*

Through the test of the fifteen research hypotheses that were described, important information was obtained which, in conjunction with all the remaining information gathered in the context of Study A, allowed answering to (part of) the research questions presented earlier in this Chapter (those concerning the faculty population).

In the next section, the research hypotheses formulated for assessing students' educational use of Web 2.0 (in general) and Facebook (in particular) are presented.

6.4. Research hypotheses regarding Study B

6.4.1. Hypotheses regarding Sub-study B1 (Students and Web 2.0)

The first set of hypotheses (hypotheses 1 to 5; H1-H5), regarding students' intentions and attitudes concerning the use of Web 2.0 to supplement their in-class learning, was based on the Theory of Planned Behavior (TPB; Ajzen, 1991). The schematic representation of these hypotheses is depicted on Figure 6.4

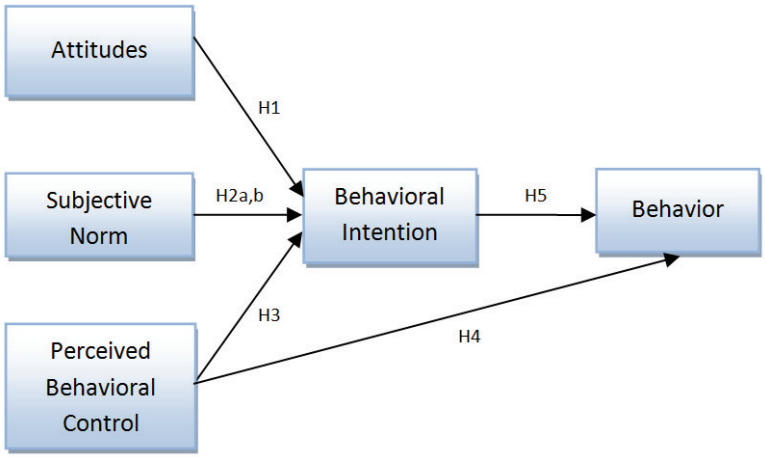

Figure 6.4. Hypotheses 1 to 5 of Study B (Based on TPB; Ajzen, 1991).

In the case of this study with student population, an extensive set of psychological scales was used, which included several measures of self-efficacy. Therefore, given the fact that, in this study, self-efficacy was assessed by specific instruments, we retained the original construct of "perceived behavioral control" in the model (TPB; Ajzen, 1991).

The hypotheses represented in Figure 6.4 were enunciated in the following manner:

Hypothesis 1 (H1): *Students' attitude towards Web 2.0 has a significant positive effect on behavioral intention of using Web 2.0 tools to supplement their in-class learning.*

Hypothesis 2 (H2): *Subjective norm has a significant positive effect on students' intention to use Web 2.0 to supplement their in-class learning.*

H2a: *Peers' Subjective Norm has a significant positive effect on students' intention to use Web 2.0 to supplement their in-class learning.*

H2b: *Faculty's Subjective Norm has a significant positive effect on students' intention to use Web 2.0 to supplement their in-class learning.*

Hypothesis 3 (H3): *Perceived behavioral control has a significant positive effect on students' intention to use Web 2.0 to supplement their in-class learning.*

Hypothesis 4 (H4): *Perceived behavioral control has a significant positive effect on students' actual usage of Web 2.0 to supplement their in-class learning.*

Hypothesis 5 (H5): *Intention to use Web 2.0 has a significant positive effect on students' actual use of Web 2.0 tools to supplement their in-class learning.*

The relation between behavioral intentions and actual actions is complex and often discrepant, and empirical studies have found that behavioral intention may not necessarily be an accurate and consistent measure of behavior (Ajzen, Brown, & Carvajal, 2004; Armitage & Conner, 2001; Wong & Sheth, 1985).

One of the reasons for Ajzen (1991) to propose the Theory of Planned Behavior was precisely to provide a framework that was able to explain the discrepancies observed between intentions and actions.

Therefore, given that the relations between intention and behavior were already addressed by hypothesis 5 (H5), which was driven from the Theory of Planned Behavior (Ajzen, 1991), hypotheses 6 to 9 (H6-H9) were tested using a reduced version of the Technology Acceptance Model (TAM; Davis, 1989), focused on revealing the factors which influenced students' attitudes and intentions towards the use of Web 2.0 to supplement their in-class learning.

Our research model, based in TAM (Davis, 1989), is presented in Figure 6.5.

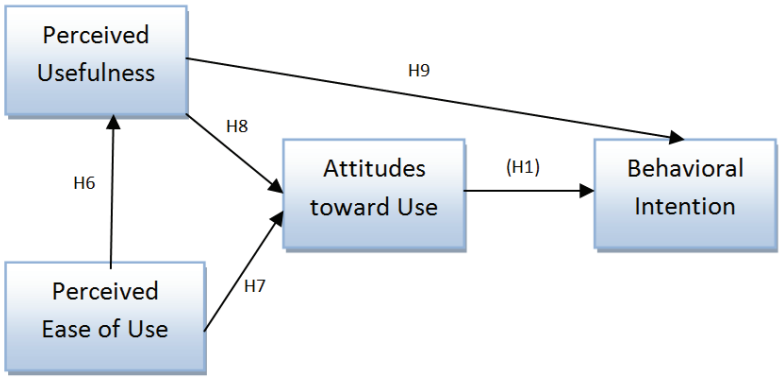

Figure 6.5. TAM-derived Model used to test hypotheses 6 to 9. Source: Davis (1989).

According to the TAM-derived model presented in Figure 6.5, hypotheses 6 to 9 were enunciated in the following manner:

Hypothesis 6 (H6): *Students' perceived ease of use of Web 2.0 has a significant positive effect on their perceived usefulness of Web 2.0, in respect to supplementing their in-class learning.*

Hypothesis 7 (H7): *Students' perceived ease of use of Web 2.0 has a significant positive effect on attitudes towards using Web 2.0 to supplement their in-class learning.*

Hypothesis 8 (H8): *Students' perceived usefulness of Web 2.0 has a significant positive effect on attitudes towards using Web 2.0 to supplement their in-class learning.*

Hypothesis 9 (H9): *Students' perceived usefulness of Web 2.0 has a significant positive effect on their intention to use Web 2.0 to supplement their in-class learning.*

Since its proposal, by Davis (1989), the TAM model has been used as the base for many studies that, although using it as a starting point, extend the original framework by proposing alternative ways in which external variables can influence attitudes and intentions (Wixom & Todd, 2005).

In fact, the extensibility of TAM is one of the advantages that this framework provides for researchers interested in exploring the effects of external variables (e.g. psychological factors; Wixom & Todd, 2005) in technology acceptance, since it provides clear guidelines on how external variables (such as personality factors or demographic indicators) can be related to the constructs of the model: TAM (Davis, 1989) postulates that perceived usefulness and perceived ease of use (of a technological tool) mediates people's attitudes and behavioral intentions (regarding that technological tool).

For the formulation of research hypotheses 10 and 11 (H10 and H11) we took advantage of the extensibility and theoretical guidance provided by TAM. These two hypotheses were formulated to study the relevance of a group of psychological constructs in understanding students' attitudes (H10) and intentions (H11) in respect to the use of Web 2.0 to supplement their in-class learning.

Figure 6.6 represents hypotheses 10 and 11 in the context of the reduced TAM model that was used is this study (except for the psychological variables, the other constructs of the model in Figure 6.6 are the same used to test hypotheses 6 to 9, presented in Figure 6.5).

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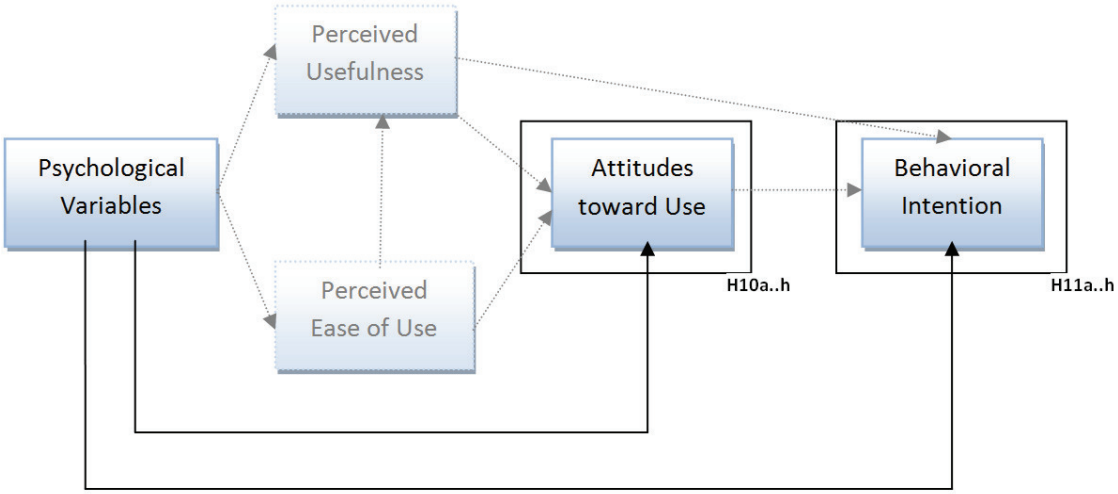

Figure 6.6. TAM extension with psychological variables (H10 and H11). Source: Davis (1989).

Using Figure 6.6 for illustrative purposes, it is important to emphasize that hypotheses 10 and 11 depend on the *set of relations* represented inside the rectangles that surround attitudes (H10) and intention (H11). Therefore, the sum of direct (solid-line arrows) and indirect (dashed-line arrows) effects will be considered in rejecting or accepting each of H10 and H11 sub-hypotheses (these hypotheses are related to *total* effects, which result from the sum of direct and indirect effects).

Therefore, and as depicted in Figure 6.6, hypothesis 10 (H10), and each of its sub-hypotheses (H10a-H10h) were formulated as follows:

Hypothesis 10 (H10): *The overall influence of the studied psychological variables on Students' attitude toward using Web 2.0 to supplement their in-class learning is significant (direct influence and/or mediated by PU and EU).*

H10a. *The overall influence of self-concept on Students' attitude toward using Web 2.0 to supplement their in-class learning is significant.*

H10b. *The overall influence of satisfaction with academic life on Students' attitudes toward using Web 2.0 to supplement their in-class learning is significant.*

H10c. *The overall influence of satisfaction with social support on Students' attitudes toward using Web 2.0 to supplement their in-class learning is significant.*

H10d. *The overall influence of personal self-esteem on Students' attitudes toward using Web 2.0 to supplement their in-class learning is significant.*

H10e. *The overall influence of collective self-esteem on Students' attitudes toward using Web 2.0 to supplement their in-class learning is significant.*

H10f. *The overall influence of general self-efficacy on Students' attitudes toward using Web 2.0 to supplement their in-class learning is significant.*

H10g. *The overall influence of academic experiences on Students' attitudes toward using Web 2.0 to supplement their in-class learning is significant.*

H10h. *The overall influence of self-perception of competence on Students' attitudes toward using Web 2.0 to supplement their in-class learning is significant.*

Similarly, as represented in Figure 6.6, hypothesis 11 (H11), and its sub-hypotheses (H11a-H11h) were enunciated in the following manner:

Hypothesis 11 (H11): *The overall influence of the studied psychological variables on Students' intention to use Web 2.0 is significant (direct influence and/or mediated by PU, EU, and Attitude).*

H11a. *The overall influence of self-concept on Students' intention to use Web 2.0 to supplement their in-class learning is significant.*

H11b. *The overall influence of satisfaction with academic life on Students' intention to use Web 2.0 to supplement their in-class learning is significant.*

H11c. *The overall influence of satisfaction with social support on Students'*

intention to use Web 2.0 to supplement their in-class learning is significant.

H11d. *The overall influence of personal self-esteem on Students' intention to use Web 2.0 to supplement their in-class learning is significant.*

H11e. *The overall influence of collective self-esteem on Students' intention to use Web 2.0 to supplement their in-class learning is significant.*

H11f. *The overall influence of general self-efficacy on Students' intention to use Web 2.0 to supplement their in-class learning is significant.*

H11g. *The overall influence of academic experiences on Students' intention to use Web 2.0 to supplement their in-class learning is significant.*

H11h.*The overall influence of self-perception of competence on Students' intentions to use Web 2.0 to supplement their in-class learning is significant.*

6.4.2. Hypotheses regarding Sub-study B2 (Students and Facebook)

For the study of the role of the psychological dimensions that our review of the literature signaled as potentially relevant (e.g. the studies by Ellison et al., 2007 and Gangadharbatla, 2008, detailed in Chapter 5), we used the framework recently proposed by Mazman and Usluel (2010) as theoretical guidance.

Nevertheless, a different approach for building the models for predicting the educational usage of Facebook was taken: instead of using structural equation modeling with latent variables (as Mazman & Usluel, 2010), we based our models in path analyses using (exclusively) observed variables.

Path analysis is one of the variants of structural equation modeling, used to describe the direct dependencies among a set of variables. The main goal of path analysis is to establish a causal model of how predictor variables are combined to affect the level of the dependent variable (Howitt & Cramer, 2010).

Since latent variables were not used, it was fundamental to assure the reliability of the

measurements included in our models. The reliability of the observed variables was verified by the computation of their Cronbach's alphas (and also through confirmatory factor analyses which did include the use of latent variables)

In this manner, we were able to explore direct relations between all the variables in the model, including the extent in which some of the dimensions of Facebook adoption were directly related with the educational use of Facebook (instead of being mediated by purposes of Facebook use, as proposed in the model by Mazman & Usluel, 2010).

In addition, and fundamentally, we wanted to scrutinize which variables, including psychological factors, had a significant influence on the educational use of Facebook, either directly or through the mediatory role of purposes of Facebook usage.

Therefore, the remaining hypotheses of Study B were formulated with the aim of clarifying which factors (including the psychological variables studied), influenced the educational use of a specific Web 2.0 tool: Facebook.

The first three hypotheses of Sub-study B2 (which correspond to hypotheses 12 to 14 of Study B), are represented schematically in Figure 6.7.

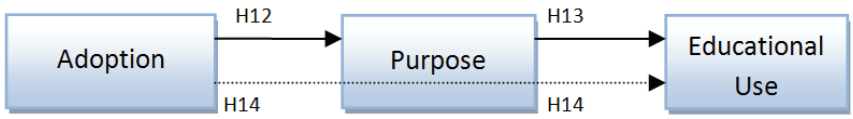

Figure 6.7. Hypotheses 12 to 14 (Derived from Mazman & Usluel, 2010)

Hypotheses 12 to 14 were enunciated in the following manner:

Hypothesis 12 (H12): *The direct influence of Facebook adoption on Students' purposes of Facebook usage is significant.*

Hypothesis 13 (H13): *The direct influence of purposes of Facebook use on Students' educational use of Facebook is significant***.**

Hypothesis 14 (H14): *The indirect influence of Facebook adoption on students' educational use of Facebook, mediated by Purposes of Facebook Usage, is significant.*

In order to assess the influence of the studied psychological variables on the educational use of Facebook, an extension of the model presented in Figure 6.7 was used.

All the psychological variables were introduced as both *direct* and *indirect predictors* of educational usage of Facebook. Using the model proposed by Mazman and Usluel (2010) as a reference, the mediatory role of purposes of Facebook use is explored as a source for indirect effects of the psychological variables in the educational use of this tool.

In Figure 6.8, the direct and indirect ("purpose"-mediated) effects of the studied psychological variables, are depicted inside the rectangle in the bottom-left corner of "Educational Use".

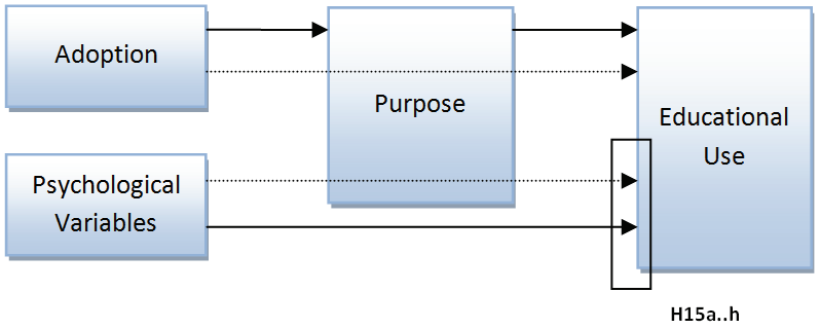

Figure 6.8. Model for testing hypothesis 15 and its sub-hypotheses (H15a to H15h)

The sum of direct (solid-line arrow) and indirect (dashed-line arrow) effects will be considered in rejecting or accepting each of hypothesis 15 (H15). This last hypothesis was enunciated in the following manner:

Hypothesis 15 (H15): *The overall influence of the studied psychological variables on students' educational use of Facebook is significant (direct influence and/or mediated by purposes of Facebook use).*

H15a. *The overall influence of self-concept on students' educational use of Facebook is significant.*

H15b. *The overall influence of satisfaction with academic life on students' educational use of Facebook is significant.*

H15c. *The overall influence of satisfaction with social support on students' educational use of Facebook is significant.*

H15d. *The overall influence of personal self-esteem on students' educational use of Facebook is significant.*

H15e. *The overall influence of collective self-esteem on students' educational use of Facebook is significant.*

H15f. *The overall influence of general self-efficacy on students' educational use of Facebook is significant.*

H15g. *The overall influence of academic experiences on students' educational use of Facebook is significant.*

H15h. *The overall influence of self-perception of competence on students' educational use of Facebook is significant.*

The test of these research questions provided relevant information for answering the research questions involving the student population.

6.5. Chapter summary

In the present chapter, an overall perspective of the empirical research conducted for this thesis was provided. The research questions introduced in the first chapter were revisited and the hypotheses that were formulated to answer those questions were presented, in the context of the theoretical frameworks from which they were derived: TPB (Ajzen, 1991), TAM (Davis, 1989), and the model for Facebook educational usage proposed by Mazman and Usluel (2010).

Most important, this chapter presented the ways in which these models were adapted and/or extended in order to provide the specific answers required by our set of research questions.

CHAPTER VII - STUDY A – ADOPTION OF WEB 2.0 BY FACULTY

7.1. Introduction

In this chapter, we present a study conducted on the Portuguese faculty population, regarding the adoption and appropriation of Web 2.0 in the context of teaching activities.

This research (Study A) was divided into three sub-studies: one related to general Web 2.0 adoption and appropriation in the context of faculty's academic activities (study A1) and two others regarding the specific use of Facebook and Blogs in that context (studies A2 and A3, respectively).

With this study, we intended to understand which factors best predicted Faculty's decision to adopt Web 2.0 (in general) in the context of their academic activities. Also, we sought to provide a more detailed view of those factors involved in Faculty's decision to adopt two specific Web 2.0 tools: Facebook and Blogs.

As presented in Chapter 6, the specific research questions that we sought to answer by conducting Study A were the following:

Research Question 3: *What factors best predict faculty's decision to adopt Web 2.0 tools to supplement their classroom instruction?*

Research Question 4: *What factors best predict faculty's decision to adopt Facebook in order to supplement their classroom instruction?*

Research Question 5: *What factors best predict faculty's decision to adopt Blogs in order to supplement their classroom instruction?*

Sub-study A1 was concerned with providing answers to research question 3, and sub-studies A2 and A3 were concerned with answering research questions 4 and 5, respectively.

The method used in this study (participants, materials used, and procedure) are presented over the next sections of this chapter, followed by general descriptive results

concerning the information gathered in the context of Study A.

Subsequently, specific results concerning each of the three sub-studies are provided, our research hypothesis (presented in Chapter 6) are tested, and global integrative models (including additional variables) are presented, depicting faculty's use of Web 2.0 (in general), Facebook, and Blogs in the context of their teaching activities.

7.2. Method

7.2.1. Participants

The participants in this study were 681 Portuguese faculty members from 12 different higher education institutions (listed in Table 7.1).

The number of answers obtained represent a response rate of 23,5%, since 2903 participation invitations were sent (cf. Table 7.1).

This relatively high response rate may result from the approach that we took in contacting the faculty members, but can also be seen as an indicator of the perceived relevance and interest of our topic of study (Web 2.0 in higher education) among this population.

In the constitution of our sample, we were preoccupied with obtaining information from as many different geographically institutions as possible, and also in including a representative number of faculty members from both of the two Portuguese higher education sub-systems (universities and polytechnics).

The study was conducted on the final academic month of the year 2010/2011, and we relied on readily available contact information, offered by higher education institutions, to formulate our list of recipients.

Tables and pictures providing a detailed perspective on participants' demographic variables are presented at the start of the results section (7.3.1.).

Table 7.1. Institution and number of faculty members contacted

Institution	N	%
Inst. Polit. Bragança	193	6,6
Inst. Polit. Castelo-branco	227	7,8
Inst. Polit. Guarda	67	2,3
Inst. Polit. Viana Castelo	73	2,5
Inst. Sup. Engª Lisboa	243	8,4
Inst. Polit. Univ. Algarve	173	6
Univ. Católica - Porto	34	1,2
Univ. Católica - Lisboa	83	2,9
Univ. Évora	573	19,7
Univ. Portucalense	123	4,2
Univ. Beira Interior	622	21,4
Univ. Trás-Montes-AD	492	16,9
Total:	N=2903	100%

7.2.2. Material

In this section, we describe the online survey that was built to collect faculty data regarding the use of Web 2.0 tools, in the context of their teaching activities.

The background structure of our survey was strongly inspired by the empirical instrument developed by Haya Ajjan and Richard Hartshorne in the context of these authors' study regarding general Web 2.0 adoption by faculty (Ajjan & Hartshorne, 2008).

However, our instrument was not a direct translation / adaptation from the one used in the context of Ajjan and Hartshorne (2008) study, since there were some important differences.

Firstly, we decided to include only a subset of the constructs assessed by the original survey, since we wanted to explore the relations among constructs provided by the original Theory of Planned Behavior (TPB; Ajzen, 1985), which is at the heart of the Decomposed Theory of Planned Behavior framework (DTPB; Taylor & Todd, 1995b),

used by Ajjan and Hartshorne (2008) to develop their research instrument.

By retaining the core items common between TPB and DTPB we tried to keep the possibility of comparing our findings with those of Ajjan and Hartshorne (2008), since the five constructs of TPB, and their relations, are also part of the DTPB used by those authors. That was seen as particularly important, since by being able to make this comparison, we also gained a valuable source of information to our own research.

In an effort to maintain some of the richness provided by DTPB, we also collected some information which provided us with greater detail concerning components that Taylor and Todd (1995b) suggested for the decomposition of attitudes and subjective norms.

Another influence of the DTPB on our work was that we preferred to substitute the general measure of perceived behavioral control by one of its particular sub-dimensions: self-efficacy, as discussed in Chapter 6.

Therefore, the models that are presented in this chapter were influenced by both the original TPB (Ajzen, 1985) and by DTPB (Taylor & Todd, 1995b).

Another important difference refers to the part of the survey that assesses the factors influencing Web 2.0 use by faculty, in the context of their courses. This part of the survey was modified to address specific Web 2.0 tools, such as Facebook, Blogs, or Wikis, instead of asking about more general Web 2.0 usage. Through this modification, we intend to be able to construct separate theoretical models for each of those tools.

Since we decided to address a less extensive set of constructs than what would be required to apply the DTPB, it became possible to repeat the core measurements for each of the specific Web 2.0 tools, without ending with a very long survey. Thus, with our version of the survey, the (non-decomposed) TPB can be applied to understand the use of each of the nine tools analyzed (Facebook, LinkedIn, Blogs, YouTube, Wikipedia, other Wikis, MSN Messenger, Skype, and Twitter).

Since there were two sub-studies (A2 and A3), focusing on two specific Web 2.0 tools (Facebook and Blogs), a group of items was included in the survey which aimed and gathering specific information concerning those tools.

Our version of the survey included a final question regarding the degree of satisfaction of faculty with their institution's Learning Management System. Such a question was also included in the students' research protocol, as we are interested in studying the effect of this variable on Web 2.0 adoption and appropriation.

In order to translate (and adapt) the selected items from the original English version into Portuguese, we counted with the help of one English teacher and one professional translator, who were both native Portuguese speakers. A draft version of the instrument was prepared, by discussing the alternative translated items with two experts, one from the field of Information and Communication Systems, and the other from that of Psychology. A pilot version was tested online, by two faculty members, and was considered adequate for its research purposes.

The complete survey can be inspected in Appendix 2. The instrument presents the following structure:

1. Informed consent (hardwired to the rest of the instrument, since the survey was administered online)

2. Demographic data section (asking for information regarding gender, age, scientific areas of formal training, scientific areas of the courses in which performs teaching, number of years of teaching experience).

3. A set of nine items, in which the degree of comfort with each of nine different Web 2.0 tools is assessed (Facebook, LinkedIn, Blogs, YouTube, Wikipedia, other wikis, Messenger, Skype, and Twitter).

4. A group of nine items, questioning about the intentions to use each of the mentioned Web 2.0 tools in the next semesters, and in the context of teaching activities.

5. Nine items inquiring about the degree in which the faculty member could explain the advantages / disadvantages of using each of the Web 2.0 tools in his/her teaching activities.

6. Nine items, regarding the usefulness of each of the Web 2.0 tools for the teaching practices.

7. Two items requiring detailed information regarding the advantages of using: a) Facebook, and b) Blogs, in the context of teaching practices.

8. A group of nine items, assessing the degree in which using each of the Web 2.0 tools was under the teacher control (Facebook, LinkedIn, Blogs, YouTube, Wikipedia, other wikis, Messenger, Skype, and Twitter).

9. Three groups of nine items, each group evaluating the degree in which: a) peers (other faculty members), b) superiors, and c) students valued the use of each of the nine specific Web 2.0 tools mentioned above.

10. A group of nine items addressing the question of the degree of compatibility between each of the Web 2.0 tools and the teaching strategies of that particular faculty member.

11. One item assessing the compatibility between the computer and the internet connection and the Web applications that the faculty member would like to use in her/his teaching activities.

12. One item evaluating the degree of satisfaction of the faculty member and his/her institution's learning management system (such as Moodle or Sakai).

We used Google Forms technology to design the online survey, and one of the limitations of this technology was the requirement to have a maximum of five options in Likert-type answering scales. Since in many of the items it was important to have an option for the cases in which the person simple didn't know (or didn't wish to answer), we ended up using 4-point Likert scaling for most of the items (and an extra "NA" option). The use of an even point scale, disenables the possibility of a person giving a neutral answer, as would be possible, for example, if the scale had 5 choices ("1" to "5") and a person picked the one in the middle of the scale ("3"). However, despite the reasons for using a 4-point scale were essentially related to the limitations of Google Forms, the use of this type of scaling is not uncommon. For example, the self-esteem scale used in the empirical study regarding student use of Web 2.0 (RSES; Santos 2008) uses this kind of scale.

In terms of the reliability of the sub-scales extracted from the online survey that we used, the indicators provided in Tables 7.2, 7.3, and 7.4 (concerning the Web 2.0, Facebook, and Blogs scales, respectively), reveal the adequacy of their values of internal consistency, with all the subscales attaining a Cronbach's alphas above the 0,7 level.

Table 7.2. Web 2.0: Reliability analysis of the items of the scale used to collect data relative to the constructs derived from TPB (N=681).

Construct	Item	Item-total correlation	Cronbach's α
Attitude	ATT_PUWeb20	,784	0,848
	ATT_COMPWeb20	,774	
Subjective Norm	SN1Web20 - Peers	,573	0,701
	SN2Web20 - Sup	,401	
	SN3Web20 - Stud	,673	
Self-efficacy	Self-efficacy / Web 20	,459	
Intention	Intention / Web 20	,690	
Actual Usage	Actual Usage / Web 20	,588	

The **total** Cronbach's α for all the items measuring the use of Web 2.0 tools by Faculty was 0,864.

(Continued on the next page, please turn)

Table 7.3. Facebook: Reliability analysis of the items of the scale used to collect data relative to the constructs derived from TPB (N=681).

Construct	Item	Item-total correlation	Cronbach's α
Attitude	ATT_PUFacebook	,749	0,785
	ATT_COMPFacebook	,709	
Subjective Norm	SN1Facebook - Peers	,438	0,717
	SN2Facebook - Sup	,576	
	SN3Facebook - Stud	,582	
Self-efficacy	Self-efficacy / Facebook	,482	
Intention	Intention / Facebook	,704	
Actual Usage	Actual Usage / Facebook	,488	

The **total** Cronbach's α for the all items measuring the use of Facebook by Faculty was 0,830.

Table 7.4. Blogs: Reliability analysis of the items of the scale used to collect data relative to the constructs derived from TPB (N=681).

Construct	Item	Item-total correlation	Cronbach's α
Attitude	ATT_PUBlogs	,792	0,839
	ATT_COMPBlogs	,761	
Subjective Norm	SN1Blogs – Peers	,565	0,708
	SN2Blogs – Sup	,415	
	SN3Blogs – Stud	,620	
Self-efficacy	Self-efficacy / Blogs	,568	
Intention	Intention / Blogs	,741	
Actual Usage	Actual Usage / Blogs	,520	

The **total** Cronbach's α for the items measuring the use of Blogs by Faculty was 0,860.

7.2.3. Procedure

After obtaining the approval of University Fernando Pessoa's Ethics Committee, personalized messages were sent to 2903 faculty members of Portuguese higher education institutions.

In order to send individual messages to this relatively large number of recipients, the "mail merging" facilities provided by a popular e-mail client (Mozilla Thunderbird) were used. The technical aspects related to this initial step are presented in Appendix 1.

Of the group of 2903 faculty members that were contacted by e-mail, a total of 695 (23,9% of 2903) faculty members followed the link that addressed them to the anonymous online survey. Of these 695, 681 accepted the informed consent declaration, and filled the totality of the items of the online instrument (23,5%).

Therefore, among the faculty members who followed the link of the survey, the response rate was 98%.

The online survey collected data for a period of one month, at the end of the academic year of 2010/2011.

7.3. Descriptive Results

7.3.1. Demographic information

The majority of the participants were male (60,5%), as depicted in Table 7.5, and Figure 7.1.

Table 7.5. Study A – Participants' Gender Distribution (N=681)

Gender	N	%
Male	412	60,5
Female	269	39,5

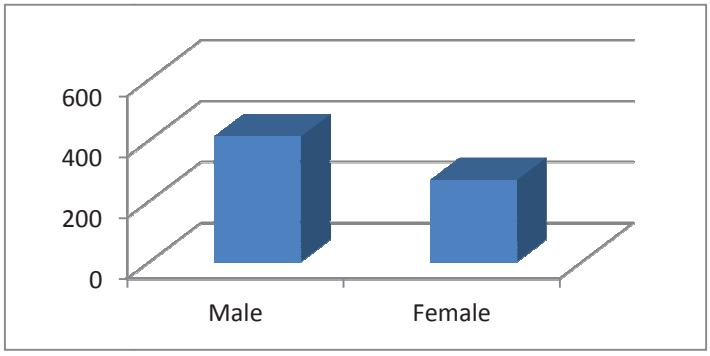

Figure 7.1. Study A – Participants' Gender Distribution (N=681)

The great majority of respondents (93%) were aged between 30 and 59 years old. The two most numerous groups, in terms of age, were those composed by faculty members with between 30 and 39, and 40-49 years. These two groups represented 70% of the sample.

Table 7.6 Study A – Participants' Age Groups (N=681)

	N	%
<30	25	3,7
30-39	218	32,0
40-49	260	38,2
50-59	155	22,8
60-69	22	3,2
≥70	1	,1

Table 7.6 presents the distribution of the participants by the diverse age groups, and Figure 7.2. provides a graphical illustration of the age composition of our sample.

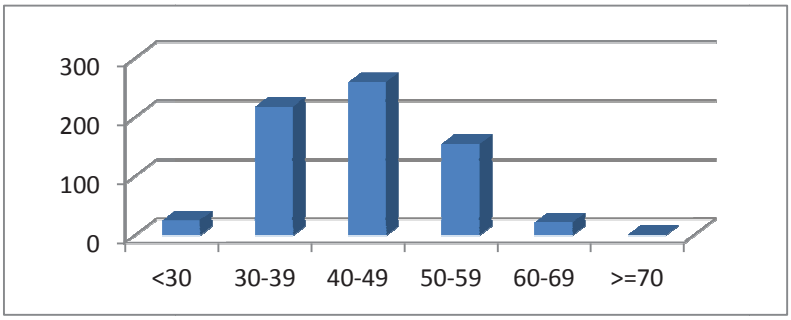

Figure 7.2. Study A – Participants' Age Groups (N=681)

In terms of teaching experience, the majority of the participants (70,5%) reported having between 10 and 29 years of practice.

Table 7.7. Teaching Experience (in Years; N=681)

	N	%
<5	53	7,8
5-9	88	12,9
10-19	292	42,9
20-29	188	27,6
30-39	55	8,1
≥40	5	,7

The number of participants with 0 to 9 years of professional experience represented 20,7% of our sample. Table 7.7 provides further numerical details regarding this variable, and the information on that table is also represented on Figure 7.3.

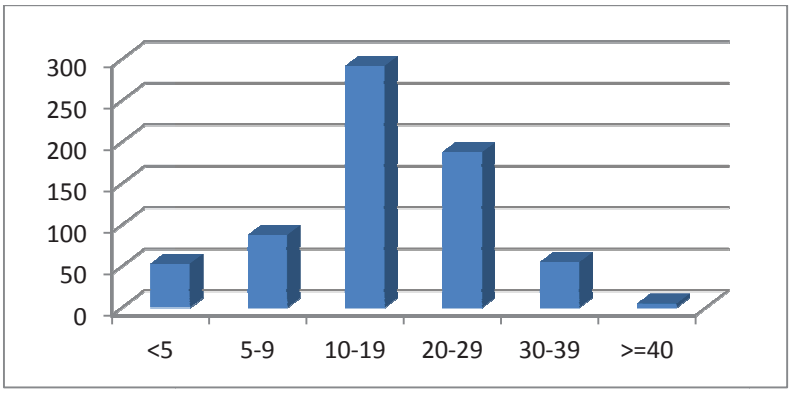

Figure 7.3. Teaching Experience (in Years; N=681)

Table 7.8 and Figure 7.4 present information regarding the academic areas in which the respondents received initial training. Percentage scores were not calculates, in this case, because each participant was free to indicate several different areas of initial training. Therefore, the sum of the areas of initial training, presented in Table 7.8 (773) exceeds the size of our sample (N=681), what is justified by the motive exposed.

Table 7.8. Field(s) of Initial Academic Training and of Teaching (N=681)

	Initial Training	**Teaching Field**
	N	N
Humanities	70	75
Social Sciences	135	160
Health Sciences	97	128
Technology and Engineering	206	256
Business Studies	76	109
Exact Sciences	84	65
Natural Sciences	85	97
Law Studies	20	23

Figure 7.4 gives a general pictorial account of the areas of initial training reported by the participants in our study. Social Sciences and Technology and Engineering were the two most salient areas of initial training for respondents in our sample.

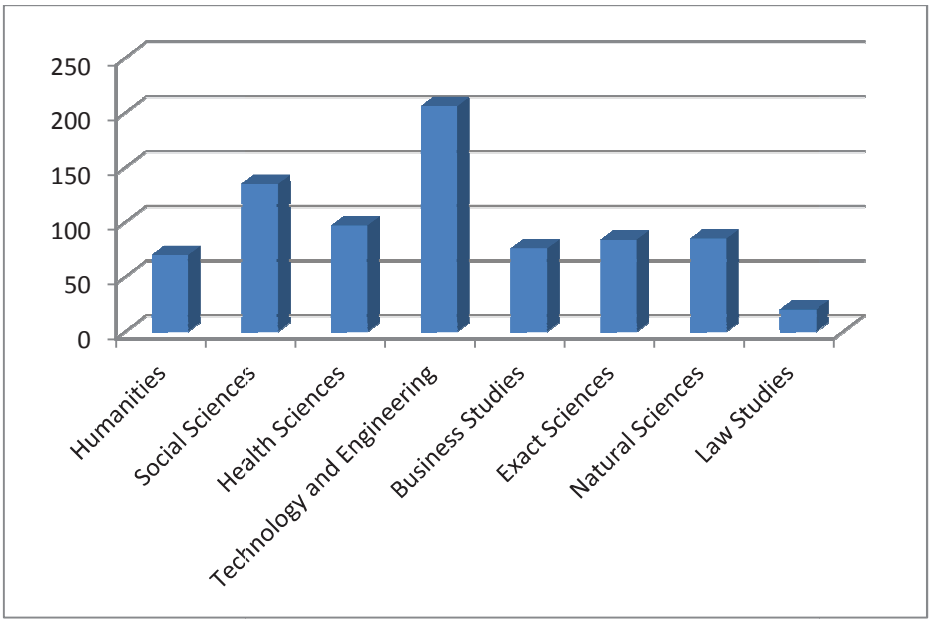

Figure 7.4. Area of Initial Academic Trainning (N=681)

Faculty members may teach students of degree courses different from their own, and of more than one academic area. Therefore, the sum of these areas indicated on Table 7.8 (913) exceeds the number of faculty members in our sample (N=681). Thus, for this variable the percentage is not presented in the table, but Figure 7.5 is helpful to gain a global perspective of the academic areas of the courses in which our participants taught.

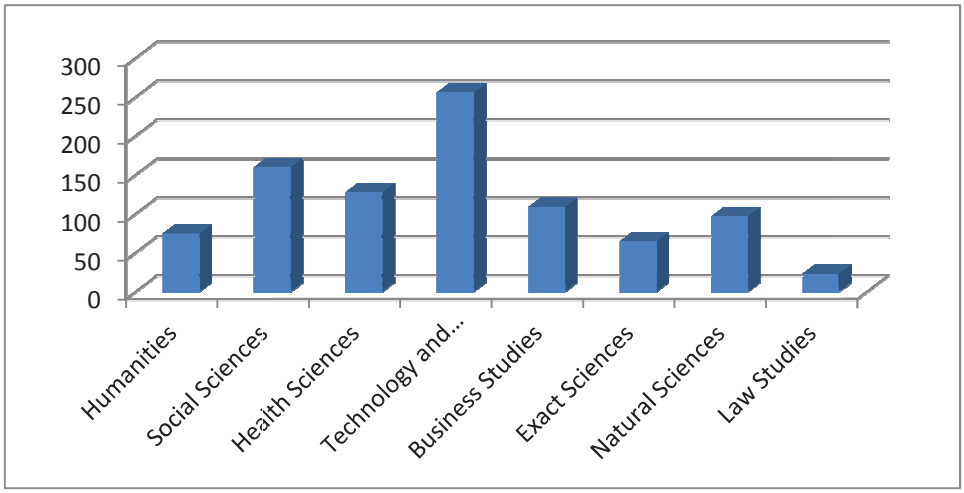

Figure 7.5. Teaching field(s) of the study participants (N=681)

In this section, some general results were provided, covering demographic information of the participants in our study, as well as some general information related to their academic and professional profile.

In the next section, descriptive results are provided which relate to Web 2.0 adoption and to general opinions of faculty members regarding information-technology related aspects of their teaching practice.

7.3.2. General Indicators of Web 2.0 Adoption by Faculty

In Table 7.9, the scores obtained, through the online survey, for each of the items assessing TPB constructs (Ajzen, 1991) are presented.

As explained in Chapter 6, in the models used in this study, the construct that is called, in the context of TPB as "perceived behavioral control" (PBC; Ajzen, 1991), was replaced by "self-efficacy", one of PBC components whose role has been emphasized in the literature (e.g. Taylor & Todd, 1995b, Ajjan & Hartshorne, 2008).

Global measures of "Web 2.0" were computed by multiplying the score of the most highly ranked tool by 2/3, and then adding the average for all the tools, multiplied by 1/3. This criterion was tested empirically, and selected after comparison with many other alternatives. It was chosen because it allowed to highlight intense use of one tool, but also to take into account the degree in which other tools were used.

Since a four-point Likert scale was used, ranging from a negative extreme of 1 to a positive extreme of 4, a mean value above or below 2.5 provided a general picture of how each of the dimensions represented in Table 7.9 was evaluated by participants, in respect to Web 2.0 tools, in general, and for the specific cases of Facebook and of Blogs.

The results presented in Table 7.9 reveal that attitudes of faculty in relation to the use of Web 2.0 tools to supplement their teaching activities were neutral, although attitudes

concerning the specific use of both Facebook and Blogs in teaching were generally negative.

Table 7.9 Means of the item scores of the scale used to collect data relative to the constructs derived from TPB (Ajzen, 1991; N=681).

Construct	Dimension	**Web 20** Mean (SD)	**Facebook** Mean (SD)	**Blogs** Mean (SD)
Attitude	Usefulness	2,48 (0,81)	1,58 (0,83)	1,83 (0,93)
	Pedagogic Compatibility	2,5 (0,86)	1,72 (0,92)	2,04 (1,02)
Subjective Norm	Peers' Social Influence	1,84 (0,89)	1,54 (0,87)	1,46 (0,74)
	Superiors' Social Influence	1,43 (0,74)	1,3 (0,7)	1,28 (0,65)
	Students' Social Influence	2,26 (1,03)	1,91 (1,13)	1,77 (1,01)
Self-efficacy	Self-efficacy	3,05 (0,53)	2,42 (1,16)	1,98 (0,95)
Intention	Intention to Use	2,23 (0,81)	1,51 (0,83)	1,57 (0,83)
Actual Usage	Actual Usage	2,84 (0,86)	2,24 (1,1)	2,4 (1,07)

Note: a four-point Likert scale was used, ranging from 1 (negative pole) to 4 (positive pole)

The social group from which faculty members perceived receiving more "social pressure" to adopt Web 2.0 tools was that of students.

However, as is discussed in the models that were built to study the effectiveness of the influence exerted by each of the social groups described in Table 7.9 (Sections 7.4 to 7.9, in this Chapter), when social norms were influent in determining Web 2.0 adoption, only the influence of peers revealed to be significant in this respect.

Overall, faculty members believed they were competent to use Web 2.0 tools (in general). In relation to Facebook, their general sense of competence was situated near the neutral point of the scale (2.5), but the general sense of competence regarding the specific use of Blogs was situated in the negative region of the scale.

Intention to use Web 2.0 tools (in general) approached the neutral point of the measure,

but intention to use specifically Facebook or Blogs were markedly negative.

The complex relations between behavioral intentions and actual use have been at the center of fierce debates in the literature (e.g. Wong & Sheth, 1985; Armitage & Conner, 2001; Ajzen et al., 2004).

According to the results depicted in Table 7.9, real use of Web 2.0 (in general) was higher than what would be predicted solely by the intentions reported by faculty members regarding the use of these tools (for the purposes of aiding in teaching activities). The same phenomenon was observed for the specific cases of Facebook and Blogs.

In order to understand these results, it is important to take into consideration that, according to TPB (Ajzen, 1991), actual use depends not only of intentions to use, but also of self-efficacy (i.e. perceived competence to use a given tool).

The interrelations among the variables depicted in Table 7.9 were explored in detail through the several models that are presented in Sections 7.4 to 7.9.

The online survey also included a one-page form in which participants were requested to indicate which advantages (if any) they perceived in using Facebook or Blogs in the context of their teaching activities.

Tables 7.10 and 7.11 and Figures 7.6 and 7.7 depict the information collected through that form.

Table 7.10- Perceived Advantages of Using Facebook in Teaching

Advantages of Facebook Use	N	%
Enhance Interaction with Peers	219	32,2%
Enhance Students' Learning	84	12,3%
Enhance Students' Course Satisfaction	112	16,4%
Improve Class Dynamics	185	27,2%
Develop Writing / Reflexive Skills	47	6,9%

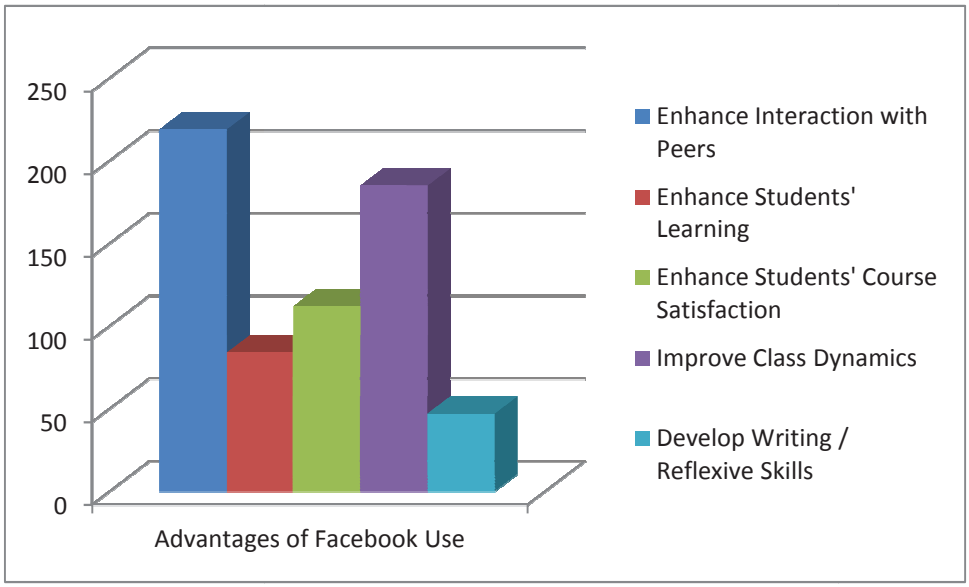

Figure 7.6 - Perceived Advantages of Using Facebook in Teaching

Comparing Figures 7.6 and 7.7, it is perceptible that our participants regarded Facebook and Blogs very differently, in terms of their potential educational advantages.

Facebook most distinctive educational applications appear to come from it enabling faculty members to contact their peers, and to promote class dynamics.

Table 7.11- Perceived Advantages of Using Blogs in Teaching

Advantages of Blogs Use	N	%
Enhance Interaction with Peers	130	19,1%
Enhance Students' Learning	199	29,2%
Enhance Students' Course Satisfaction	118	17,3%
Improve Class Dynamics	187	27,5%
Develop Writing / Reflexive Skills	181	26,6%

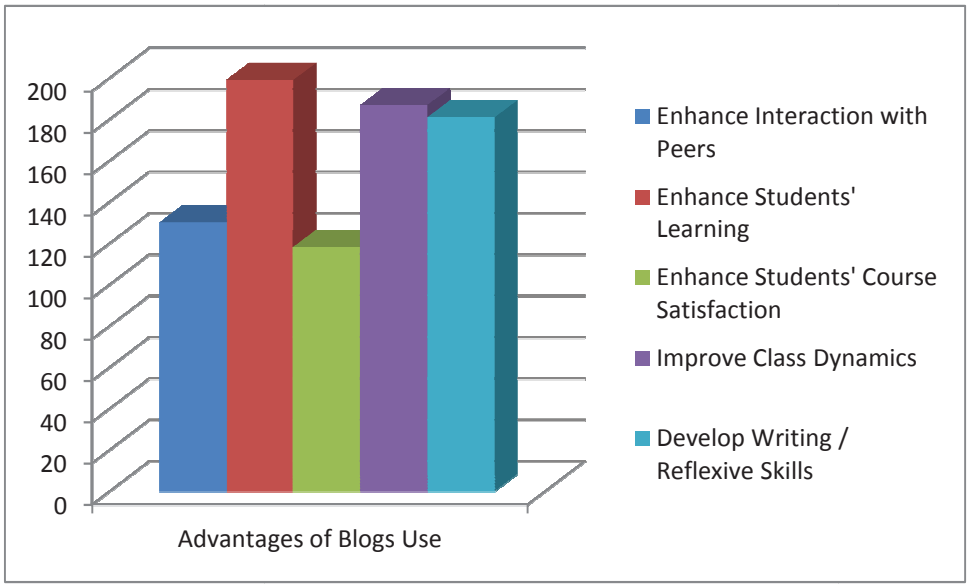

Figure 7.7 - Perceived Advantages of Using Blogs in Teaching

In what respects the use of Blogs in their teaching activities, our participants recognized the importance of this type of tool to enhance student learning, improve class dynamics (as much as Facebook), and to promote writing and reflexive skills.

Figures 7.6 and 7.7 reveal that, as far as the information collected through this item in our survey allows to tell, faculty members perceive Blogs as having a greater educational advantage over Facebook, at least in the relatively narrow indicators focused in this item.

However, it must be noted that none of the suggested advantages was acknowledged by more than one third of participants,

Another important variable measured through the survey concerns the degree of satisfaction that faculty members reported in regard to their institutions' learning management system (LMS).

As is summarized in Table 7.12, and depicted in Figure 7.8, the majority of the

participants answered in the neutral or positive regions of the scale, reporting neutral (3) or moderate positive (4) levels of satisfaction with their institutions' LMS.

Table 7.12. Satisfaction with Institutions' LMS

Degree of satisfaction	N	%
1="totally non-satisfied"	18	2,6
2	80	11,7
3	197	28,9
4	272	39,9
5="totally satisfied"	114	16,7

Although relatively few of the participants indicated moderate (2) or high (1) non-satisfaction, few were also totally satisfied (5) with the LMS provided by their institution (Figure 7.8).

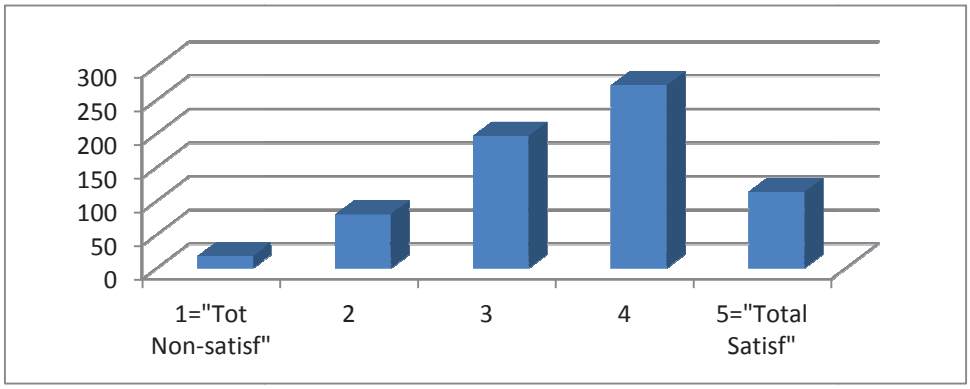

Figure 7.8. Satisfaction with Institutions' LMS

In what concerns the perceived compatibility between the information technology resources (computers and Internet connectivity) available at the participants' institution and the types of Web applications that he/she would like to use in their teaching practice, the most frequent answer was that on the "totally compatible" extreme of the scale (Table 7.13, Figure 7.9).

The proportion of participants in the positive side of the scale was 71%, and 90% indicated levels of technological compatibility ranging from neutral (3) to "total" (5).

Only 10% of participants provided answers on the negative side of the scale, and the number of faculty members perceiving their institutions information technology resources as "totally incompatible" with the Web applications they would like to use in their teaching was only 3,2%

Table 7.13 Institutions' IT resources compatibility with Web applications desired for teaching

Degree of compatibility	N	%
1="totally incompatible"	22	3,2
2	46	6,8
3	129	18,9
4	170	25,0
5="totally compatible"	314	46,1

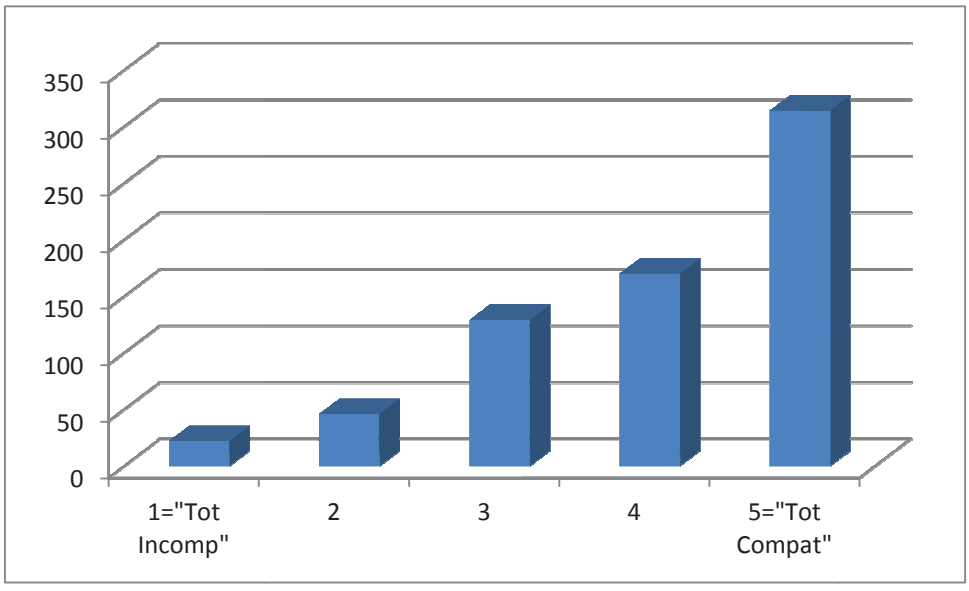

Figure 7.9. Institutions' IT resources compatibility with Web applications desired for teaching

In this section, a general descriptive perspective of participants' demographic characteristics was provided. We also presented some indicators collected through our

online survey related to participants' opinions about the advantages of using Facebook and Blogs in their teaching practice.

Finally, participants' opinions regarding their satisfaction with their institution's LMS was presented, followed by a depiction of the participants' perceived compatibility between the IT resources provided by their higher education institutions and the Web applications that they wished to use in their teaching practice.

The above results respect the totality of Study A, concerning Web 2.0 adoption by faculty members, in the context of their teaching activities. They have been presented in an essentially descriptive manner, and they provide important indicators for the understanding of a group of key aspects concerning out topic of study.

Over the next sections, we will present the remaining results of our study through the use of theoretical models (derived from TPB; Ajzen, 1991) which will provide a systematic account of the results that were obtained in the context of this study. Sub-study A1 concerns the use of Web 2.0 (in general) for teaching purposes. In sub-studies A2 and A3 we will focus our attention in faculty's adoption of two specific Web 2.0 tools: Facebook and Blogs.

7.4. Results of Study A1 – Academic Adoption of Web 2.0 by Faculty

As described in Chapter 6, the main research question that we intended to answer through this Sub-study is enunciated as follows:

Research Question 3:

What factors best predict faculty's decision to adopt Web 2.0 tools to supplement their classroom instruction?

From the Theory of Planned Behavior (TPB; Ajzen, 1991), we formulated a group of

hypotheses intended to answer that question. Those hypotheses, taking the form of relations among constructs provided by TPB, are depicted in Figure 7.10.

Comparing the model represented in Figure 7.10 with the one originally proposed by Ajzen (1991), one difference is detectable. In the third rectangle at the bottom left side of the diagram, "Web 2.0 Self-efficacy" takes the place of "Perceived Behavioral Control". This slight modification (inspired in research by Taylor & Todd, 1995b), was discussed in Chapter 6.

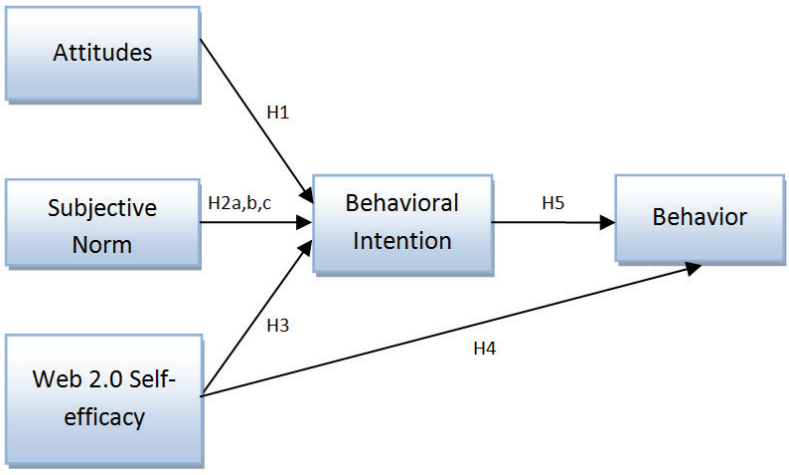

Figure 7.10. Core research model used to test hypothesis 1 to 5 (H1-H5)

In Figure 7.10, each arrow linking two constructs (represented by rectangles) depicts each one of our research hypotheses (e.g. "H1" represents "Hypothesis 1").

The scheme presented in Figure 7.10, based on TPB, was reproduced in the SPSS/Amos model, presented in Figure 7.11.

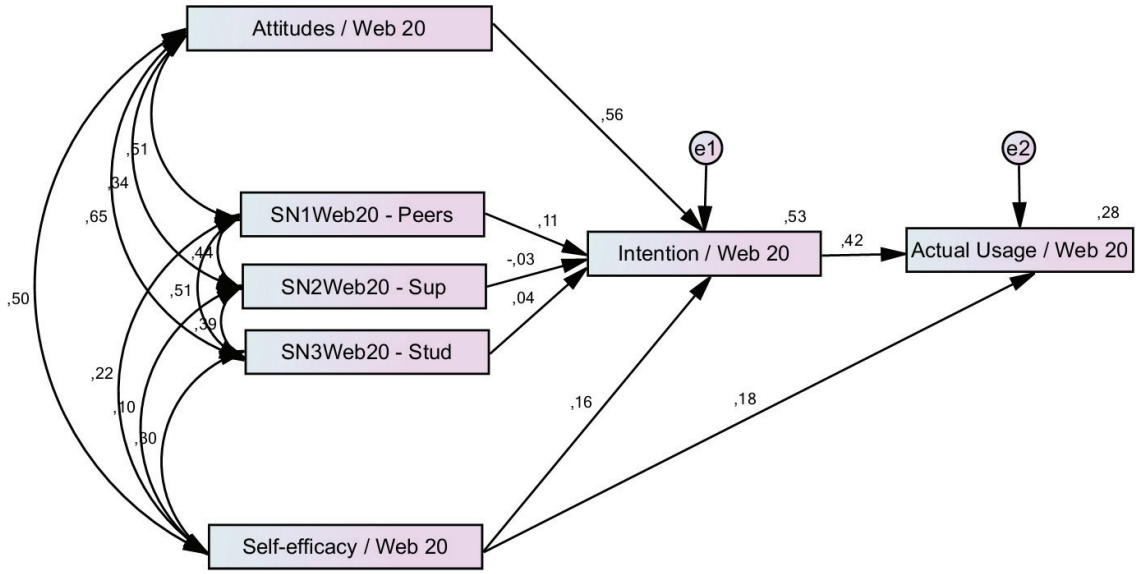

Figure 7.11. SPSS/Amos model corresponding to scheme presented in Figure 7.10

In the SPSS/Amos diagram of Figure 7.11, the numbers above each one-directional arrow linking the variable represent their standardized regression estimates ("β"), presented also (in **bold** type) on Tables 7.14 and 7.15.

The bi-directional arrows on the left of the diagram represent the degree of correlation between exogenous variables: all coefficients were significant, with $p<0.01$.

In SPSS/Amos diagrams, the total variance explained by the endogenous variable predictors is presented as a number above the right corner of the rectangle representing that variable.

The two variables "e1" and "e2" , inside the small circles above "Intention / Web 2.0" and "Actual Usage / Web 2.0", represent the error terms associated with those endogenous variables (in SPSS/Amos, any observed endogenous variable must have an error term associated with it).

Multivariate normality is a critically important assumption in conducting structural modeling analyzes (Byrne, 2010). For the calculation of multivariate normality, the

univariate normality of the variables in the model is taken into account.

In practice, however, most raw empirical data fail to meet the assumption of multivariate normality (Byrne, 2010). Additionally, previous research (e.g. Kline; 1998) demonstrated that even in conditions of severe non-normality of data, the parameters obtained in structural equation models (e.g. path estimates) remain fairly adequate.

The most important indicator of the degree of multivariate non-normality present in a model is kurtosis (Byrne, 2010). Therefore, the Mardia's coefficient of multivariate kurtosis, provided by SPSS/Amos, was used to assess the presence (and degree) of multivariate non-normality.

Although there is no absolute consensus in the literature regarding cut-off values for classifying multivariate non-normality using the Mardia's coefficient, it is commonly considered that values ranging from one to ten are indicative of moderate multivariate non-normality, and values above ten reveal severe multivariate non-normality in the data.

As expected from the literature (e.g. Byrne, 2010), there was usually some degree of multivariate non-normality in our models, as measured by the Mardia's coefficient, even if moderate (i.e. Mardia's coefficient between one and ten).

For the model depicted in Figure 7.11, the Mardia's coefficient was 4,510 (which indicates the existence of moderate multivariate non-normality in the data).

Therefore, "bootstrapping", one of the procedures available in SPSS/Amos to handle the presence of non-normal data (Byrne, 2010), was performed to confirm regression and covariance estimates. The "bias-corrected" estimates, obtained by using the bootstrapping procedure are presented in the tables in where regressions and covariances are depicted (e.g. Table 7.14 and Table 7.15) .

The fact that the estimates provided by the default maximum likelihood method and their "bias-corrected" ("BC") equivalents were always practically indistinguishable in the tables, confirms the robustness of these parameters, found in previous research, such as Kline (1998).

Table 7.14. Test of Study A1 hypothesis (unmodified TPB-base model): Predictors of Intention

	Estimates	BC Estimates	**Std Estimates**	BC Std Estimates
Attitudes / Web 20 (**H1**)	0,582**	0,584	**0,559****	0,559
SN1Web20 – Peers (**H2a**)	0,097**	0,097	**0,107****	0,107
SN2Web20 – Sup (**H2b**)	-0,029	-0,029	**-0,026**	-0,026
SN3Web20 – Stud (**H2c**)	0,031	0,031	**0,04**	0,04
Self-efficacy / Web 20 (**H3**)	0,243**	0,244	**0,158****	0,158

Note:.* p<0,05. ** p<0,01 .

The predictor variables presented in Table 7.14 explained 53% of the variance of the variable measuring intentions of Web 2.0 use in teaching activities (R^2=0,53; Figure 7.11).

Table 7.15. Test of Study A1 hypothesis (unmodified TPB-based model): Predictors of Actual Usage

	Estimates	BC Estimates	**Std Estimates**	BC Std Estimates
Self-efficacy / Web 20 (**H4**)	0,291**	0,294	**0,177****	0,178
Intention / Web 20 (**H5**)	0,453**	0,453	**0,423****	0,424

Note:.* p<0,05. ** p<0,01 .

The predictor variables presented in Table 7.15 explained 28% of the variance of the variable measuring "actual usage" of Web 2.0 in teaching activities (R^2=0,28; Figure 7.11). Although relatively low, a similar low predictive power of behavioral intentions on actual use of Web 2.0 was found in a precedent study in this field of research (Hartshorne & Ajjan, 2009, concerning Web 2.0 adoption by students).

Therefore, applying the model depicted on Figure 7.11 to test the validity of each of our research hypotheses (earlier presented in Chapter 6, and here summarized in Figure

7.10, and signaled in **bold** type on Tables 7.14 and 7.15), we can say that:

Hypothesis 1 **(H1),** stating that faculty's attitude towards Web 2.0 has a significant positive effect on behavioral intention of using Web 2.0 tools in their pedagogical activities, was confirmed (β=0,559, p<0,01).

General hypothesis 2 **(H2)**, proposing that subjective norm has a significant positive effect on faculty's intention to use Web 2.0 in their pedagogical activities, was partially confirmed, given that:

Hypothesis 2a **(H2a),** stating that peers' subjective norm has a significant positive effect on faculty's intention to use Web 2.0 in their pedagogical activities, was confirmed (β=0,107, p<0,01)

Hypothesis 2b **(H2b)**, stating that superiors' subjective norm has a significant positive effect on faculty's intention to use Web 2.0 in their pedagogical activities, was rejected.

Hypothesis 2c **(H2c)**, stating that Students' Subjective Norm has a significant positive effect on faculty's intention to use Web 2.0 in their pedagogical activities, was rejected.

Hypothesis 3 **(H3)**, stating that Web 2.0 self-efficacy has a significant positive effect on faculty's intention to use Web 2.0 in their pedagogical activities, was confirmed (β=0,158, p<0,01).

Hypothesis 4 **(H4)**, proposing that Web 2.0 self-efficacy has a significant positive effect on faculty's actual usage of Web 2.0 in their pedagogical activities, was confirmed (β=0,177, p<0,01).

Hypothesis 5 **(H5):** stating that intention to use Web 2.0 in teaching has a significant positive effect on Faculty's actual use of Web 2.0 tools to supplement their pedagogical activities, was confirmed (β=0,423, p<0,01).

Although the model derived from the Theory of Planned Behavior (Figures 7.10 and 7.11) was useful for the formulation of the research hypotheses concerning this study, and for testing them, the goodness of fit indicators (χ^2, χ^2/df, RMSEA) revealed that a

modification in the relations proposed by TPB was needed in order for the model to fit our data well.

Through the indicators provided by SPSS/Amos "modification indices" ("MI's"), it was found that a unique modification of the original TPB-inspired model was necessary for it to attain good fit measures, which consisted in considering that attitudes ("Attitudes / Web 2.0" in Figure 7.11) could have a direct influence on Web 2.0 actual usage ("Actual Usage / Web 2.0", in Figure 7.11).

By adding that unique predictive link, the model presented in Figure 7.12 was obtained.

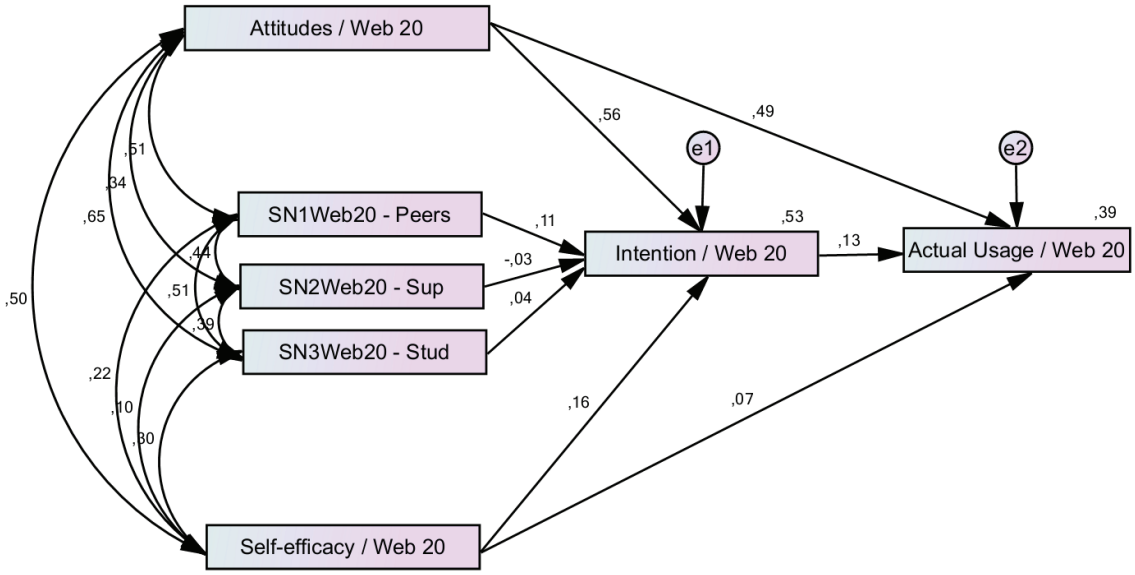

Figure 7.12. Model with additional link between "attitudes" and "actual usage"

The goodness of fit indicators for the model presented in Figure 7.12 were excellent, as presented in Table 7.16.

In addition to the indicators provided in Table 7.16, even the simple χ^2 statistic, which

tends to reject good models when the size of the sample is large (as is our case, N=681), supported the goodness of fit of the model: χ^2 (3, N=681) =2,640, p=0,451 (a non-significant χ^2 measure is considered a good indicator of model fit).

For the model presented in Figure 7.12, the Mardia's coefficient of multivariate kurtosis was 4,510 (the same as in the model presented in Figure 7.11). This value indicates the existence of moderate multivariate non-normality in the sample.

Therefore, complementary to the results provided by the χ^2 statistic, the Bollen-Stine bootstrap, an adjusted chi-square test which corrects for the bias introduced when data deviated from the normal distribution, proposed by Bollen and Stine (1992) was also used. For this model (Figure 7.12), the Bollen-Stine bootstrap "p" value was 0,491 (for 2000 samples). This indicator is interpreted in the same manner than its equivalent in the χ^2 statistic: by being equal or higher that 0,05 it indicates good fit of the model (at that significance level).

This model (Figure 7.12) was used to confirm the validity of the test of hypotheses previously conducted. As is depicted on Figure 7.12, and summarized in Tables 7.17 and 7.18, all the significant regression coefficients found in the TPB-inspired model used to test hypothesis 1 to 5 (H1-H5) remain significant (or remain non-significant), supporting the earlier test of hypotheses.

Table 7.16. Goodness of fit indicators for the model presented in Figure 7.12

Fit measure	Good fit	Acceptable fit	Model value
χ^2/df	≤ 2	≤ 3	0,880
RMSEA	≤ 0.05	≤ 0.08	0,000
CFI	≥0.97	≥0.95	1,000
GFI	≥0.97	≥0.95	0,999
AGFI	≥0.90	≥0.85	0,990
IFI	≥0.95	≥0.90	1,000

Note:criteria from Schermelleh-Engel et al. (2003) & Byrne (2010)

Comparing the results obtained in the original, TPB-inspired, model and the modified version built from the indicators provided by SPSS/Amos, we can see that (as expected), no difference exists among the predictors of "intention" (Table 7.14 *versus* Table 7.17). Also as expected, the total variance explained by "intention" predictors is unchanged (R^2=0,53; Figure 7.12).

Table 7.17. Confirmation of Study A1 test of hypotheses (modified TPB): Predictors of intention

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
Attitudes / Web 20 (**H1**)	0,582**	0,584	**0,559****	0,559
SN1Web20 – Peers (**H2a**)	0,097**	0,097	**0,107****	0,107
SN2Web20 – Sup (**H2b**)	-0,029	-0,029	**-0,026**	-0,026
SN3Web20 – Stud (**H2c**)	0,031	0,031	**0,04**	0,04
Self-efficacy/Web 20**(H3)**	0,243**	0,244	**0,158****	0,158

Note:.* p<0,05. ** p<0,01 .

Table 7.18. Confirmation of Study A1 test of hypotheses (modified TPB): Predictors of actual usage

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
Attitudes / Web 20	0,541**	0,541	**0,485****	0,485
Self-efficacy/Web 20 **(H4)**	0,123*	0,126	**0,074***	0,076
Intention / Web 20 **(H5)**	0,136**	0,136	**0,127****	0,127

Note:.* p<0,05. ** p<0,01 .

All the differences among the two models are concentrated on the predictors of "actual usage" (Table 7.15 versus Table 7.18).

As is represented in Table 7.18, when "attitudes" are considered a direct predictor of "actual usage" (β=0,485, p<0,01), the predictive weight of "intention" on "actual usage" decays from β=0,423 (Table 7.15) to a mere β=0,127 (Table 7.17). Nevertheless, the influence of "intention" on Web 2.0 "actual usage" remained significant, as predicted by hypothesis 5 (H5).

Also, the influence of "self-efficacy" on "actual usage" decays from 0,177 (Table 7.15) to 0,074, but hypothesis 4 (H4) remains valid, although the size of its the effect is lower and its statistical significance is reduced from $p<0,01$ to $p<0,05$.

The addition of one predictor variable to "actual usage" led to a significant increase of the variance explained for this variable, which increased from 0,28, in the first model to 0,39 (Figure 7.12).

Therefore, in conclusion, this slightly modified, excellent fitting model (Figure 7.12), confirmed all the results obtained with our initial model (inspired in TPB), in what regards the test of our research hypotheses.

7.5. Integrative Model and Discussion of Results of Study A1 (Web 2.0)

In order to provide a richer and integrative model of Web 2.0 pedagogical usage by Faculty, a set of additional variables were added to the model proposed in the previous section (Figure 7.12), taking advantage of its good statistical properties.

Therefore, the following variables were integrated into the model: a) gender, b) age, c) years of professional experience ("PROFEXP"), d) institutions' IT resources compatibility with Web applications desired for teaching ("RESOURCES"), and e) Satisfaction with Institutions' LMS ("SATISF_LMS_Inst").

Additionally, the construct "Attitudes towards Facebook" was decomposed in two of the constituents of attitudes proposed by Taylor and Todd (1995b): a) compatibility ("ATT_COMPFacebook"), and b) perceived usefulness ("ATT_PUFacebook").

The new variables were all considered exogenous, and were therefore correlated with the other existing exogenous variables in the model. Each variable was tested as a predictor of: a) intention to use Web 2.0 in teaching activities, and b) actual usage of Web 2.0 in teaching activities.

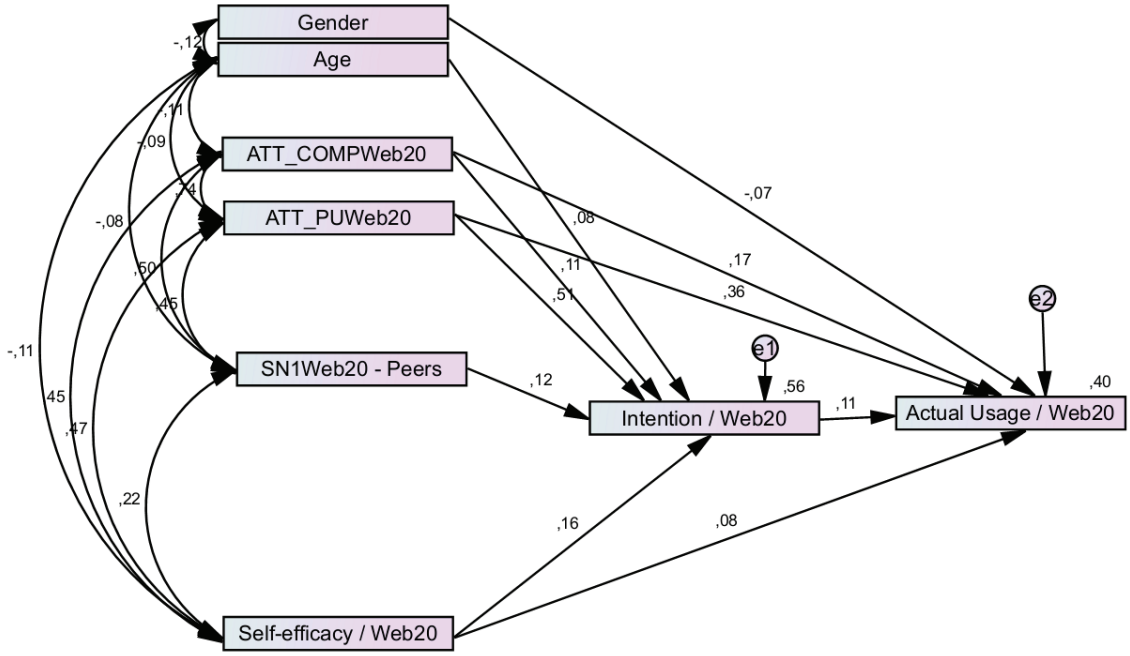

Figure 7.13 Final integrative model for Web 2.0 adoption (faculty members)

After all the non-significant relations among the variables were removed, the model depicted in Figure 7.13 emerged (the intermediate steps of this procedure are documented on Appendix 3).

For the model in Figure 7.13, no modification was suggested by SPSS/Amos "modification indices" ("MI's"), what indicated that no important relations among the variables were missing in the model (in order for it to present good values of fit to our data).

The χ^2 statistic provided evidence for the goodness of fit of the final integrative model (Figure 7.13): χ^2 (7, N=681) =6,639, p=0,467. This finding was consistent with the other goodness of fit indicators, presented in Table 7.19.

Table 7.19 Goodness of Fit Indicators for the model presented in Figure 7.13 (N=681)

Fit measure	Good fit	Acceptable fit	Model value
χ^2/df	≤ 2	≤ 3	0,948
RMSEA	< 0.050	< 0.080	0,000
CFI	≥0.97	≥0.95	1,000
GFI	≥0.95	≥0.90	0,998
AGFI	≥0.90	≥0.85	0,988
IFI	≥0.95	≥0.90	1,000

Note:criteria from Schermelleh-Engel et al. (2003) & Byrne (2010)

Since the multivariate kurtosis for the variables in the model was 4,001, the Bollen-Stine statistic was computed to confirm the results obtained with the χ2 test results. The Bollen-Stine bootstrap returned a "p" value of 0,487, therefore, corroborating the result of the χ2 statistic.

Table 7.20. Study A1 - Predictors of intention according to final integrative model

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
SN1Web20 – Peers	0,111**	0,111	**0,123****	0,123
Self-efficacy / Web 20	0,247**	0,248	**0,161****	0,16
ATT_PUWeb20	0,512**	0,513	**0,512****	0,513
ATT_COMPWeb20	0,101**	0,101	**0,107****	0,107
Age	0,071**	0,07	**0,079****	0,079

Note:.* p<0,05. ** p<0,01 .

The set of predictor variables presented in Table 7.20 explained 56% of the variance observed for the variable measuring intentions of using Web 2.0 in teaching activities (R^2=0,56; Figure 7.13).

Table 7.21 Study A1 - Predictors of actual usage according to final integrative model

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
Self-efficacy / Web 20	0,128*	0,132	**0,078***	0,08
Intention / Web 20	0,114*	0,113	**0,106***	0,106
ATT_PUWeb20	0,386**	0,385	**0,361****	0,36
ATT_COMPWeb20	0,176**	0,176	**0,174****	0,175
Gender	-0,122*	-0,122	**-0,069***	-0,069

Note:.* p<0,05. ** p<0,01 .

The five predictor variables presented in Table 7.21 explained 40% of the variance observed for the variable measuring actual use of Facebook in teaching activities (R^2=0,40; Figure 7.13).

The covariances and correlations among the variables conserved in the final model are presented in Table 7.22.

Table 7.22 Study A1 - Covariances and correlations among variables in final integrative model

	Cov	BC Cov	**Corr**	BC Corr
Age<->Gender	-0,051**	-0,052	**-0,115****	-0,117
ATT_COMPWeb20<->Age	-0,088**	-0,087	**-0,113****	-0,112
ATT_PUWeb20<->Age	-0,063*	-0,062	**-0,085***	-0,084
ATT_PUWeb20<->ATT_COMPWeb20	0,509**	0,508	**0,737****	0,737
Self-efficacy / Web 20<->Age	-0,053**	-0,053	**-0,111****	-0,112
Self-efficacy / Web 20<->ATT_COMPWeb20	0,204**	0,203	**0,454****	0,453
Self-efficacy / Web 20<->ATT_PUWeb20	0,2**	0,199	**0,472****	0,471
SN1Web20 - Peers<->Age	-0,065*	-0,065	**-0,08***	-0,08
SN1Web20 - Peers<->ATT_COMPWeb20	0,379**	0,378	**0,496****	0,496
SN1Web20 - Peers<->ATT_PUWeb20	0,322**	0,322	**0,446****	0,446
SN1Web20 - Peers<->Self-efficacy / Web 20	0,103**	0,102	**0,219****	0,218

Note:.* p<0,05. ** p<0,01 .

Therefore, taking into account the final version of the model (depicted in Figure 7.13), it was found that faculty's attitudes towards the pedagogical use of Web 2.0 had a significant positive effect on behavioral intention of using Web 2.0 tools in their teaching activities.

In particular, when Web 2.0 tools were perceived as useful, and compatible with preferred teaching practices, higher levels of intention of using Web 2.0 in teaching were observed. Perceived usefulness was, however, a much stronger predictor of intentions *and* of actual use, in relation to perceived compatibility.

Subjective norm demonstrated to have a significant positive effect on faculty's intention to use Web 2.0 in their pedagogical activities, but faculty members revealed to be influenced only by their peers in this matter (and not by their superiors, or by the students).

Web 2.0 self-efficacy (i.e. the beliefs faculty had on their competence to use Web 2.0 tools) was found to have a significant positive effect on faculty's intention to use Web 2.0 in their pedagogical activities, and also on faculty's actual usage of Web 2.0 for those purposes.

As expected, and predicted by TPB (Ajzen, 1991), intention to use Web 2.0 in teaching was a predictor of the actual usage of Web 2.0 by Faculty, for the purpose of supplementing their pedagogical activities.

Age was observed to have a weak positive effect on intention to use Web 2.0 for pedagogical purposes, although this effect disappeared in relation to actually using these tools in teaching activities.

Gender seemed not to influence intentions of using Web 2.0 tools for teaching activities, but being a woman was a small (but statistically significant) predictor of *not* actually using Web 2.0 tools for teaching purposes.

The effects of: a) the number of years of professional experience, b) the perceived institutions' IT resources compatibility with Web applications desired for teaching, and c) the satisfaction with institutional Learning Management System were not significant, in the context of the TPB-derived research model depicted in Figure 7.13.

7.6. Results of Study A2 – Academic Adoption of Facebook by Faculty

This sub-study sought to provide an answer to the following research question, previously presented in Chapter 6:

Research Question 4:

What factors best predict faculty's decision to adopt Facebook in order to supplement their classroom instruction?

Using the same theoretical rationale described in the previous sub-study (Section 7.4), and in Chapter 6, the hypotheses which were tested in this study are represented in Figure 7.14.

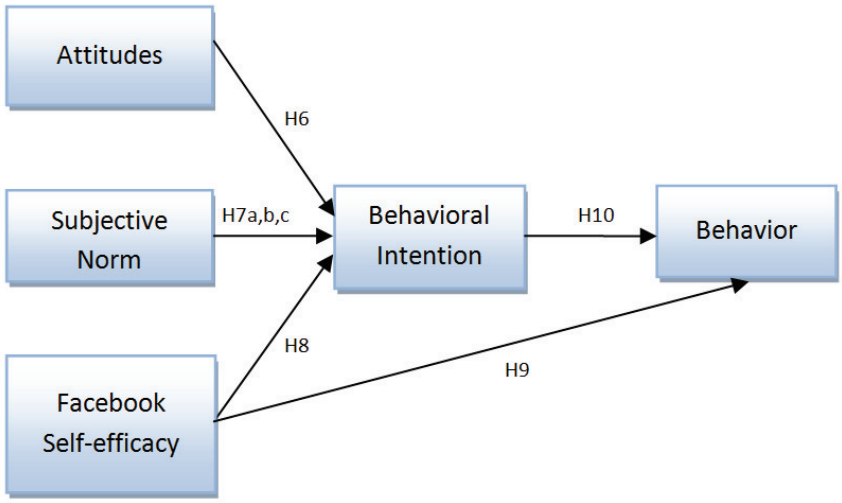

Figure 7.14. Core research model used to test hypothesis 6 to 10 (H6-H10)

In Figure 7.14, each arrow linking two constructs (represented by rectangles) depicts each one of our research hypotheses (e.g. "H9" represents "Hypothesis 9").

The scheme presented in Figure 7.14 was translated into the SPSS/Amos model presented in Figure 7.15.

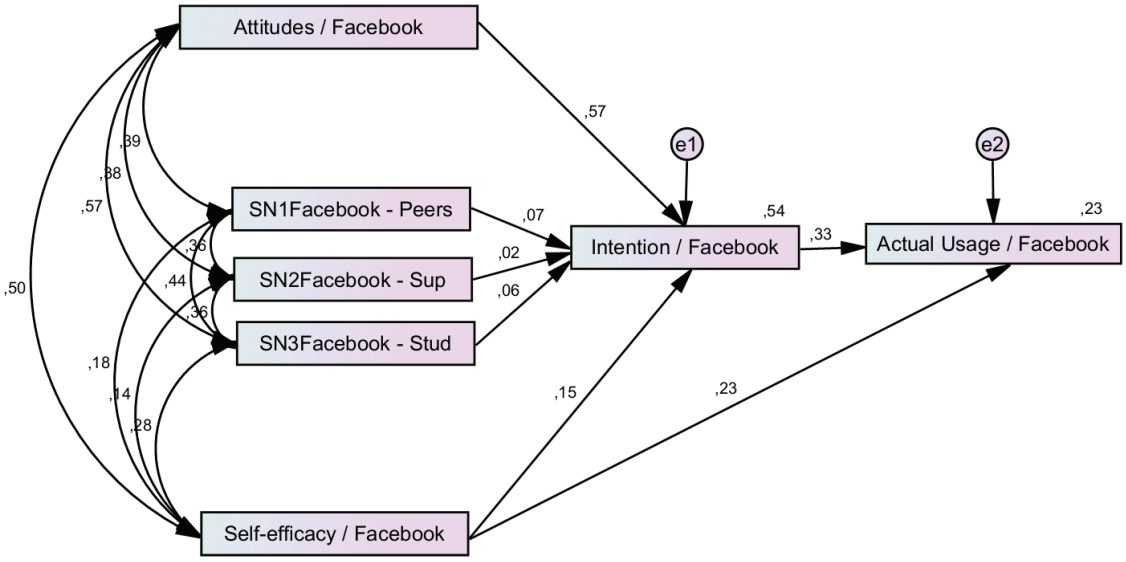

Figure 7.15. SPSS/Amos model corresponding to scheme presented in Figure 7.14

The bi-directional arrows on the left of the diagram represent the degree of correlation between exogenous variables: all coefficients were significant, with $p<0.01$.

The numbers above one-directional arrows linking each variable represent their standardized regression estimates ("β"), presented also (in **bold** type) on Tables 7.23 and 7.24.

The total variance explained by the endogenous variable predictors ("R^2") is presented as a number above the right corner of the rectangle representing that variable.

Table 7.23. Test of Study A2 hypothesis (unmodified TPB-based model): predictors of intention

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
Attitudes / Facebook **(H6)**	0,592**	0,592	**0,569****	0,568
SN1Facebook – Peers **(H7a)**	0,065*	0,065	**0,068***	0,069
SN2Facebook – Sup **(H7b)**	0,02	0,022	**0,017**	0,018
SN3Facebook – Stud **(H7c)**	0,048	0,048	**0,065**	0,065
Self-efficacy / FB **(H8)**	0,107**	0,107	**0,15****	0,15

Note:.* p<0,05. ** p<0,01 .

The set of predictor variables presented in Table 7.23 explained 54% of the variance observed for the variable measuring intentions of using Facebook in teaching activities (R^2=0,54; Figure 7.15).

Table 7.24. Test of Study A2 hypothesis (unmodified TPB- based model): predictors of actual usage

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
Self-efficacy / FB **(H9)**	0,216**	0,216	**0,228****	0,227
Intention /Facebook **(H10)**	0,436**	0,436	**0,328****	0,329

Note:.* p<0,05. ** p<0,01 .

The two predictor variables presented in Table 7.24 explained 23% of the variance observed for the variable measuring "actual use" of Facebook in teaching activities (R^2=0,23; Figure 7.15).

Using the model depicted on Figure 7.15 to test the validity of each of our research hypotheses (earlier presented in Chapter 6, and here summarized in Figure 7.14, and signaled in **bold** type on Tables 7.23 and 7.24), we can say that:

Hypothesis 6 **(H6)**, stating that Faculty's attitude towards Facebook has a significant positive effect on behavioral intention of using this tool in their pedagogical activities,

was confirmed (β=0,569, p<0,01).

Hypothesis 7 **(H7)**, stating that subjective norm has a significant positive effect on faculty's intention to use Facebook in their pedagogical activities, was partially confirmed, given that:

Hypothesis 7a **(H7a)**, stating that peers' subjective norm has a significant positive effect on faculty's intention to use Facebook in their pedagogical activities, was confirmed (β=0,068, p<0,05).

Hypothesis 7b **(H7b)**, stating that **s**uperiors' subjective norm has a significant positive effect on faculty's intention to use Facebook in their pedagogical activities was rejected.

Hypothesis 7c **(H7c)**, stating that students' subjective norm has a significant positive effect on faculty's intention to use Facebook in their pedagogical activities was rejected.

Hypothesis 8 **(H8)**, stating that Facebook self-efficacy has a significant positive effect on faculty's intention to use Facebook in their pedagogical activities, was confirmed (β=0,150, p<0,01).

Hypothesis 9 **(H9)**, stating that Facebook self-efficacy has a significant positive effect on faculty's actual usage of Facebook in their pedagogical activities, was confirmed (β=0,228, p<0,01).

Hypothesis 10 **(H10)**, stating that intention to use Facebook in teaching has a significant positive effect on Faculty's actual use of Facebook to supplement their pedagogical activities, was confirmed (β=0,328, p<0,01).

The model from which hypotheses 6 to 10 were derived, depicted in Figure 7.14, was inspired in the Theory of Planned Behavior (Ajzen, 1991).

However, SPSS/Amos suggested a slight modification to the model, in order for it to provide adequate goodness of fit indicators. Therefore, using SPSS/Amos "modification indices" ("MI's"), we added a link between "Attitudes / Facebook" and "Actual Usage / Facebook".

By making that unique modification, the model presented in Figure 7.16 was obtained.

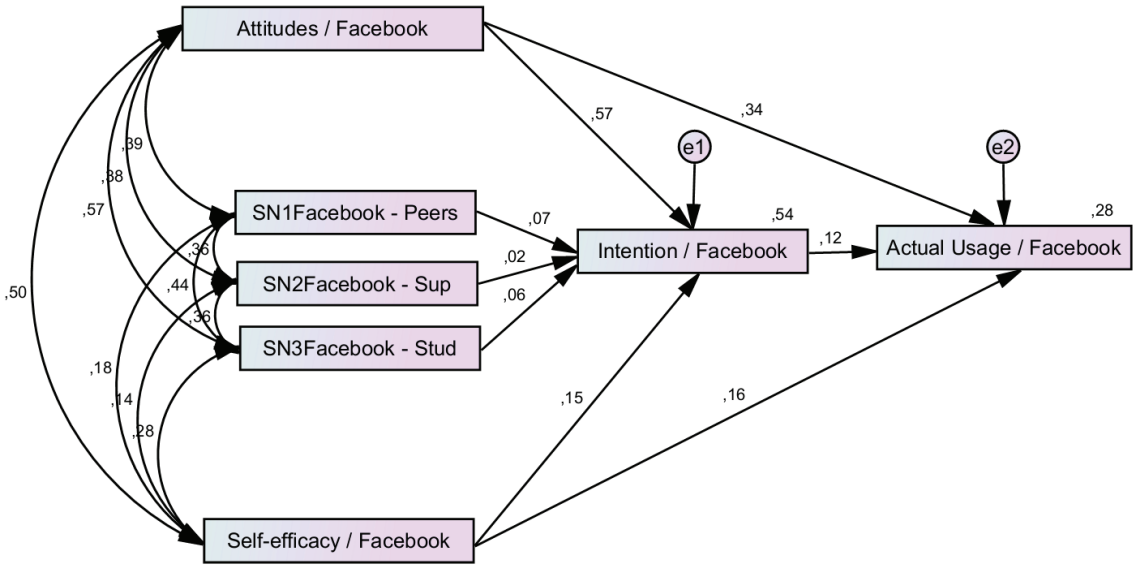

Figure 7.16. Model with additional link between "attitudes" and "actual usage"

For the model represented in Figure 7.16, the χ^2 statistic confirmed its goodness of fit: $\chi^2(3,N=681) = 0,355$, p=0,949. The other goodness of fit indicators, provided in Table 7.25, confirm that the model fits our data very well.

The multivariate kurtosis for the variables in the model was 18,350, but the Bollen-Stine bootstrap test confirmed the χ^2 results (p = 0,957), and the bias-corrected estimates (provided in Tables 7.26 and 7.27) have a near perfect match with the default (non-corrected) estimates provided by SPSS/Amos.

Table 7.25. Goodness of fit indicators for the model presented in Figure 7.16

Fit measure	Good fit	Acceptable fit	Model value
χ^2/df	≤ 2	≤ 3	0,118
RMSEA	≤ 0.05	≤ 0.08	0,000
CFI	≥0.97	≥0.95	1,000
GFI	≥0.97	≥0.95	1,000
AGFI	≥0.90	≥0.85	0,999
IFI	≥0.95	≥0.90	1,000

Note:criteria from Schermelleh-Engel et al. (2003) & Byrne (2010)

This model (Figure 7.16) was used to confirm the validity of the test of hypotheses previously conducted. As is depicted on Figure 7.16, and summarized in Tables 7.26 and 7.27, all the significant regression coefficients found in the TPB-inspired model used to test hypothesis 6 to 10 (H6-H10) remain significant (or remain non-significant), supporting the earlier test of hypotheses.

Table 7.26. Confirmation of Study A2 test of hypotheses (modified TPB): Predictors of intention

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
Attitudes / Facebook **(H6)**	0,592**	0,592	**0,569****	0,568
SN1Facebook – Peers **(H7a)**	0,065*	0,065	**0,068***	0,069
SN2Facebook – Sup **(H7b)**	0,02	0,022	**0,017**	0,018
SN3Facebook – Stud **(H7c)**	0,048	0,048	**0,065**	0,065
Self-efficacy / FB **(H8)**	0,107**	0,107	**0,15****	0,15

Note:.* p<0,05. ** p<0,01 .

As can be verified by comparing Table 7.26 and Table 7.23, there was no change whatsoever in terms of the values on the table describing the regression values for the predictors of intention, and Figure 7.16 reveals that (also as expected) the total variance

explained for the variable measuring intentions by its predictors remained the same (54%).

Table 7.27.Confirmation of Study A2 test of hypotheses (modified TPB): Predictors of actual usage

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
Self-efficacy / FB **(H9)**	0,148**	0,147	**0,156****	0,155
Intention / Facebook **(H10)**	0,161*	0,161	**0,121***	0,121
Attitudes / Facebook	0,467**	0,467	**0,338****	0,338

Note:.* p<0,05. ** p<0,01 .

The comparison between Table 7.27 and Table 7.24 reveals the main changes which have occurred in the model, due to the addition of the supplementary link between "Attitudes" and "Actual Usage": the effects of "Intentions" on "Actual Usage" reduced dramatically (from β =0,328, p<0,01 to β=0,121, p<0,05).

The effects of "Self-efficacy" were also considerable reduced, although conserving its significant level: β=0,156, p<0,01, when in the original TPB-inspired model attained a value of β=0,228, p<0,01.

"Attitudes", previously (and according to TPB; Ajzen, 1991) not linked directly to "Actual Usage" revealed to be its most strong direct predictor (β=0,338, p<0,01), in the model presented in Figure 7.16.

The set of three predictors included in Table 7.27 led to a slight increase of the variance explained for "Actual Usage", from 23% to 28%.

Therefore, in conclusion, we verified that this slightly modified, excellent fitting model (Figure 7.16), confirmed all the results obtained with our initial model (inspired in TPB), in what regards the test of our research hypotheses.

7.7. Integrative Model and Discussion of Results of Study A2 (Facebook)

To enrich the model of Facebook adoption by faculty (in the context of their teaching activities), a set of additional variables were added to the model depicted in the previous section (Figure 7.16).

The additional variables were: a) gender, b) age, c) years of professional experience ("PROFEXP"), d) institutions' IT resources compatibility with Web applications desired for teaching ("RESOURCES"), and e) Satisfaction with Institutions' LMS ("SATISF_LMS_Inst").

Furthermore, the construct "Attitudes towards Facebook" was decomposed in two of the constituents of attitudes proposed by Taylor and Todd (1995b): a) compatibility ("ATT_COMPFacebook"), and b) perceived usefulness ("ATT_PUFacebook").

The new variables were all considered exogenous, and were therefore correlated with the other existing exogenous variables in the model. Each variable was tested as a predictor of: a) intention to use Facebook in teaching activities, and b) actual usage of Facebook in teaching activities.

Through the removal of all non-significant relations among the variable, the model depicted in Figure 7.17 emerged.

The intermediate processes that led to the emergence of our final model concerning Facebook adoption by faculty members in the context of their teaching activities are presented in Appendix 4.

For the model in Figure 7.17, no modification was suggested by SPSS/Amos "modification indices" ("MI's"), attesting that no important relation (regression or correlation) could be added to the model for improving its goodness of fit.

The χ2statistic for the final version of the model (Figure 7.17) confirmed its goodness of fit $\chi 2$ (6, N=681) =5,532, p=0,478. This result was complemented with the fit indicators

presented in Table 7.28.

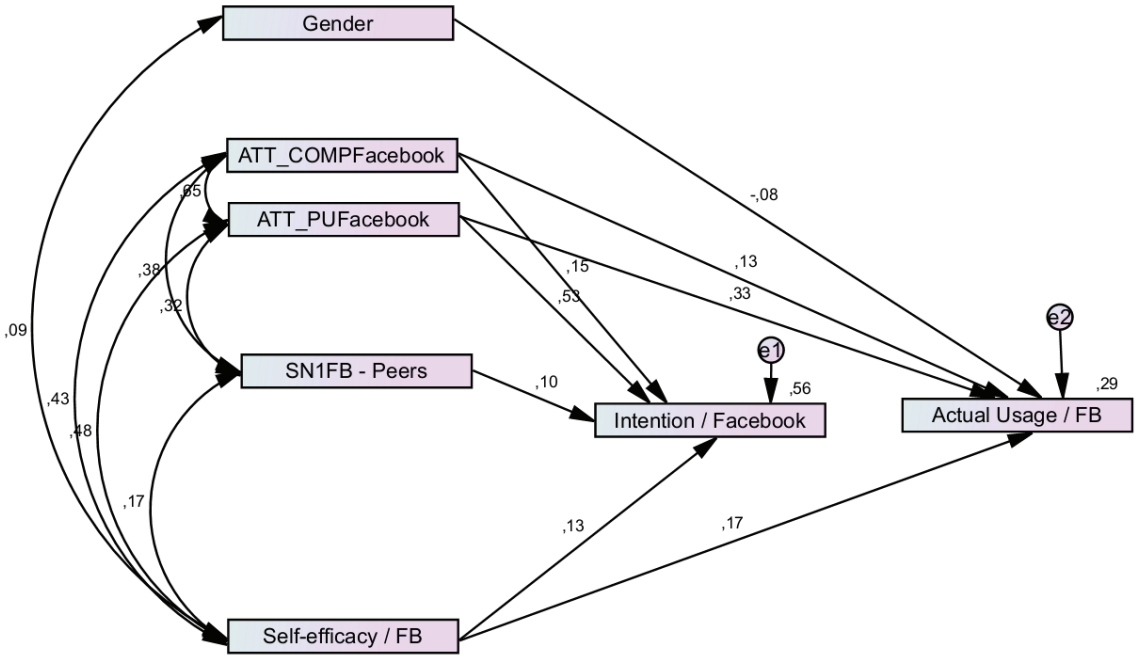

Figure 7.17 Final integrative model for Facebook adoption (faculty members)

Table 7.28. Goodness of fit indicators for the model depicted in Figure 7.17

Fit measure	Good fit	Acceptable fit	Model value
χ^2/df	≤ 2	≤ 3	0,922
RMSEA	≤ 0.05	≤ 0.08	0,000
CFI	≥0.97	≥0.95	1,000
GFI	≥0.95	≥0.90	0,998
AGFI	≥0.90	≥0.85	0,989
IFI	≥0.95	≥0.90	1,000

Note:criteria from Schermelleh-Engel et al. (2003) & Byrne (2010)

Since the multivariate kurtosis for the variables in the model was 8,103, the Bollen-Stine bootstrap was performed, and its results confirmed the good fit of the model (p = 0,426).

Table 7.29. Study A2 - Predictors of intention according to final integrative model

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
SN1FB – Peers	0,095**	0,095	**0,1****	0,1
Self-efficacy / FB	0,094**	0,094	**0,131****	0,131
ATT_PUFacebook	0,526**	0,525	**0,528****	0,527
ATT_COMPFacebook	0,133**	0,134	**0,148****	0,149

Note:.* p<0,05. ** p<0,01 .

The set of predictor variables presented in Table 7.29 explained 56% of the variance observed for the variable measuring intentions of using Facebook in teaching activities (R^2=0,56; Figure 7.17).

Table 7.30. Study A2 - Predictors of actual usage according to final integrative model

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
Self-efficacy / FB	0,165**	0,164	**0,173****	0,173
ATT_PUFacebook	0,436**	0,433	**0,329****	0,328
ATT_COMPFacebook	0,155**	0,158	**0,13****	0,132
Gender	-0,182*	-0,183	**-0,081***	-0,081

Note:.* p<0,05. ** p<0,01 .

The four predictor variables presented in Table 7.30 explained 29% of the variance observed for the variable measuring “actual use” of Facebook in teaching activities (R^2=0,29; Figure 7.17).

Table 7.31. **Study A2 - Covariances and correlations among variables in final integrative model**

	Cov	BC Cov	**Corr**	BC Corr
SN1FB - Peers<->Self-efficacy / FB	0,176**	0,175	**0,173****	0,173
Self-efficacy / FB<->ATT_PUFacebook	0,469**	0,469	**0,484****	0,484
SN1FB - Peers<->ATT_PUFacebook	0,236**	0,236	**0,325****	0,324
Self-efficacy / FB<->ATT_COMPFacebook	0,463**	0,462	**0,432****	0,431
SN1FB - Peers<->ATT_COMPFacebook	0,303**	0,302	**0,376****	0,376
ATT_PUFacebook<->ATT_COMPFacebook	0,5**	0,499	**0,649****	0,648
Self-efficacy / FB<->Gender	0,05**	0,05	**0,087****	0,088

Note:.* p<0,05. ** p<0,01 .

The covariances and correlations conserved in the model, after removal of those that were non-significant in the context of overall relations among the retained variables and regressions, are presented in Table 7.31.

Therefore, in the context of Study A2, and as depicted in the final model provided in Figure 7.17, it was found that faculty's attitude towards Facebook had a significant positive effect on behavioral intention of using this tool in their pedagogical activities.

Both perceiving Facebook as compatible with favorite teaching practices, and perceiving Facebook as useful were significant positive predictors of faculty's intention to use this tool to complement their teaching. However, usefulness was a stronger predictor than compatibility, both for intention *and* for actual use of Facebook in teaching activities.

Peers' subjective norm (social influence) was found to have a significant positive effect on faculty's intention to use Facebook in their pedagogical activities, but the social influence of superiors and of students was not significant in determining faculty's intention in respect to the use of Facebook in this context.

Facebook self-efficacy had a significant positive effect on both faculty's intention to use

Facebook in their pedagogical activities, and in their actual usage of Facebook for this purpose, as predicted by TPB (Ajzen, 1991).

Gender appears to have no influence in faculty's intention to use Facebook for teaching purposes, but being a woman was a weak negative predictor of Facebook actual usage (in the context of pedagogical activities).

Although, as expected (by TPB; Ajzen, 1991), the intention to use Facebook had a significant positive effect on Faculty's actual use of this tool to supplement their pedagogical activities, the predictive character of intention diminishes to statistical insignificance when attitudes are decomposed (into perceived usefulness and compatibility), and studied as direct predictors of actual use.

The effects of: a) age, b) the number of years of professional experience, c) the perceived institutions' IT resources compatibility with Web applications desired for teaching, and d) the satisfaction with institutional Learning Management System, were all (statistically) non-significant, in the context of research model presented in Figure 7.17.

7.8. Results of Study A3 – Academic Adoption of Blogs by Faculty

The main research question that we intended to answer in this third sub-study, previously presented in Chapter 6, was the following:

Research Question 5:

What factors best predict faculty's decision to adopt Blogs in order to supplement their classroom instruction?

The theoretical framework used for deriving the hypotheses that allowed us to provide an answer to Research Question 5 was the Theory of Planned Behavior (TPB; Ajzen, 1991), as in the two previous sub-studies (Study A1, concerning Web2.0, and Study A2, focusing Facebook). As in Studies A1 and A2, the original TPB "perceived behavior

control" construct was replaced by "self-efficacy", one of the components of self-efficacy proposed by Taylor and Todd (1995b).

The set of hypotheses that were tested in the context of this study (earlier presented in Chapter 6) are depicted in Figure 7.18

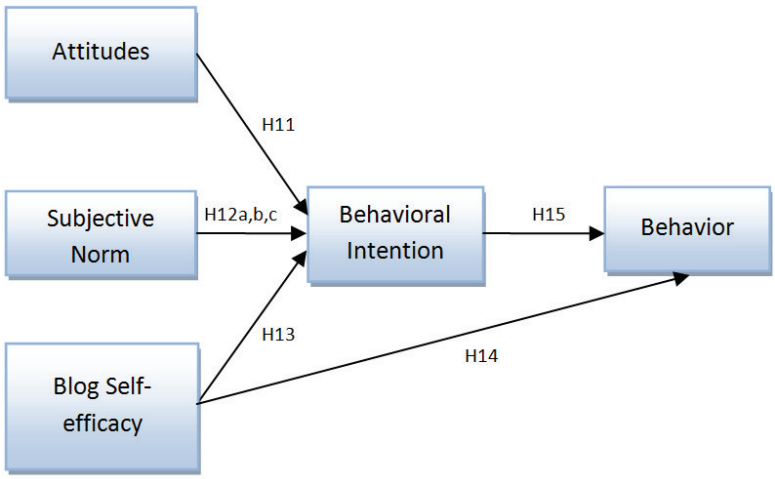

Figure 7.18. Core research model used to test hypothesis 11 to 15 (H11-H15)

The scheme presented in Figure 7.18 was translated into the SPSS/Amos model, depicted in Figure 7.19

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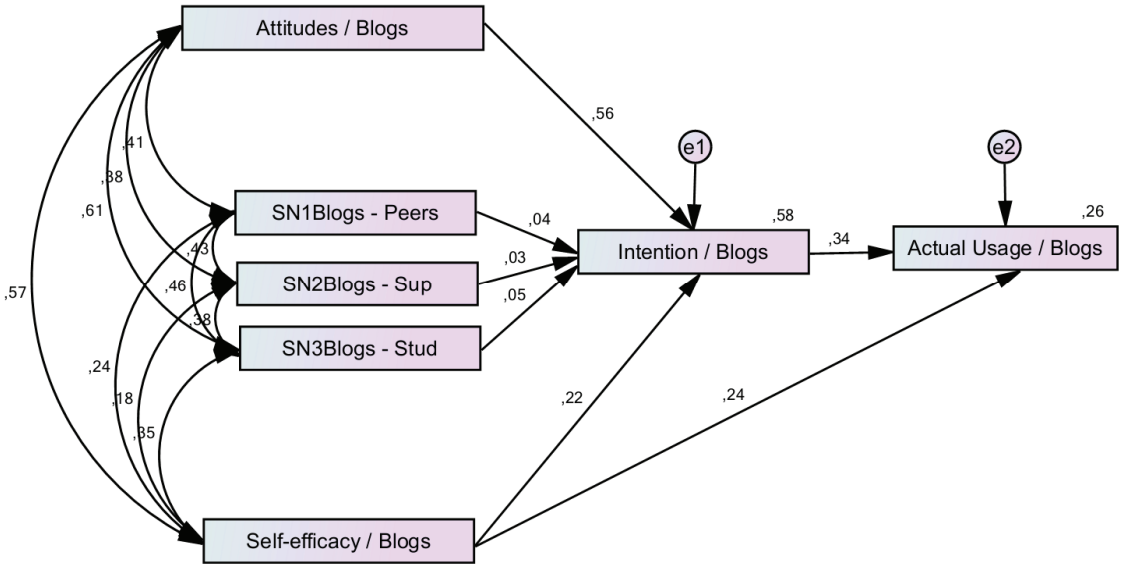

Figure 7.19. SPSS/Amos model corresponding to scheme presented in Figure 7.18

In Figure 7.19, bi-directional arrows on the left side of the diagram represent the degree of correlation between exogenous variables: all coefficients were significant, with $p<0.01$.

The numbers above one-directional arrows linking each variable represent their standardized regression estimates ("β"), presented also (in **bold** type) on Tables 7.32 and 7.33.

The total variance explained by the endogenous variable predictors ("R^2") is presented as a number above the right corner of the rectangle representing that variable.

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Table 7.32. Test of Study A3 hypothesis (unmodified TPB-based model): predictors of intention

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
Attitudes / Blogs **(H11)**	0,517**	0,518	**0,562****	0,562
SN1Blogs – Peers **(H12a)**	0,048	0,047	**0,043**	0,042
SN2Blogs – Sup **(H12b)**	0,035	0,035	**0,028**	0,028
SN3Blogs – Stud **(H12c)**	0,038	0,038	**0,045**	0,046
Self-efficacy / Blogs **(H13)**	0,189**	0,188	**0,215****	0,215

Note:.* p<0,05. ** p<0,01 .

The predictor variables presented in Table 7.32 explained 58% of the variance observed for the variable measuring intentions of using Blogs in teaching activities (R^2=0,58; Figure 7.19).

Table 7.33. Test of Study A3 hypothesis (unmodified TPB- based model): predictors of actual usage

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
Self-efficacy / Blogs **(H14)**	0,265**	0,265	**0,236****	0,236
Intention / Blogs **(H15)**	0,439**	0,438	**0,342****	0,343

Note:.* p<0,05. ** p<0,01 .

The predictor variables presented in Table 7.33 explained 26% of the variance observed for the variable measuring intentions of using Blogs in teaching activities (R^2=0,26; Figure 7.19).

Using the model depicted on Figure 7.19 to test the validity of each of our research hypotheses (earlier presented in Chapter 6, and here summarized in Figure 7.18, and signaled in **bold** type on Tables 7.32 and 7.33), we can say that:

Hypothesis 11 **(H11)**, stating that faculty's attitude towards Blogs has a significant positive effect on behavioral intention of using these tools in their pedagogical activities, was confirmed (β=0,562, p<0,01).

Hypothesis 12 (**H12)**, stating that subjective norm has a significant positive effect on faculty's intention to use Blogs in their pedagogical activities, was rejected, given that:

Hypothesis 12a (**H12a)**, peers' subjective norm has a significant positive effect on faculty's intention to use Blogs in their pedagogical activities, was rejected.

Hypothesis 12b (**H12b)**, superiors' subjective norm has a significant positive effect on faculty's intention to use Blogs in their pedagogical activities, was rejected.

Hypothesis 12c (**H12c)**, students' subjective norm has a significant positive effect on faculty's intention to use Blogs in their pedagogical activities, was rejected.

Hypothesis 13 (**H13)**, blog self-efficacy has a significant positive effect on faculty's intention to use Blogs in their pedagogical activities, was confirmed (β=0,215, p<0,01)..

Hypothesis 14 (**H14)**, blog self-efficacy has a significant positive effect on faculty's actual usage of Blogs in their pedagogical activities, was confirmed (β=0,236, p<0,01)..

Hypothesis 15 (**H15)**, intention to use Blogs in teaching has a significant positive effect on Faculty's actual use of Blogs to supplement their pedagogical activities, was confirmed (β=0,342, p<0,01)..

The model from which hypotheses 11 to 15 were derived, depicted in Figure 7.18, was inspired in the Theory of Planned Behavior (Ajzen, 1991), but SPSS/Amos "modification indices" ("MI's") suggested the addition of a link between "Attitudes / Blogs" and "Actual Usage / Blogs", for augmenting the fit of the model to our data.

By making that single modification, the model presented in Figure 7.20 was obtained.

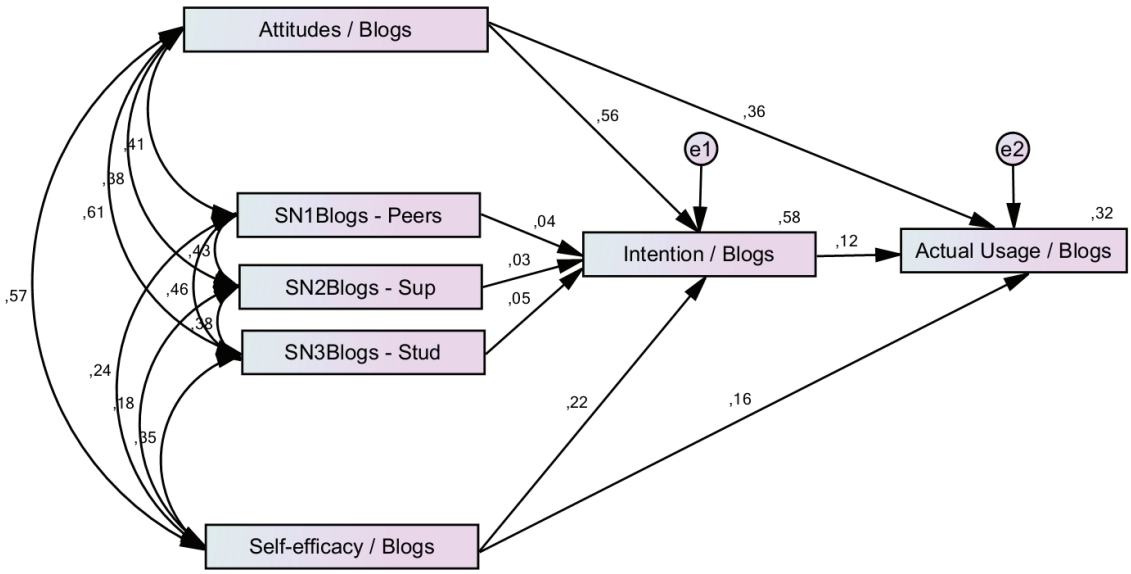

Figure 7.20. Model with additional link between "attitudes" and "actual usage"

This model (Figure 7.20) presented excellent goodness of fit indicators. In addition to the χ^2statistic being non-significant (χ^2[3, N=681]=1,432, p=0,698), the remaining usually used indicators of goodness of fit revealed a very good fitting model, as is presented in Table 7.34.

The multivariate kurtosis for the variables in the model was 18,009, but the Bollen-Stine bootstrap confirmed the good fit of the model (p = 0,695).

Table 7.34. Goodness of fit indicators for the model presented in Figure 7.20

Fit measure	Good fit	Acceptable fit	Model value
χ^2/df	≤ 2	≤ 3	0,477
RMSEA	≤ 0.05	≤ 0.08	0,000
CFI	≥0.97	≥0.95	1,000
GFI	≥0.97	≥0.95	0,999
AGFI	≥0.90	≥0.85	0,994
IFI	≥0.95	≥0.90	1,000

Note:criteria from Schermelleh-Engel et al. (2003) & Byrne (2010)

This model (Figure 7.20) was used to confirm the validity of the previous test of hypothesis. As is depicted on Figure 7.20, and summarized in Tables 7.31 and 7.32, all the significant regression coefficients found in the TPB-inspired model used to test hypothesis 11 to 15 (H11-H15) remain significant (or remain non-significant), supporting the earlier test of hypotheses.

Table 7.35. Confirmation of Study A3 test of hypotheses (modified TPB): Predictors of intention

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
Attitudes / Blogs **(H11)**	0,517**	0,518	**0,562****	0,562
SN1Blogs – Peers **(H12a)**	0,048	0,047	**0,043**	0,042
SN2Blogs – Sup **(H12b)**	0,035	0,035	**0,028**	0,028
SN3Blogs – Stud **(H12c)**	0,038	0,038	**0,045**	0,046
Self-efficacy / Blogs **(H13)**	0,189**	0,188	**0,215****	0,215

Note:.* p<0,05. ** p<0,01 .

Since no modification was done to the predictors of intention, the values presented in Table 7.35, reproduce those depicted in Table 7.32, and the total variance explained by these predictors on the variable measuring intentions of using Blogs in teaching activities remained unchanged (R^2=0,58; Figure 7.20).

Table 7.36. Confirmation of Study A3 test of hypotheses (modified TPB): Predictors of actual usage

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
Self-efficacy / Blogs **(H14)**	0,178**	0,177	**0,158****	0,158
Intention / Blogs **(H15)**	0,158*	0,157	**0,123***	0,122
Attitudes / Blogs	0,419**	0,42	**0,356****	0,356

Note:.* p<0,05. ** p<0,01 .

The comparison of Tables 7.36 and 7.33, reveals the main changes which have occurred in the model, due to the addition of the supplementary link between "Attitudes" and "Actual Usage": the effects of "Intentions" on "Actual Usage" were greatly reduced, from β=0,342, p<0,01 to β=0,123, p<0,05.

The effects of "Self-efficacy" were also considerable reduced, although conserving its significant level: β=0,158, p<0,01, when in the original TPB-inspired model attained a value of β=0,236, p<0,01.

"Attitudes", previously (and according to TPB; Ajzen, 1991) not linked directly to "Actual Usage" was revealed to be its most strong direct predictor (β=0,356, p<0,01), in the model presented in Figure 7.16.

The set of three predictors included in Table 7.36 led to a slight increase of the variance explained for "Actual Usage", from 26% to 32%.

In conclusion, we verified that this slightly modified, excellent fitting model (Figure 7.20), confirmed all the results obtained with our initial model (inspired in TPB), in what regards the test of our research hypotheses.

7.9. Integrative Model and Discussion of Results of Study A3 (Blogs)

In order to enrich the model of Blogs adoption by faculty (in the context of their teaching activities), a set of additional variables was added to the model depicted in the previous section (Figure 7.20).

The influence of the following variable was analyzed: a) gender, b) age, c) years of professional experience ("PROFEXP"), d) institutions' IT resources compatibility with Web applications desired for teaching ("RESOURCES"), and e) Satisfaction with Institutions' LMS ("SATISF_LMS_Inst").

Furthermore, the construct "Attitudes towards Blogs" was decomposed in two of the constituents of attitudes proposed by Taylor and Todd (1995b): a) compatibility ("ATT_COMPBlogs"), and b) perceived usefulness ("ATT_PUBlogs").

The new variables were all considered exogenous, and were therefore correlated with the other existing exogenous variables in the model. Each variable was tested as a predictor of: a) intention to use Blogs in teaching activities, and b) actual usage of Blogs in teaching activities.

After removing of all non-significant relations among the variable, the model depicted in Figure 7.21 emerged.

The intermediate steps that led to this final integrative model concerning Blogs adoption by faculty members in the context of their teaching activities are detailed in Appendix 5.

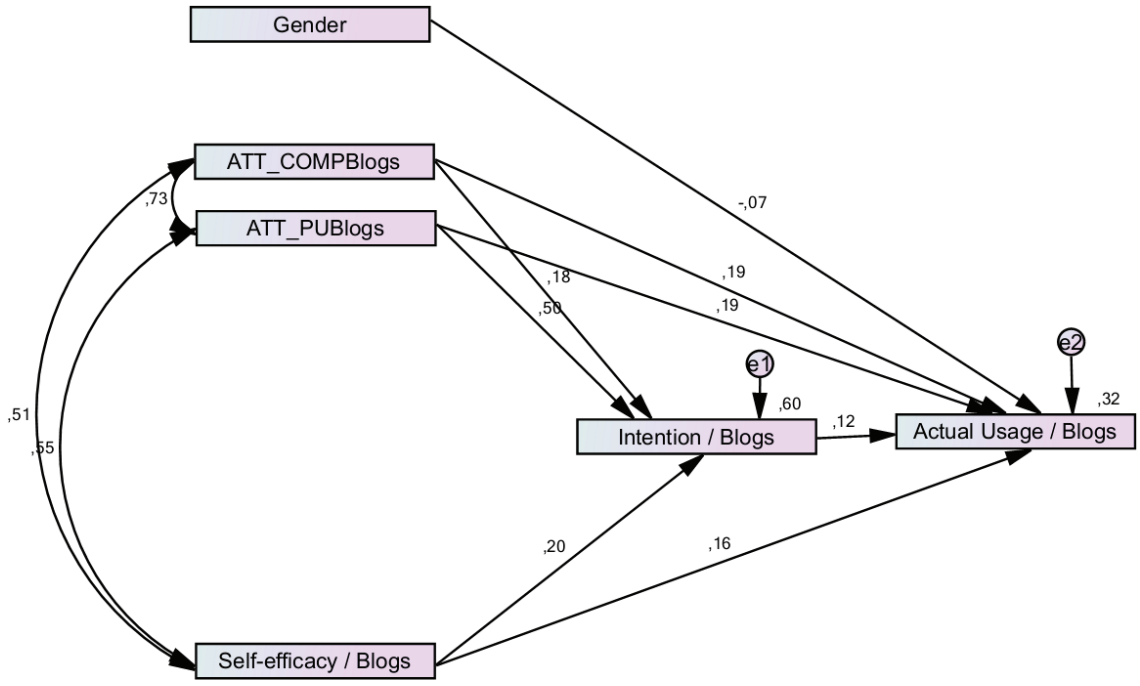

Figure 7.21 Final integrative model for Blogs adoption (faculty members)

The χ^2statistic for the final version of the model (Figure 7.21) supported its goodness of fit: $\chi^2(4, N=681)=5{,}520$, $p=0{,}238$. This test was complemented with the fit indicators presented in Table 7.37.

The multivariate kurtosis for the variables in the model was 1,449, which is relatively low, and a Bollen-Stine bootstrap "p" value of 0,240 confirmed the χ^2result.

Table 7.37 Goodness of fit indicators for the model presented in Figure 7.21

Fit measure	Good fit	Acceptable fit	Model value
χ^2/df	≤ 2	≤ 3	1,380
RMSEA	≤ 0.05	≤ 0.08	0,024
CFI	≥0.97	≥0.95	0,999
GFI	≥0.97	≥0.95	0,997
AGFI	≥0.90	≥0.85	0,986
IFI	≥0.95	≥0.90	0,999

Note:criteria from Schermelleh-Engel et al. (2003) & Byrne (2010)

Table 7.38 presents the predictors of intention to use Blogs in teaching activities, along with their regression weights and levels of significance.

Table 7.38. Study A3 - Predictors of intention according to final integrative model

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
Self-efficacy / Blogs	0,177**	0,177	**0,202****	0,201
ATT_PUBlogs	0,444**	0,445	**0,496****	0,496
ATT_COMPBlogs	0,147**	0,148	**0,18****	0,181

Note:.* p<0,05. ** p<0,01 .

The three predictor variables presented in Table 7.38 explained 60% of the variance observed for the variable measuring intentions of using Blogs in teaching activities (R^2=0,60; Figure 7.21).

Table 7.39 presents the predictors of actual usage of Blogs in teaching activities, along with their regression weights and levels of significance.

Table 7.39. Study A3 - Predictors of actual usage according to final integrative model

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
Self-efficacy / Blogs	0,178**	0,178	**0,159****	0,159
Intention / Blogs	0,16*	0,158	**0,125***	0,124
ATT_PUBlogs	0,219**	0,219	**0,191****	0,191
ATT_COMPBlogs	0,194**	0,195	**0,186****	0,186
Gender	-0,159*	-0,16	**-0,073***	-0,074

Note:.* p<0,05. ** p<0,01 .

The set of predictor variables presented in Table 7.39 explained 32% of the variance observed for the variable measuring actual usage of Blogs in teaching activities (R^2=0,32; Figure 7.21).

Table 7.40.Study A3 - Covariances and correlations among variables in final integrative model

	Cov	BC Cov	**Corr**	BC Corr
Self-efficacy / Blogs <->ATT_PUBlogues	0,483**	0,483	**0,548****	0,548
Self-efficacy / Blogs <->ATT_COMPBlogues	0,49**	0,488	**0,507****	0,506
ATT_PUBlogs<->ATT_COMPBlogs	0,685**	0,684	**0,726****	0,725

Note:.* p<0,05. ** p<0,01 .

The covariances and correlations conserved in the model, after removal of those that were non-significant in the context of overall relations among the retained variables and regressions, are presented in Table 7.40.

Therefore, as depicted in Figure 7.21, faculty's attitudes related to the pedagogical use of Blogs influenced positively the intention of using these tools in their pedagogical activities.

Of the attitudes influencing intentions to adopt Blogs for teaching purposes, perceived usefulness was the strongest predictor (comparing with the other component of general attitudes that was measured: perceived compatibility of Blogs with preferred pedagogical practices).

However, in the case of Blogs, the influence of the two types of attitudes (perceived usefulness and perceived compatibility with teaching practices) in actually using this type of Web 2.0 tool in pedagogical activities were similarly important.

Contrary to what was observed for the complete set of Web 2.0 tools, and for the particular case of Facebook, social influence did not appear to be a predictor of faculty's intention to use Blogs in their pedagogical activities.

It had been already verified that faculty were not significantly influenced by the social "pressure" of students or superiors, in the case of Web 2.0 (in general), and in the specific case of Facebook. But for Blogs, social influence, overall (including that coming from other faculty peers), appears *not to be* a significant predictor of the intention to use this kind of Web 2.0 tool to supplement teaching practices.

Faculty's believes in their own competence to use Blogs (self-efficacy) were a positive predictor of both intentions to use Blogs in teaching, and of actually using Blogs for that purpose.

As expected, from TPB (Ajzen, 1991), the intention to use Blogs as an aid in teaching was a significant positive predictor of the real use of these tools in pedagogical activities, in all the models in which this relation was tested (including the final one, integrating demographic and LMS-related variables).

In relation to Blogs, gender played the same (weak) negative predictor role that was observed for Web 2.0 (in general), and for Facebook: being a woman did not affect intentions to use Blogs for teaching purposes, but it did influenced (negatively) the actual use of Blogs to supplement classroom instruction.

The effects of: a) age, b) the number of years of professional experience, c) the perceived institutions' IT resources compatibility with Web applications desired for teaching, and d) the satisfaction with institutional Learning Management System, were all (statistically) non-significant, in the context of research model.

7.10. Chapter Summary

This chapter presented the details of a study conducted to assess the adoption of Web 2.0 by faculty, in the context of their teaching activities.

The study method (material, participants, and procedure) were described, the general results obtained regarding the adoption of Web 2.0 tools by faculty were depicted, followed by detailed analyses of the results concerning faculty use of Web 2.0 (in general), and of Facebook and Blogs (in particular), to supplement their teaching activities.

Three integrative models, incorporating demographic, professional and institution's IT-related aspects (including faculty satisfaction with the Learning Management Systems adopted by their institution) were provided for the use of: a) Web 2.0 (in general); b) Facebook, and c) Blogs.

These three integrative models were based in the Theory of Planned Behavior (TPB; Ajzen, 1991), which was used as a sound and proved base to test the research hypotheses, but they expanded the original relations proposed by the theory, and even challenge some key assumptions of TPB (Ajzen, 1991), as in the case of the use of Facebook for teaching purposes, where the effects of intentions to use on actual usage were considered statistically insignificant, when considered the supplementary variables added to the model.

Nevertheless the effect between intentions and actions are complex (as exposed by Wong & Sheth, Ajzen, 1985; Ajzen, Brown, & Carvajal, 2004), and this particular result obtained for the use of Facebook by faculty, in the context of their teaching activities,

serve to expose the need to consider the specificities of each Web 2.0 tool when investigating the factors leading to its use.

The non-influence of social norm as a predictive factor of the use of Blogs as teaching aiding tools is another example of how different factors determine the educational use of different Web 2.0 tools.

Answers for the specific questions related to this study (Research Questions 3, 4, and 5) are provided in a form of a summary of all the results described and discussed in this chapter, in the concluding chapter (Chapter 9). The results here present also contribute to answer the first two more general research questions of our study (Questions 1 and 2), and are similarly summarized in Chapter 9, were they are complemented with the results from the study with the student population, in order to provide full answer to those mode comprehensive questions (which involve results from both the faculty and the student populations).

CHAPTER VIII - STUDY B – ADOPTION OF WEB 2.0 BY STUDENTS

8.1. Introduction

This chapter describes a research study in which data about the educational use of Web 2.0 tools by higher education students were simultaneously gathered with measurements of a set of psychological dimensions: a) personal and collective self-esteem, self-concept, general self-efficacy, social support, satisfaction with academic life, and several aspects of academic experiences: interpersonal, career, institutional, personal and course satisfaction.

The first part of the study (Study B1) concerned students' educational use of Web 2.0 tools (in general), and the second part focused on the educational use of a specific Web 2.0 tool: Facebook (Study B2).

As presented in Chapter 6, Study B1 sought to provide answers to these two research questions (research questions 6 and 7):

Research Question 6: What factors, among those proposed by the Theory of Planned Behavior (Ajzen, 1991) and the Technology Acceptance Model (Davis, 1989), best predict students' decision to adopt Web 2.0 tools, in general?

Research Question 7: In what extent the studied psychological variables influence students' attitudes and intentions regarding the use Web 2.0 to supplement their in-class learning?

In order to answer research questions 6 and 7, a model was developed, based on the core constructs and relationships proposed by TAM (Davis, 1989), but incorporating the psychological variables that were found to have a significant influence on students' attitudes and intentions regarding the use of Web 2.0 to supplement their in-class learning.

The proposed framework enriches a well studied model of technology acceptance (TAM) with psychological variables selected from recent literature, but never before combined together in the same model.

As described earlier in this introduction (and with mode detail in Chapter 6), after studying the factors which are related to the educational uses that students make of Web 2.0 (in general), the next step of our research was concerned with the factors that predicted students' adoption of Facebook for educational purposes (Study B2).

The research question that was intended to be answer in Study B2 was:

Research Question 8: What factors, including the studied psychological variables, best predict students' decision to adopt Facebook in order to supplement their classroom instruction?

To answer this research question, we started from a model whose core architecture was inspired by the one recently proposed by Mazman and Usluel (2010), detailed in Chapter 5, and then explored ways of modifying that initial model, in such a way that the effects of the studied psychological variables could be taken into account.

The method used in this study (participants, material used, and procedure) are presented over the next sections of this chapter, followed by general descriptive results concerning the information gathered in Study B.

Subsequently, specific results concerning each of the two mentioned sub-studies (B1/B2) are provided, our research hypothesis (presented in Chapter 6) are tested, and a global integrative model (including additional variables) is provided, both for students' use of Web 2.0 to complement their in-class learning, and for students' educational usage of Facebook.

8.2. Method

8.2.1. Participants

A total of 702 Portuguese higher education students participated in our study. Of these, 550 were selected for the full set of analyses, since not all the students answered to all of the instruments adequately (students who did not answer to some of the scales, or whose answers did not followed the instructions provided with each instrument were excluded from our final sample).

For the validation of the scale of collective self-esteem based on the CSES (Luhtanen & Crocker, 1992), however, a total of 644 students were selected, since this number of students did provide complete answers to that scale, and the rest of their answers to the rest of the scales appeared to be of adequate quality, although some did not met the full requirements for inclusion in the final sample.

In terms of demographics information, the final selected sample of 550 students was composed by 372 students of female gender, and 178 were males. 478 (86,9%) had between 19 and 25 years of age, and 459 (83,5%) were enrolled on the first cycle of higher education studies (first three years of higher education studies). The most numerous group of students (N=241, 43,8%) were enrolled in the second year, and the first and third year students were near the same in number.

The students' data were gathered in five different Portuguese higher education institutions: Universidade Fernando Pessoa/Porto (N=207 , 37,6%), Instituto Superior Miguel Torga (N=93, 16,9%), Universidade da Beira Interior (N=165, 30%), Universidade de Aveiro (N=40, 7,3%), and Instituto de Administração e Contabilidade do Porto (N=45, 8,2%).

About half of the sample was composed by students enrolled in the Psychology Major (N=238, 43,3%), and the rest were distributed by other nine Majors: Computer Science, Criminology, Dental Medicine, Speech Therapy, Aeronautical Engineering, Medicine, Portuguese and Spanish Studies, New Communication Technologies, Accounting and Administration. There were 20 Aeronautical Engineering and 20 Medicine students.

Students from the Major in Portuguese and Spanish Studies were the smaller group with only 14 subjects. All the other Majors contributed to our sample with 40 to 50 students.

Grouping the Majors by broad scientific and academic fields, we find that our final sample of 550 students is composed of 297 (54%) students from Social and Human Sciences (including Psychology), 106 (19,3%) from Engineering, 102 (18,5) from Health Sciences, and 45 (8,2%) from the field of Business Studies.

A more detailed description of our sample is provided at the beginning of the results section, where a descriptive account of the demographic variables is provided, together with the descriptive results concerning the other variables assessed in the study.

8.2.2. Material

8.2.2.1. General Overview of the Instruments used in Study B (Students)

In this section, a general overview of the 14 instruments used to collect data among the students population, in the context of Study B, is provided.

Each of the instruments will be separately described in the following subsections.

Therefore, for measurements regarding Web 2.0 adoption, an instrument based on the survey developed by Hartshorne and Ajjan (2009) was used. This instrument was relevant for Sub-study B1, regarding students' use of Web 2.0 tools (in general) to supplement their in-class learning.

The constructs assessed by the Web 2.0 survey are depicted in Table 8.1.

(Continued on the next page, please turn)

Table 8.1 Web 2.0 Survey (used in Sub-study B1)

Instrument	Assessed Constructs
Student Adoption of Web 2.0 Survey (derived from Hartshorne and Ajjan, 2009)	Actual Use Behavioral Intention Attitudes Perceived Ease of Use Perceived Usefulness Subjective Norms Perceived Behavioral Control

For measuring variables specifically related to the usage of Facebook, the instruments presented in Table 8.2 were used.

The Facebook-related scales presented in Table 8.2 were important for Sub-study B2, in which students' educational usage of Facebook was investigated.

Table 8.2 Facebook-related Scales (used in Sub-study B2)

Instrument	Assessed Constructs
FBI - Facebook Intensity Scale (translated from Ellison et al., 2007)	**Intensity of Facebook Use**
AF - Adoption of Facebook Scale (translated from Usluel & Mazman, 2009; Mazman & Usluel, 2010)	**Related to Facebook Adoption:** Usefulness Ease of Use and Facilitating Conditions Social Influence Community Identity
PFU - Purpose of Facebook Usage Scale (translated from Mazman & Usluel, 2010)	**Related to Purposes of Facebook Usage:** Social Relations Work Related
EUF - Educational Usage of Facebook Scale (translated from Mazman & Usluel, 2010)	**Educational Usage of Facebook**

Table 8.3 presents those instruments that were important for both sub-studies (B1 and B2).

Table 8.3. Psychological Instruments (used to collect data for both sub-studies: B1 and B2)

Instrument	Assessed Construct
CSEp - Collective Self-esteem Scale –esteem (Based on CSES, Luhtanen & Crocker, 1992)	*Collective* Self-esteem
SWLS – Satisfaction with Life Scale (Neto, 1999)	Satisfaction with Life
SWALS – Satisfaction with Academic Life Scale (Based on the SWLS, Neto, 1999)	Satisfaction with Academic Life
ESSS – Satisfaction with Social Support Scale (Ribeiro, 1999)	Satisfaction with Social Support
SPP-CS – Self-Percep. Profile for College Students (Ribeiro, 1994)	Students' Self-perception
QVAr – Questionnaire of Academic Experiences (Almeida, Ferreira & Soares, 2001)	Students' Academic Experiences
RSES – Rosenberg Self-Esteem Scale (Santos, 2008)	*Personal* Self-esteem
ICAC – Self-concept Inventory (Serra, 1986)	(General) Self-concept
AE – General Self-efficacy (Ribeiro, 1995)	(General) Self-efficacy

Through the instruments presented in Table 8.3, it was possible to assess a rich set of psychological variables in order to study their influence on students' adoption of Web 2.0 to supplement their in-class learning, and students' educational usage of Facebook.

The criteria used for the inclusion of each of the instruments depicted in Table 8.3 were based either on previous research documented in the literature (e.g. Gangadharbatla, 2008, for collective self-esteem), and/or by our curiosity in clarifying the interplay between each of the psychological dimensions depicted in Table 8.3 and the use of Web 2.0 tools for academic purposes, given their sociability nature (McLoughlin & Lee, 2007).

Each of the instruments presented in Tables 8.1, 8.2, and 8.3 will be detailed in the following sections.

8.2.2.2. Student Adoption of Web 2.0 Survey

The first instrument of our empirical protocol respecting the Student population was a survey that was derived from the one developed and used by Hartshorne and Ajjan (2009) in their study about Students' adoption of Web 2.0, introducing slight modifications in order to adapt it to collect data regarding the constructs of an alternative theoretical framework, different from the Decomposed Theory of Planned Behavior (DTPB; Taylor & Todd, 1995b), explored by those authors.

Thus, we retained the items proposed by Hartshorne and Ajjan (2009) that were related to the (non-decomposed) Theory of Planned Behavior (TPB; Ajzen, 1991), as well as some of the items of Hartshorne the original instrument which were necessary to explore an alternative framework, based on the Technology Acceptance Model (TAM; Davis, 1989).

By using TAM (Davis, 1989), we were able to take advantage of the rich set of guidelines provided by existing literature regarding the enrichment of that model with external factors, including psychological variables (e.g. Taylor & Todd, 1995a; Venkatesh et al., 2003; Wixom & Todd, 2005).

As was described on Chapter 4, all of these alternative models have a common root that can be traced back to the original Theory of Reasoned Action (Fishbein & Ajzen, 1975). That same root is also shared by the DTPB, used as a framework by Hartshorne and Ajjan (2009) survey. This common ancestry explains why some items from a survey built with DTPB in mind can be used to build alternative instruments which are oriented by different (but related) theoretical frameworks.

Another difference between our survey and the one developed by Hartshorne and Ajjan (2009) was the fact that we assessed the usage of a different set of Web 2.0 tools. In this respect, the main differences were that we have chosen to ask students about their use of some specific Web 2.0 services and applications, such as Facebook, Twitter, YouTube, Messenger and Skype, instead of questioning them about more general categories, such as Social Networks (in which Facebook, MySpace, Orkut, could be included, for example).

It is our belief that the popularity and salience of Facebook (among social network sites), Twitter (among microblogging services), or YouTube (among video services providers) makes it justifiable to center our research interest in these specific services and sites.

In the case of Facebook, it is also important to note that there are other instruments in our empirical protocol which assess usage and adoption of this social network site and, in this manner, the information collected through this survey regarding Facebook can be cross-validated with the data collected by the other instruments in the protocol.

The other important difference between our survey and the one used by Hartshorne and Ajjan (2009) was our inclusion of a group of items that evaluated the degree of satisfaction that students had in respect to their Higher Education Institution learning management system (such as Moodle or Sakai). The inclusion of this group of items was motivated by our interest in studying the relations between satisfaction with the Institutional Learning Management Systems and Web 2.0 usage indicators.

Also, while the Hartshorne and Ajjan (2009) study collected data using an online version of the survey, we decided to collect data in the classroom, in person, in order to have a sample in which people who don't usually answer online surveys could be included. Although we used online data gathering in another study (the one concerning faculty adoption of Web 2.0), in the case of the student population we decided that collecting the data in the context of the classroom might increase the representativeness and the quality of the answers, since in that formal context students are predictably less distracted from other stimuli and more prone to participate in activities such as survey filling.

Since the original survey used by Hartshorne and Ajjan (2009) was in English, it was necessary to adapt those items in which we were interested for the context of Portugal. The translation of the items from English into Portuguese was done independently by one English teacher, and one professional English translator. Both these professionals were Portuguese native speakers. The alternative translated versions of the items were then discussed with two specialists, one from the field of Psychology and the other from Information and Communication Systems.

The resulting draft version of the Portuguese survey was then pilot-tested with 11 college students. After taking into account the feedback gathered with the pilot version of the survey, a final version of the instrument was prepared, and integrated with the other 13 instruments of the research protocol designed to access Web 2.0 adoption and appropriation by college students (Study B).

We now present the main structure of the Portuguese survey, inspired on the one developed by Hartshorne and Ajjan (2009), but with the before-mentioned differences.

Generally, the main sections of the Web 2.0 Adoption survey were:

1. One item, asking for the degree of comfort students associated with their usage of a set of Web 2.0 applications and services (Facebook, Twitter, Blogs, Wikis, YouTube, Social Bookmarking, Instant Messaging, and Skype).
2. One item, related to students' use of each of the mentioned applications and services to complement their in-class learning.
3. One item, by which students could indicate the main advantages they perceived from using those applications and services in the context of their in-class learning (raging from enhancing communication with faculty or other students to augmenting course satisfaction).
4. One item, through which students could indicate the Web 2.0 tools they *used* more frequently (or those *they intended to use* more frequently): from a set composed by Facebook, Twitter, Blogs, YouTube, and Wikis.
5. A group of three items where information about students' satisfaction with their own institution's Learning Management Systems (LMS's) is collected, as well as information regarding students' perception about complementing those institutionally governed systems with Web 2.0 tools.
6. A scale composed of sixteen items, which gathered data relative to TAM and TPB variables, thus allowing us to test the adequacy of those theoretical models for describing the adoption and acceptance of Web 2.0 within the our sample of the student population. The reliability analysis of each item and construct measured by this scale is presented in Table 8.4. The table also contains information regarding to each of the two theoretical frameworks (TAM and/or TPB) the construct belongs.

In the context of the present study, the survey items described on points 1 through 4 of

the previous list were used to provide a descriptive overview of how students perceive each of the mentioned Web 2.0 tools, both in what respects their degree of comfort with each one (1) and, particularly, their attitudes and intentions towards using each of them to supplement their in-class learning (2, 3, and 4).

The three items referred on 5 will be used to assess the students' perceptions regarding their institutions' LMS's, and how they perceive Web 2.0 tools as complementary to it. These set of items were not a part of the original English instrument from which the survey was derived: we intend to explore the influence of these variables, alongside the other demographic and psychological variables to inform our integrative model of students' attitudes and behavioral intentions towards Web 2.0 use to supplement in-class learning.

The scale described on point 6 is of crucial importance to sub-study B1, since it provides the measurements needed to build the core components of the model which will be expanded and modified to include the additional (mainly psychological) factors whose influence o students attitudes and intentions regarding the educational use of Web 2.0 our research found significant.

The answers to all the items of the survey items (except one) were collected through the use of Likert-type scales. The exceptional item was the question regarding the tools students used more frequently (described on point 4), which required a multiple-choice response.

The reliability indicators relative to the scale mentioned in point 6 are presented on Table 8.4. As can be verified by inspection of the data presented on that table, the item-total correlation is greater than .3 for all the items of the scale, which is considered a good reliability indicator (Field, 2009).

For those constructs measured by multiple items, the respective Cronbach's α is also presented in Table 8.4. It is generally accepted in the literature that α values equal of higher than .7 are indicative of acceptable internal reliability (Field, 2009; Howitt & Cramer, 2010). As can be inspected on the right column of Table 8.4, the α's for the subscales measuring the constructs assessed by this scale also provide good signs of internal reliability.

Additionally, the Cronbach's α for the sixteen items of the scale was 0,943, which indicates very good reliability for the scale as a whole.

This survey was one of the several instruments used to gather information within the student population (Study B). The data collected with this instrument was particularly important for sub-study B1, which is mainly preoccupied with exploring psychological dimensions related to students use (or non-use) of Web 2.0 to supplement their in-class learning.

(Continued on the next page, please turn)

Table 8.4. Reliability analysis of the items of the scale used to collect data relative to the constructs of the original TPB and TAM frameworks (Portuguese higher education students, N=550).

Construct	Item	Models	Item-total correlation	Cronbach's α
Actual Use	AU	TPB, TAM	,332	-
Behavioral Intention	INT	TPB, TAM	,753	-
Attitudes	ATT01	TPB, TAM	,797	0,854
	ATT02		,640	
	ATT03		,759	
Perceived Ease of Use	EU	TAM	,749	-
Perceived Usefulness	PU01	TAM	,832	0,941
	PU02		,795	
	PU03		,810	
	PU04		,861	
Subjective Norms	SNPeers01	TPB	,755	0,876
	SNPeers02		,705	
	SNSup01		,635	
	SNSup02		,695	
Perceived Behavioral Control	PBC01	TPB	,509	0,751
	PBC02		,457	

8.2.2.3. The Facebook Intensity Scale

This instrument was originally developed in the United States by Ellison, Steinfield, and Lampe (2007), with the goal of creating a measure of Facebook usage that went beyond frequency and duration indexes (Ellison et al., 2007).

The measure is composed by eight items, of which six require participants to answer

through a 5-point Likert scale, and two are self-report assessments about Facebook behavior, namely: a) the number of Facebook "friends", and b) the time spent on Facebook each day (on average).

The first six (Likert-scale) items were designed to evaluate the degree of emotional attachment to Facebook and the level to which Facebook was integrated in the person's daily life. In this part of the instrument, the person may choose any of the five optional answers, which range from 1 ("strongly disagree") to 5 ("strongly agree").

In respect to the last two items, they can be formulated both as open-ended questions (such as in Ellison et al., 2007), or as closed-ended questions.

In the case of using open-ending questions, participants indicate the number of friends they have in Facebook (question 7), and the average number of hours spent per day on Facebook (question 8). This raw number is then transformed mathematically (by taking the natural logarithm), in order to make it comparable with the first six (Likert-type) items of the instrument, and to allow for a global average index of Facebook usage intensity (Ellison et al., 2007).

The Cronbach's alpha for the original version of the Facebook Intensity scale was .83.

The preparation of the Portuguese version of the Facebook Intensity scale followed the same procedures used in adapting the Hartshorne and Ajjan survey described in the previous section: two independent translators provided alternative Portuguese versions of each of the items of the scale, which were then selected through discussion with two specialists. The resulting draft was pilot-tested with a sample of 11 college students, whose feedback was taken into account in producing the final version of the instrument.

We opted for a version of the scale similar to that used by Ellison et al. (2007), with answers to questions 7 and 8 being given through a raw number, which was converted by a logarithm conversion, as proposed by the original authors, and using as floor and ceiling values of the logarithm transformation the values of 1 and 5, respectively, in order to maintain the comparability of the scores in these items with those of the rest of the scale.

Table 8.5 presents the item-total correlations of each of the items comprising the

Portuguese version of the Facebook Intensity scale. All items correlate with the total score of the scale well beyond the minimum recommended level of .3 (Field, 2009), thus providing support for the reliability of the translated instrument.

Table 8.5. Reliability analysis of the items of the translated Portuguese Facebook Intensity scale (N=550).

Item	Item-total correlation
intFB01	,868
intFB02	,672
intFB03	,831
intFB04	,636
intFB05	,816
intFB06	,656
intFB07	,712
intFB08	,757

The Cronbach's α for the entire Portuguese version of the scale was .924, which is indicative of very good reliability of the translated scale.

8.2.2.4. Facebook Adoption, Educational Usage and Purposes Scales

The scales described in this section were originally developed in Turkey, by Sacide Mazman and Yasemin Usluel (Usluel & Mazman, 2009; Mazman & Usluel, 2010).

In the context of our investigation, we translated these Turkish scales, and the model that Mazman and Usluel (2010) proposed for the educational usage of Facebook was of crucial importance for our sub-study B2, which concerned the role that a group of psychological variables play in students' use of Facebook for educational purposes.

Our first contact with these three instruments was through the paper published by Mazman and Usluel (2010), which concerned the modeling of the educational usage of Facebook by higher education students.

The Portuguese versions of Mazman and Usluel scales were translated through two different, complementary, pathways: since we could only find one person professionally accredited to perform direct Turkish to Portuguese translations, and in order to have at least two independent translations, we asked another professional translator to translate the original scales from Turkish into English.

The first draft of the Portuguese scales was discussed with two specialists (one from Psychology, and the other from Information Systems Research), and thereafter another independent translator back-translated the preliminary Portuguese version of the scale into English. During the translation phase we could count with the assistance of the original authors, who provided us with a precious revision of the back-translated English version of the scales.

The resulting preliminary Portuguese scales were pilot-tested in a sample of 11 higher education students, who gave positive feedback regarding the wording and understandability of the scale items. Therefore, no modification was introduced into the scales due to information collected in their pilot-testing with this sample of students.

Through the rest of this section, we describe the properties of each of the original Turkish scales (Usluel & Mazman, 2009; Mazman & Usluel, 2010), and their corresponding Portuguese versions that were produced and used in the context of our research.

For the study reported in the research paper where the three scales were presented together (Mazman & Usluel, 2010), the authors collected their data through an online survey, which was spread on Facebook. People who answered to the survey could spread it to their friends if they wished so, and the link to the survey was written on several Facebook group's wall.

The authors collected 606 valid survey responses, with an about equal number of males and females answering to the instrument. Most of the people who answered to the survey were college students, having between 18 and 25 years old (Mazman & Usluel, 2010).

In order to build the Adoption of Facebook (AF) scale, the authors examined the existing literature on the field of technology adoption, such as Diffusion of Innovation theory (Rogers, 2003), the Theory of Reasoned Action (Ajzen, 1991), and the Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003).

Using the guidance provided by these theoretical frameworks, a preliminary 23-item scale regarding Facebook adoption was prepared, by Usluel and Mazman (2009). This draft scale contemplated five constructs and 23 items, namely:

1. Four items regarding "usefulness". The authors used the definition of the concept proposed by Davis (1989), who defined (perceived) "usefulness" as the degree in which a person believes that the use of a given system would contribute to enhance his or her job performance.

2. Four items about "ease of use". Defined as the degree in which a person believes that using a system will be effortless.

3. Four items respecting to "social influence", concerned with measuring the persons' preconceived opinion regarding how others will judge her/his behavior.

4. Seven items on "facilitating conditions", defined as objective environmental factors that contribute to facilitate actions, and to enable the persons control of his/her own environment.

5. Four items concerning "community identity", defined as the persons' identification with a group, and his/her own sense of belonging to that group.

The answers were collected by using a 10-point Likert-type scale, white alternatives varying from 1 (for the option "Strongly disagree") to 10 (for the option "Strongly agree").

The items were revised by six professionals working in the field of instructional technologies, who were also Facebook users. The reviewed items were then subject to the judgment of seven experts, regarding appropriateness and clarity, and revised accordingly to the obtained feedback (Usluel & Mazman, 2009).

After the data were collected, the authors divided the data in two subparts: explanatory

factor analysis was conducted for “odd sequence numbered” data and first and second order confirmatory factor analysis was performed for “single sequence numbered” data. These analyses confirmed that the Facebook Adoption Scale had 5 factors, which together explained 69.3% of the total variance.

Usluel and Mazman (2009) named the five extracted factors as: a) “usefulness”, b) “ease of use”, c) “social influence”, d) “facilitating conditions”, and e) “community identity”.

The Cronbach alpha for the scale was found to be .909 (Mazman & Usluel, 2010), a strong indicator of good internal consistency, and thus of the reliability of the measure.

The factor structure and the reliability of the original Facebook adoption scale items can be inspected in Table 8.6 (one of the four items concerning “community identity” was dropped by the authors, after factor analysis).

(Continued on the next page, please turn)

Table 8.6. Factor structure and reliability of the original Adoption of Facebook scale (AF) items (Mazman & Usluel, 2010)

Construct	Item	Factor loads	Cronbach's α
Usefulness	U1	.802	.838
	U2	.833	
	U3	.588	
	U4	.598	
Ease of use	EU1	.664	.897
	EU2	.863	
	EU3	.907	
	EU4	.839	
Social influence	SE1	.828	.843
	SE2	.879	
	SE3	.628	
	SE4	.785	
Facilitating conditions	FC1	.708	.849
	FC2	.716	
	FC3	.679	
	FC4	.546	
	FC5	.633	
	FC6	.530	
	FC7	.585	
Community identity	CI1	.766	.864
	CI2	.849	
	CI3	.849	

The Portuguese version of the Adoption of Facebook (AF) scale was translated from the version of the instrument published in Usluel and Mazman (2009), which had some minor differences from the scale used in Mazman and Usluel (2010) study.

The Usluel and Mazman (2009) instrument had four items associated with "Community Identity", instead of the three items related with this factor in Mazman and Usluel (2010).

Also, the Usluel and Mazman (2009) adoption scale had five items related with "Facilitating Conditions", instead of the seven provided in Mazman and Usluel (2010).

Therefore, the Usluel and Mazman (2009) scale, used as a base for the Portuguese translation, had a total of 21 items, and a five-factor factorial structure.

All of the 21 items of the Usluel and Mazman (2009) Facebook Adoption scale were retained in the Portuguese version of the instrument.

The Portuguese-translated scale proved excellent psychometric properties (as had occurred with its original counter-part: Uslulel & Mazman, 2009; Mazman & Usluel, 2010), although it was needed to aggregate the items of two of the five original factors into a single factor. For this reason, the Portuguese version of the Adoption of Facebook scale presents a four-factor structure (instead of the five-factors assessed by the original Turkish scale).

The two factors that were aggregated in the Portuguese version were "Ease of Use" and "Facilitating Conditions", since the items measuring these constructs loaded strongly on the same factor.

The details of the several factorial analyses (both exploratory and confirmatory) that were carried in order to establish the number of factors of the Portuguese AF scale are presented in Appendix 7. In Table 8.7, the proposed factorial structure for the Portuguese AF scale is presented.

(Continued on the next page, please turn)

Table 8.7. Factor structure and reliability of the translated Facebook Adoption Scale items (N=550)

Constructs	Item	Item order on the scale	Item-total correlation	Factor loads	Cronbach's α
Usefulness	U1	1	,832	,752	,905
	U2	2	,823	,713	
	U3	3	,783	,757	
	U4	4	,719	,658	
Ease of use and	EU1	5	,838	,826	,946
Facilitating conditions	EU2	6	,887	,886	
	EU3	7	,883	,879	
	EU4	8	,855	,857	
	FC1	13	,796	,769	
	FC2	14	,755	,633	
	FC3	15	,675	,661	
	FC4	16	,777	,637	
	FC5	17	,662	,557	
Social influence	SE1	9	,750	,851	,894
	SE2	10	,799	,849	
	SE3	11	,738	,778	
	SE4	12	,780	,823	
Community identity	CI1	18	,620	,794	,874
	CI2	19	,742	,694	
	CI3	20	,813	,720	
	CI4	21	,757	,614	

The four factors depicted in Table 8.7 were able to explain 75 % of the total variance.

The overall Cronbach's α for the Portuguese version of the AF scale was 0.956.

The data presented on Table 8.7 respect our complete sample of 550 students. However, the factors were found previously with an exploratory factor analysis on the even

numbered participants (N=278), and confirmed through confirmatory factor analysis on the odd numbered subjects (N=272). Appendix 7 contains the results from these separate analyses with the two parts of the sample.

Table 8.8 presents the goodness of fit indicators found in the confirmatory factor analysis, for the proposed factorial structure of the Portuguese version of the scale. A more detailed account of this analysis is also presented in Appendix 7.

Table 8.8. Confirmatory Factor Analysis (CFA): Adoption Scale (Odd participants, N=272)

Fit measure	Good fit	Acceptable fit	Model value
χ^2/df	≤ 2	≤ 3	2,256
RMSEA	≤ 0.05	≤ 0.08	0,068
CFI	≥0.97	≥0.95	0,961
GFI	≥0.95	≥0.90	0,907
AGFI	≥0.90	≥0.85	0,853
IFI	≥0.95	≥0.90	0,961

Note: criteria from Schermelleh-Engel et al. (2003) & Byrne (2010)

In what concerns the Purposes of Facebook Usage (PFU) scale, its main goal was to provide a measure of the different purposes for which Facebook was used (Mazman & Uslual, 2010).

From a preliminary set of 12 items, Mazman and Usluel (2010) removed one item, due to its low factor load, as revealed by factor analysis. The final Turkish version of the PFU was, therefore, composed of 11 items.

After conducting confirmatory factor analyses, the authors found that this scale consisted of three factors, which were named (Mazman & Usluel, 2010):

1. Social relations: such as communicating with friends, in order to maintain social contact, or making new friendships.

2. Work-related purposes: such as sharing information regarding an ongoing

professional project.

3. Purposes related to daily activities: these items assessed aspects such as using Facebook to simple have fun, waste time, or keeping up with events within a person's social circles.

The total Cronbach alpha for the scale was .793, and the alpha coefficients for each of the abovementioned constructs is presented on Table 8.9 (Mazman & Usluel, 2010).

Table 8.9. General structure and partial reliability indicators of the Purpose of Facebook Usage scale (Mazman & Usluel, 2010)

Constructs	Item	Item order on the scale	Cronbach's α
Social relations	SOC01	1	.681
	SOC02	2	
	SOC03	3	
	SOC04	4	
	SOC05	5	
	SOC06	6	
	SOC07	7	
Work related	WK01	8	.813
	WK02	9	
Daily	DAY01	10	.871
	DAY02	11	

Table 8.10 presents the overall factorial structure of the Portuguese instrument built from Mazman and Usluel (2010) Purposes of Facebook Usage scale, in the context of our research.

The two factors represented on that table were first found by exploratory factor analysis on the even numbered cases of our global sample (i.e. 278 of the 550 participants) and later confirmed by confirmatory factor analysis on the odd numbered participants (N=272).

Table 8.10. Factor structure and reliability of the translated Purposes of Facebook Usage Scale items (N=550)

Constructs	Item	Item order on the scale	Item-total correlation	Factor loads	Cronbach's α
Social relations	SOC01	1	,780	,883	,886
	SOC02	2	,578	,645	
	SOC03	3	,867	,923	
	SOC04	4	,790	,847	
Work related	WK01	5 (8)	,805	,905	,889
	WK02	6 (9)	,805	,922	

The best solution that was found in the exploratory factor analyses (with the even numbered participants) resulted from the Kaiser criterion (SPSS's default criterion for factor analysis), followed by varimax rotation.

A more detailed account of the exploratory and confirmatory procedures is provided on Appendix 8. A summary of the results from the confirmatory analysis of this factorial model is presented on Table 8.11.

Table 8.11. Confirmatory Factor Analysis (CFA): Purposes Scale (Odd participants, N=272)

Fit measure	Good fit	Acceptable fit	Model value
RMSEA	≤ 0.05	≤ 0.08	0,078
CFI	≥0.97	≥0.95	0,98
GFI	≥0.95	≥0.90	0,966
AGFI	≥0.90	≥0.85	0,911
IFI	≥0.95	≥0.90	0,98

Note: criteria from Schermelleh-Engel et al. (2003) & Byrne (2010)

In the best solution found (with two factors; depicted in Table 8.10), the items translated from SOC01, SOC02, SOC03, and SOC04 loaded distinctively in one separate factor, and the items translated from WK01 and WK02 loaded strongly on a second component.

However, the other three items from the original scale that measured "social relations" (SOC05, SOC06, andSOC07) loaded strongly on both of the extracted factors, and were therefore discarded from the final Portuguese version of the instrument, and from our analysis. Thus, we used the four items from SOC01 through SOC04 to provide a measure of the construct "social relations", in the Portuguese version of the Purposes of Facebook Usage scale.

In what refers to the third construct measured by the original instrument, "daily", the fact that we did not found a separate factor in which the two items DAY01 and DAY02 (Table 8.9) loaded independently, and given that they also loaded ambiguously in the two components that we obtained from the best exploratory factorial solution, we decided to exclude them from the final version of the Portuguese scale.

Thus, from the original Turkish Purposes of Facebook Usage scale (Mazman & Usluel, 2010), we built a Portuguese instrument measuring two of the constructs assessed by that scale, comprised of six items (instead of the 11 items of the original scale). Table 8.10 presents the general structure of the final Portuguese scale, and provides additional information regarding its reliability.

The total variance explained by the final Portuguese version of the scale, with 6 items, was 81.5%.

The Cronbach's α for the total scale was .879, which provides an excellent indicator of the reliability of the instrument.

In order to build the original Educational Usage of Facebook (EUF) scale, a set of 11 items regarding Facebook features that might have potential educational usage was reunited by Mazman and Usluel (2010). Factorial analyses revealed that the original version of the scale consisted of three factors:

1. Communication: items assessing Facebook use to facilitate class debates, delivery of assignments, inform about administrative issues concerning academic life.

2. Collaboration: items evaluating Facebook use to enhance the exchange of ideas and

to promote conjoint work of people with common interests and goals.

3. Resource and material sharing: items assessing the use of Facebook to share academic materials and resources (such as videos or text documents).

In terms of reliability indicators, the Cronbach's alpha was .938 for the 11 items of the final scale, and the reliability data respecting each of the identified factors can be consulted in Table 8.12.

Table 8.12. General structure and partial reliability indicators of the original EUF Academic Usage of Facebook scale (Mazman & Usluel, 2010)

Constructs	Item	Item order on the scale	Cronbach's α
Communication	COM01	1	.902
	COM02	2	
	COM03	3	
	COM04	4	
	COM05	5	
	COM06	6	
Collaboration	COL01	7	
	COL02	8	.848
	COL03	9	
Resource and material	RES01	10	.853
Sharing	RES02	11	

Table 8.13 presents the (single-factor) structure proposed for the Portuguese version of the Educational Usage of Facebook scale, taking into account the results of the factor analyses detailed in Appendix 9.

Table 8.13. Structure and reliability of the Portuguese version of the EUF scale (N=550)

Dimension	Item	Item order on the scale	Item-total correlation	Factor loads	Cronbach's α
Educational usage of Facebook	EDU01	1	,652	,701	.943
	EDU02	2	,676	,731	
	EDU03	3	,782	,827	
	EDU04	4	,827	,870	
	EDU05	5	,799	,844	
	EDU06	6	,742	,796	
	EDU07	7	,653	,702	
	EDU08	8	,796	,838	
	EDU09	9	,814	,853	
	EDU10	10	,798	,843	
	EDU11	11	,752	,799	

Note: The factor loading values refer to the non-rotated solution, given the one-dimensionality of the scale

As can be inspected in Table 8.14, the confirmatory factor analysis performed with the odd number participants in our sample supported the single-factor structure of the translated scale. A more detailed perspective of this procedure is presented in Appendix 9.

Table 8.14. Confirmatory Factor Analysis (CFA): EUF Scale (Odd participants, N=272)

Fit measure	Good fit	Acceptable fit	Model value
χ^2/df	≤ 2	≤ 3	1,433
RMSEA	≤ 0.05	≤ 0.08	0,040
CFI	≥0.97	≥0.95	0,996
GFI	≥0.95	≥0.90	0,982
AGFI	≥0.90	≥0.85	0,940
IFI	≥0.95	≥0.90	0,996

Note: criteria from Schermelleh-Engel et al. (2003) & Byrne (2010)

For the total sample of N=550 higher education students, the single factor proposed for the Portuguese version of the Educational Usage of Facebook scale explained 64.4 % of the total variance.

In conclusion, although the translated version of the Educational Usage of Facebook was not able to retain the same rich factorial structure of its original counter-part, the statistical indicators provided through our analyses reveal that it provides a very reliable measure of general educational usage of Facebook.

8.2.2.5. Collective Self-Esteem Scale

While reviewing the literature about psychological dimensions of Web 2.0 adoption and use in Higher Education, we came across the concept of collective self-esteem (CSES; Luhtanen & Crocker, 1992) used in the context of a study by Gangadharbatla (2008), in which the author investigated predictors of young people's attitudes regarding social networking sites.

The original version of the Collective Self-Esteem Scale (CSES; Luhtanen & Crocker, 1992), was developed with the aim of creating a measure of collective self-esteem that was compatible with social identity theory.

The theoretical framework behind the CSES emphasizes the importance of membership to social groups for the person's self-concept and behavior. Social identity theory also proposes that two different aspects can be found within self-concept: a) personal identity, which derives from individual's attributes, such as competence, talent, and sociability; b) social identity, derived from the person's knowledge of his/her membership in social groups, and including the emotional significance related to that membership (Luhtanen & Crocker, 1992).

The instrument consists of a 16-item scale, which is composed by four subscales, each with four items. The subscales measure: (1) Membership Esteem, (2) Private Collective Self Esteem, (3) Public Collective Self Esteem, and (4) Importance of Identity. These

constructs are defined as follows (Luhtanen & Crocker, 1992):

Each of the four subscales of the original CSES measures the following dimensions of collective self-esteem:

a) private collective self-esteem, that measures personal evaluation of how good one's social groups are;

b) public collective self-esteem, that assesses one's perceptions of how positively other people evaluate one's social groups;

c) membership collective self-esteem: which assesses an individual's judgments of how worthy they are as members of their social groups;

d) (importance to) identity collective self-esteem, that assesses the importance of one's social groups memberships to one's self-concept.

In terms of reliability, the authors reported internal consistency values (Cronbach alpha) varying between .73 and .80 for each of the subscales and a Cronbach alpha value of .85 for the total CSES (Luhtanen & Crocker, 1992).

Since there was no Portuguese translation of this scale (to our knowledge), we tried to make one. Although the final Portuguese scale that we built proved to have acceptable psychometric properties, we were only able to measure three of the four dimensions of collective self-esteem covered by CSES. Also, because many of the translated items had to be removed, our scale became much more shorter than the scale by Luhtanen and Crocker (1992), with only six items in total, and with only two items measuring each of the three dimensions of self-esteem covered by the CSES. Therefore, we named our scale as "CSEp", instead of calling it a Portuguese version of the CSES, because of the major differences in length and factorial structure of the results obtained by both instruments.

The confirmatory factor analysis (CFA) conducted to test the three-factor structure that was proposed by exploratory factor analysis (EFA), as summarized in Table 8.16, and detailed in Appendix 10.

For the analysis of the factorial structure and reliability of the collective self-esteem

scale, the answers from 644 of the 702 subjects that composed our initial sample were considered. Although only 550 subjects from our initial sample answered acceptably to all the scales, 644 students provided apparently valid responses to the collective self-esteem scale, and were included in the validation phase of the instrument. EFA was performed on the even numbered participants (N=318), and CFA was conducted on the odd numbered students of our sample (N=326).

Table 8.15. Factorial structure and reliability of the CSEp scale (N=644)

Constructs	Item	Item order on the scale	Factor loads	Cronbach's α
Private Collective	CSE01	1 (6)	,760	,768
Self-esteem	CSE04	4 (14)	,797	
Public Collective	CSE02	2 (7)	,712	,672
Self-esteem	CSE05	5 (15)	,726	
Importance to Identity	CSE03	3 (4)	,773	,628
	CSE06	6 (12)	,797	

Note: the numbers inside parenthesis indicate the order of the item in the original 16-item CSES scale (by Luhtanen & Crocker, 1992)

In terms of internal reliability, the Cronbach's alphas of each of the three scales were within the acceptable range (ranging between 0,628 and 0,768) and the total alpha for the CSEp was 0.640. Although these values were not as high as would be desirable, they are nevertheless acceptable, particularly considering the reduced number of items on the instrument (and on the subscales), and also taking into account the results from the confirmatory factor analysis.

Table 8.16. Confirmatory Factor Analysis (CFA) for the CSEp scale (Odd participants, N=326)

Fit measure	Good fit	Acceptable fit	Model value
χ^2/df	≤ 2	≤ 3	1,719
RMSEA	≤ 0.05	≤ 0.08	0,048
CFI	≥0.97	≥0.95	0,987
GFI	≥0.97	≥0.95	0,988
AGFI	≥0.90	≥0.85	0,964
IFI	≥0.95	≥0.90	0,988

Note: criteria from Schermelleh-Engel et al. (2003) & Byrne (2010)

8.2.2.6. Satisfaction with Life and Satisfaction with Academic Life Scales

In a pioneering study concerning psychological dimensions related to the use of a specific Web 2.0 tool (Facebook), Ellison, Steinfield, and Lampe (2007) explored the relations between the use of Facebook, personal self-esteem and satisfaction with life. The authors' study also included other constructs, such as social capital (which comes from the field of Sociology), but for our present study the preoccupation of the authors with the psychological variables of "self-esteem" and "satisfaction with life" were of paramount importance.

We already intended to include these variables in our study concerning the psychological dimensions of Web 2.0 use by higher education students, but the reading of Ellison et al. (2007) was both encouraging and informative.

Thus, in the study presented on this chapter, satisfaction with life will be assessed in order to relate it to students' attitudes and intentions regarding the use of Web 2.0 tools to supplement their in-class learning.

For this purpose, we used the Portuguese version of the Satisfaction with Life Scale (SWLS; Neto, 1999), but also a supplementary scale that we built by making a (verbally) slight modification to the SWLS (following a suggestion on Ellison, et al .,

2007).

Since the SWLS scale has only five items, we felt that it was not harmful to include both the validated SWLS (Neto, 1999), and a version in which the term "life" was simply replaced by "academic life", in order to capture students' satisfaction with the academic sphere of their life, besides the general life satisfaction provided by the SWLS.

We called the modified version of the instrument the "Satisfaction with Academic Life Scale" (SWALS), and the scale is presented in Appendix 11

Although the good psychometric properties of the SWLS had already been studied previously with similar samples (Neto, 1999), they were confirmed with our sample of 550 students: the Cronbach's alpha for the total five items of the scale was 0,820, with all item-total correlations presenting values above 0,5.

In what respects the SWALS scale, developed by us in the context of this study, its Cronbach's alpha was 0,880, with two items correlating with the total score of the scale by at least 0,628, and three items correlating above 0,737 with the total.

The reliability indicators regarding both the SWLS and SWALS were thus very satisfactory in the data collected from our sample of 550 students.

8.2.2.7. Satisfaction with Social Support Scale

The Satisfaction with Social Support Scale ("Escala de Satisfação com o Suporte Social"; ESSS), was built by Ribeiro (1999) as an instrument to assess a person's satisfaction with her/his existing social support.

Social support can be defined as the existence and availability of people in whom a person can trust, in whom he/she can find positive regard and affection, and who care about her/him (Ribeiro, 1999).

This instrument provides a measure of *perceived* social support, departing from the assumption that this perception is a fundamental dimension of the cognitive and

emotional processes related to subjective well-being and to quality of life (Ribeiro, 1999).

The ESSS is comprised of 15 items, each one being a statement in respect to which the person must indicate his/her degree of agreement / disagreement. A Likert-type scale with five points is used to collect the answers to each item.

In the context of our study, the direction of the Likert scale was reversed in relation to that of the original instrument. Instead "1" corresponding to "totally agree" and "5" to "totally disagree", the direction of the scale was reversed, after consulting with the original author, in order to be in accordance with the rest of the scales used in the study.

To study the factorial structure of the ESSS, Ribeiro (1999) conducted principal component analysis, and selected for inclusion the items whose factor loadings were superior than 0.40, what led to 15 items being chosen, and to the finding of four factors which together accounted for 63.1% of the total variance.

The first factor was called "Satisfaction with Friends" ("Satisfação com os Amigos", in Portuguese; Ribeiro, 1999, p. 552), and measures the persons' satisfaction with his/her friends.

The second factor was named "Intimacy" ("Intimidade", in Portuguese; Ribeiro, 1999, p. 552), and measures the individuals' perception of the existence of intimate social support.

The third factor received the name of "Satisfaction with Family" ("Satisfação com a Família", in Portuguese; Ribeiro, 1999, p. 552), and assesses the satisfaction with the persons' existing social support.

Finally, the fourth factor was described as "Social Activities" ("Actividades Sociais", in Portuguese; Ribeiro, 1999, p. 552), and measures the satisfaction of the person with the social activities in which she/he is involved.

Validity of the instrument was studied by comparing the scores of the ESSS with those provided by related scales, as the Self Perception Profile for College Students (Ribeiro, 1994) and the General Self-Efficacy Scale (Ribeiro, 1995), among others.

It is important to notice that these two other scales are also used in our study. While the reasons for their inclusion reach beyond the convenience of having forms to validate our measures, this aspect was a relevant decision factor in our decision of including this set of measures.

In terms of the ESSS internal consistency, the Cronbach alpha of .85 revealed good properties of the ESSS regarding this psychometric aspect (Ribeiro, 1999). For the four subscales comprised in the ESSS, Ribeiro (1999) found Cronbach's alphas varying from 0,64 and 0,83.

With our sample of 550 higher education students, we found a global Cronbach's alpha of 0,864, thus confirming the good reliability of the measure. All of the Cronbach's alphas for each of the ESSS subscales were also within the acceptable range, varying between 0,634 and 0,834, thus replicating the reliability indicators provided by Ribeiro (1999).

8.2.2.8. Sub-scales from Self-Perception Profile for College Students

The Self-Perception Profile for College Students was originally conceived by Newman and Harter (1986, cit in Ribeiro, 1994), and is an instrument intended for measuring the "personal competence" of higher education students.

The theoretical assumptions behind this instrument include a structural perspective on the self-concept construct, based on the idea that a person's self-concept results from the sum of partial self-concepts (Ribeiro, 1994). This view of the self-concept construct allows for a separate representation of each of its domains.

Each item has four possible alternative answers. First, the student shall select one of two opposite statements (first two alternatives), and then, for the statement that she/he has chosen, the student must still select the degree of identification with that statement: precise identification with the statement or just approximation to its contents (remaining two alternatives). Thus, each item is scored with either the value 1,2,3, or 4. Lower

scores denote lower self-perception of that competency, and higher scores relate to higher perceived competency in that domain. For each subscale, half of the items were formulated in a positive direction (i.e. lower scores resulting from answers on the left, and higher scores attributed for answers on the right), while the other half were formulated in the opposite direction (Ribeiro, 1994).

Although the complete set of scales of the instrument provides a global single score, resulting from the summation of the scores from the subscales, the most informative presentation of the result is in the form of a profile (Ribeiro, 1999).

In our study, we have used two of the subscales of the Portuguese adaptation of the Self-Perception Profile for College Students conducted by Ribeiro (1999): a) the subscale regarding academic competence, and the subscale measuring intellectual competence.

In a study with 609 students (53% females) enrolled in one of the last two years of secondary education (K11 or K12), and in higher education, from several secondary schools and colleges in the city of Porto (Portugal), Ribeiro (1999) confirmed that the factorial structure of the Portuguese version closely approximated that of the original scale (Newman and Harter, 1986, as cited by Ribeiro, 1994).

The factorial analysis conducted by Ribeiro (1994) led to the agglutination of two of the original 13 subscales, thus resulting in the Portuguese version of the instrument comprising just 12 subscales. From the 54 items presented in the original version, 52 were retained in the version adapted for Portugal.

The global Cronbach *alpha* for the Portuguese version was 0.92, while the the majority of the subscales presented values ranging from 0.69 to 0.87 in this indicator of internal consistency (Ribeiro, 1994).

Importantly, since those are the two subscales of the Self Perception Profile for College Students that were used in our research, the academic competence subscale obtained a Cronbach *alpha* of 0.81 and the intellectual competence subscale achieved a Cronbach *alpha* of 0.86, which are good indicators regarding the internal consistency of these two subscales.

Also noticeable, in respect to these two subscales (assessing intellectual and academic

competences), is the finding reported in Ribeiro (1994) that there were statistically strong relations between them, with one explaining 49% of the variance of the other.

With our sample of 550 students, we found a Cronbach's alpha of 0,704 for the academic competence subscale, and a Cronbach's alpha of 0,805 for the intellectual competence subscale, which indicate adequate reliability of the instrument.

8.2.2.9. Questionnaire of Academic Experiences

The Questionnaire of Academic Experiences – Reduced Version ("Questionário de Vivências Académicas – versão Reduzida" [QVA-r], in Portuguese; Almeida, Ferreira & Soares, 1999) is composed by 60 items, distributed by five dimensions: personal, interpersonal, career, study, and institutional. Those five dimensions were considered particularly important for the quality of students' academic adaptation (Almeida, Ferreira & Soares, 1999).

Regarding the 60-items that comprise the QVA-r, Almeida et al. (1999) found good indicators of internal consistency, with Cronbach *alphas* of above .82 for four of the dimensions, except the institutional dimension, which received a Cronbach *alpha* of .71

The five dimensions measured by the QVA-r, will be described in the next paragraphs. The information regarding each one is given in Almeida et al., (1999).

The first dimension was called "*personal",* and its items are related to psychological and physical well-being, self-confidence, autonomy and anxiety towards evaluation situations.

The second dimension was named "*interpersonal"*, and the items relating to it assess aspects of academic adaptation, such as relationships with other students and friends, as well as more intimate and/or significant relationships. It also includes students' involvement with extracurricular activities, such as student associations, or other academic activities which involve socializing with other students.

The third dimension was "*career",* and was assessed by items related to the Major in which the students were enrolled, but also enclosing the students' broader vocational

project, inherent to the choice of the scientific and professional areas related that Major.

The fourth dimension, "*study"*, includes items essentially related with time management and with study methods. Although there can be found Major-related items within the ones measuring this dimension, those are more related to learning and curricular aspects of student experiences.

The fifth, and final, dimension evaluated by the QVA-r regards "*institutional"* adaptation. The items concerned with this dimension assess student's interest in the HE institution in which the student is enrolled, and his/her desire to continue studying in that institution, as well as the student's perceived quality of the institution's academic services and support structures.

Regarding the reliability of the instrument, Almeida et al. (1999) found good indicators of internal consistency, with Cronbach *alphas* of above .82 for four of the dimensions, except the institutional dimension, which received a Cronbach *alpha* of .71.

With our sample of 550 students, the Cronbach's alpha for the total scale was 0,930. The individual Cronbach's alpha's of each sub-scale is presented in Table 8.17.

Table 8.17. Dimensions on the QVA-r and subscale reliability (N=550)

Dimension	Description	Items	Alpha
Personal	Items related to *self* and to perceived psychological and physical well-being	13	0,897
Interpersonal	Relationships with peers, intimacy relationships, involvement with extracurricular activities	13	0,851
Career	Vocational adaptation to the chosen area of studies, and career perspectives	13	0,881
Study	Competencies of study, work habits, time management, use of resources such as library	13	0,832
Institutional	Interest for the HE Institution, will to continue studying in the institution, satisfaction with quality of the institutional services and structure	8	0,704

Therefore the high reliability of the QVA-r receives support from the data collected in

our sample of higher education students.

8.2.2.10 Rosenberg Self-esteem Scale

Along a persons' life, he/she receives feedback from socially interacting with others, while performing many social roles. Self-esteem has been generally described as the self-evaluative component of self-concept (Santos, 2008), by which a person appraises her/hir self-image from the feedback received in the context of these social interactions.

Serra (1986) considers that self-esteem is the most important component of self-concept, being associated with the evaluative aspects that a person makes about him-/her- self, basing on her/his abilities and performance.

Rosenberg (1989) defines self-esteem as an overall evaluation of one's worth or value: a measure of positive or negative orientation toward oneself.

Acording to Mruk (1995), while assessing self-esteem there can be identified two sorts of problems: one respects the singularity of self-esteem as a phenomenon, and the other concerns the wide diversity of instruments that exists for its evaluation.

Nevertheless, the scale presented in this section has enjoyed widespread use among researchers dealing with psychological phenomena regarding self-esteem. In fact, since it was proposed almost five decades ago, the Rosenberg Self-esteem Scale (RSES; Rosenberg, 1965, cit in Santos, 2008; Rosenberg, 1989) has become the most extensively used scale used in psychological research regarding this construct. The RSES has been translated to many languages, from Japanese to Italian, and many more (Santos, 2008).

In Portugal, many studies have been made that show its adequacy in measuring self-esteem in adolescent and young adults populations (Azevedo & Faria, 2004; Santos & Maia, 1999/2003; Romano, Negreiros & Martins, 2007; Santos, 2008).

The RSES is comprised of 10 items, 5 with positive, and 5 with negative orientation. The items address aspects regarding self-respect and self-acceptance (Romano et al., 2007). The answer to each item results in a score ranging from 1 to 4, for that item.

The version of the RSES used in this study was the one translated and adapted by Santos and Maia (1999; 2003), who took into account some of the limitations that were previously identified on the existing Portuguese versions of this instrument (Santos, 2008).

In the context of our study, the direction of the Likert scale was reversed in relation to that of the original instrument. Instead "1" corresponding to "totally agree" and "4" to "totally disagree", the direction of the scale was reversed, after consulting with the original author, in order to be in accordance with the rest of the scales used in the study.

While producing their Portuguese version of the RSES, Santos and Maia (1999; 2003) tried not only to produce a rigorous translation of the original scale, but also worried about making a culturally equivalent instrument, in respect to the original version. After several increasingly better translations, the authors tested a pilot version with a sample of high school students, to assess any remaining wording problem on the instructions and on the scale items (Santos, 2008).

In a research comprised of three studies, and using high school students as their sample, Santos and Maia (2003) tested the factorial structure of the RSES, through confirmatory factor analysis. The authors concluded that the scale assesses a one-dimensional construct, as was originally proposed by Rosenberg (1965 cit in Santos, 2008; 1989). This finding was important because the factorial structure of the RSES has been a topic of some disagreement among researchers (Marsh, 1996, cit in Santos, 2008).

In these first series of studies, with high school students, the psychometric properties of the version of the RSES translated by Santos e Maia (1999; 2003) was very good, with internal consistency values (Cronbach's *alpha*) varying between 0.86 and 0.92. The temporal stability of the scale was also high, with a correlation coefficient of 0.90 among the scores obtained with a two week time interval (Santos, 2008).

One interesting finding made by Santos e Maia (2003), while validating the RSES for use within the High School student population, was the fact that there were significant differences among genders, with males presenting higher levels of self-esteem.

Following these studies with the RSES, Santos (2008) conducted a study to validate the scale for use with Higher Education students.

For that study, Santos (2008) gathered a sample of 212 higher education students, from three Portuguese institutions: two universities and one polytechnic. One of the institutions was private, and the other two were public. There sample was composed of 37% males and 63% females), with ages comprised between 20 and 40 years old (with a mean of 22.8 years, DP=3.09).

The corrected correlations between the items and the global score of the scale varied between 0.23 and 0.64 and the Cronbach's *alpha* for the scale was 0.82

Santos (2008) then studied the validity of the RSES for assessing this population, by comparing the scores with the measures produced by the SWLS and the ICAC, having found positive correlation values of 0.49 and 0.38 between the RSES and each of those two measures, respectively.

Finally, and contrary to what Santos and Maia (2003) had found among High School students, in the case of Higher Education student population there were no significant differences in terms of self-esteem, between the two genders (Santos, 2008).

In our sample of 550 students, the Cronbach's alpha for the scale was 0,869, with all of the items correlating to the total of the scale by more than 0,417.

8.2.2.11. Self-Concept Clinical Inventory

The "Inventário Clínico de Auto-Conceito" (ICAC; Serra, 1986), is a Likert-type scale built with the purpose of assessing emotional and social aspects of self-concept. From a total of 75 items used in the experimental format of the instrument, the final version comprises 20 questions.

For each of this instrument items, there are five alternative possible answers, presented in either direct or inverse order. The total score of the may vary between a minimum of 20 and a maximum of 100. The higher the score, the better is the person's self-concept (as measured by the ICAC).

For the analysis of the statistical properties of the ICAC, Serra (1986) gathered a sample consisting of 920 university students and elements of the general population, in different

geographically regions.

In terms of the factorial structure of the ICAC, a principal component analysis of the 20 items, followed by *varimax* rotation, revealed six factors, which together explained 53.42% of the total variance (Serra, 1986).

Each of the six factors extracted was named according with its interpreted meaning:

- factor 1 (F1), was called "*social acceptance/rejection*", and contributes with 20.12% for the cumulative percentage of the variance;

- factor 2 (F2), was regarded as "*self-efficacy*", contributing to 9.01% of the variance;

- factor 3 (F3), was interpreted as "*psychological maturity*", and contributed with 6.97% of the variance;

- factor 4 (F4), comprised items related to "*impulsivity/activity*", and accounted for 6.20% of the variance;

- factors 5 and 6 (F5, F6), together contributed to 11.12% of the cumulative percentage of the variance, but were considered mixed factors, and as thus have not received specific names.

The Spearman-Brown coefficient was chosen to assess the ICAC internal consistency: a value of .791 was considered a good indicator of this psychometric feature. (Serra, 1986).

We computed the Cronbach's alpha regarding the results collected with the ICAC in our sample, and found an alpha of 0,864 for the complete scale, and Cronbach's alphas varying from 0,615, for the subscale composed of the items associated with factor 4 to 0,763 (with the only subscale obtaining an alpha less than 0.7 being the one measuring the fourth factor.

This results support the reliability of the ICAC to assess self-concept dimensions within the sample of 550 students participating in our study.

8.2.2.12 Self-efficacy Scale

This instrument was adapted for Portugal by Ribeiro (1995), from the *Self-Efficacy Scale* previously built by Sherer et al. (1982, as cited by Ribeiro, 1995).

Self-Efficacy is the personal judgment that people make regarding their ability to organize and implement activities, in unknown situations, and capable of containing some degree of ambiguity (Ribeiro, 1995).

Although self-efficacy is a situation-dependent variable (Bandura, 1977), some authors consider that Likert-type scales, such as the Self-Efficacy Scale here presented may be used to provide a general assessment of self-efficacy (Ribeiro, 1995). People with varied past experiences of success are predicted to have higher expectancies of self-efficacy, when compared with other people with less successful experiences, according to the authors of this scale.

In the original scale, answers are given through a 14-point Likert-type scale (Sherer et al., 1982, as cited by Ribeiro, 1995). In the derived self-efficacy scale for use in Portugal, a 7-point Likert scale was preferred (Ribeiro, 1995). The instrument provides a global score, but also allows obtaining a profile, based on the scores of the different subscales.

In order to build the original version of the instrument, Sherer et al. (1982, as cited by Ribeiro, 1995) initially tested 36 items, which were reduced to 23, after statistical assessment of the measurement quality of each item.

After performing a culturally-aware translation of the original scale, Ribeiro (1995) departed from the 23 items of the English version of the instrument and conducted a series of tentative principal component analysis, through which the author decided to select an orthogonal (varimax) rotated three-factor solution. The three factors included 15 of the original 23 items, and the resulting Portuguese scale ended up using these 15 items, instead of the original 23.

For the three factors suggested in the factorial solution obtained by Ribeiro (1995), the Cronbach *alphas*, were .80 (for the first), .80 (for the second), and .60 (for the third).

Given the semantic content of the items that were selected for each factor, Ribeiro (1995) named the first factor "Initiative and Persistence" ("Iniciação e Persistência", in Portuguese), the second factor was called "Efficacy in the Face of Adversity" ("Eficácia Perante a Adversidade", in the original), and the third was named "Social Efficacy" ("Eficácia Social", in Portuguese).

Regarding the validity of the Portuguese *self-efficacy scale*, Ribeiro (1995) conducted a series of comparisons between the scores obtained by this instrument and the ones obtained by other measures. For our study, it is particularly important to emphasize that the scores in the *self-efficacy* scale correlated significantly with the academic achievement indicator provided by the average grades reported by students at time of administration of the instrument (Ribeiro, 1995).

On the other hand, Ribeiro found that the scores of this scale relate well with those obtained in the self-efficacy subscale of the ICAC (Serra, 1986; described above). Thus, there seems to be a close relationship between general self-efficacy and self-concept (Ribeiro, 1995).

In what respects the reliability of the measurements provided by this instrument with our sample of 550 higher education students, the Cronbach's alphas for the total scale was 0,898. The "Initiative and Persistence" subscale had an alpha of 0,844, the subscale measuring "Efficacy in the Face of Adversity" obtained an alpha of 0,863, and the alpha for the "Social Efficacy" scale was 0,648. These results replicate the findings of Ribeiro (1995) in respect to this instruments' reliability.

8.2.3. Procedure

In the process of selection of the instruments to be included in this study, the original authors were contacted, and written permission was obtained for use in the context of the research (both in the case of the measures that already existed for use in Portugal, and in the case in which the instruments were done for use in other Countries, and had to be adapted for use with our Portuguese sample of higher education students).

Data were collected on the several higher education institutions in the context of a class. Each participant was assessed only once, and the filling of the full set of the scales took about 35 minutes. The length and nature of the instruments that were used determined our option for collecting student data in this setting, since it would not be possible to use a more practical approach, such as online surveying. The classroom setting was selected to maximize the quality of the collected data, and to reinforce students' involvement in the task of filling the relatively lengthy set of instruments.

Informed consent was obtained in written form each of the participants, and anonymity of the data was guaranteed. The intended empirical procedures and the full set of materials to be used received previous approval from the Fernando Pessoa University's Ethical Committee.

An initial pilot study was conducted on a small sub-set (N=11) of our intended sample (undergraduate students from Universidade Fernando Pessoa), to assess students feedback regarding each of the instruments and to the extension of the proposed set of scales. Another purpose of the pilot-study was to confirm our estimate regarding the time required for completion of the complete set of instruments.

The last four instruments presented on Table 8.3 (QVA-r, RSES, ICAC, and AE) required about 15 minutes on average to complete, and initially they were introduced conditionally: although these four instruments assessed a group of variables that were interesting for our study (based on the literature, and in our research curiosity), they took about 15 minutes to fill. The final decision regarding the use of the full protocol was taken in face of the positive feedback obtained in the pilot study.

Students always filled the Web 2.0 survey first (Table 8.1), followed by the Facebook-related scales (Table 8.2). Answering to these scales took about ten minutes.

Aiming at compensating for the natural effects of fatigue, the order by which the students filled the remaining nine instruments (Table 8.3) was that presented on that table (staring on CSEp until AE), or the reverse (starting on AE until CSEp). Nevertheless, individual complains regarding the time and effort required to fill the instruments were very rare.

All data was analyzed with IBM SPSS, complemented with the specialized software for performing structural equation modeling (IBM SPSS/Amos).

8.3. Descriptive statistics of variables common to both sub-studies (B1 / B2)

In this section, the descriptive results concerning the demographic aspects of our sample, and the psychological variables measured through the instruments depicted in Table 8.3 are presented.

This set of results were relevant for both Sub-study B1, concerning students' Web 2.0 use to supplement their in-class learning, and for Sub-study B2, focusing on the particular case of the educational usage of Facebook (a specific Web 2.0 tool).

The descriptive results concerning the Web 2.0 survey (Table 8.1), which was used only in the context of Sub-study B1 (Web 2.0) are provided in the section depicting the specific results related to that study (Section 8.4.1), and the descriptive statistics of the Facebook scales, are presented in Section 8.5.1, covering the results specifically relevant to Sub-study B2 (Facebook).

Therefore, Table 8.18 and Figure 8.1 present the information regarding the gender distribution of the students included in our sample.

Table 8.18. Gender distribution of participants

	N	%
Male	178	32,4
Female	372	67,6
Total	550	100,0

The number of female students represented in our study more than doubles the number of male students, although data from a relatively large number of male students were obtained (N=178).

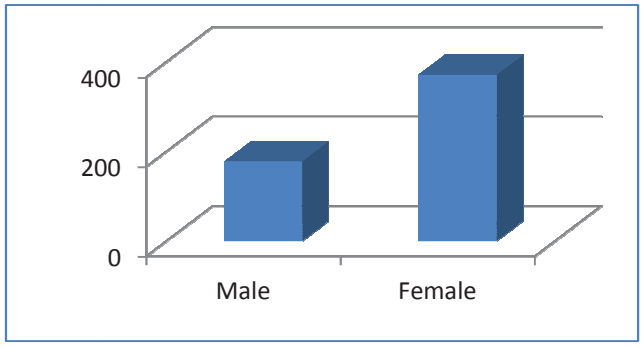

Figure 8.1. Gender distribution of participants

In terms of the age distribution of the students in our sample, Table 8.19 presents the number and proportion of the participants for several age groups.

Table 8.19. Age group distribution of participants

	N	%
≤19	161	29,3
20-22	245	44,5
23-25	72	13,1
26-30	31	5,6
31-40	21	3,8
>40	20	3,6
Total	550	100,0

As can be verified by inspecting Table 8.19, the vast majority of the students in our sample had less than 23 years, although the number of students with more than 30 years-old represented a non-negligible part of the sample (N=41, representing 7,4 % of the total number students included in the study). Figure 8.2 provides a pictorial perspective of the distribution of the students by the defined age-groups.

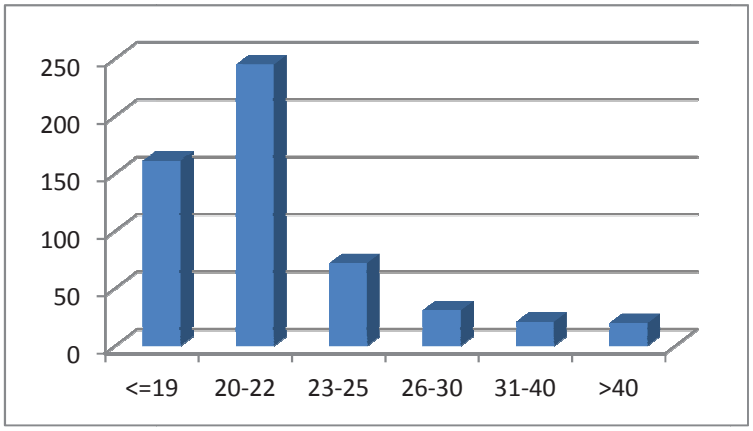

Figure 8.2. Age group distribution of participants

Since the implementation of the Bologna Reforms in Portugal, the first cycle of higher education studies have three years, and the second cycle has usually five (or six in some specific areas, such as Medicine).

In the context of our study, an ordinal variable was created through which students enrolled in second-cycle programs (MSc) were classified as being in the fourth or fifth year of higher education studies, depending of those students being enrolled in the first or in the second year of their Master degree courses. Although there were students of Medicine in our sample, no student was enrolled in the sixth year, for which only the range comprising years 1 to 5 is represented in Tables 8.20 and Figure 8.3.

Table 8.20. Academic year of enrolment

	N	%
1st	106	19,3
2nd	241	43,8
3rd	112	20,4
4th	88	16,0
5th	3	,5
Total	550	100,0

As depicted in Table 8.20 and Figure 8.3, students in the second year of their higher education students were the most numerous group in our sample.

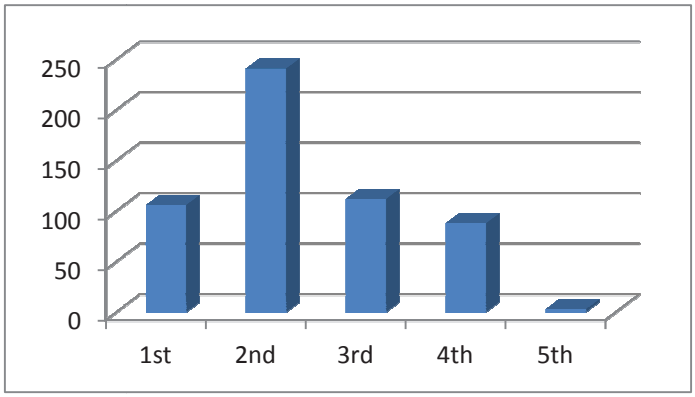

Figure 8.3. Academic year of enrolment

The higher education institutions where the data were collected are presented in Table 8.21, and Figure 8.4 depicts the proportion of students from each institution in our sample.

Table 8.21 Participants' Higher Education Institution

	N	%
UFP	207	37,6
ISMT	93	16,9
UBI	165	30,0
UA	40	7,3
ISCAP	45	8,2
Total	550	100,0

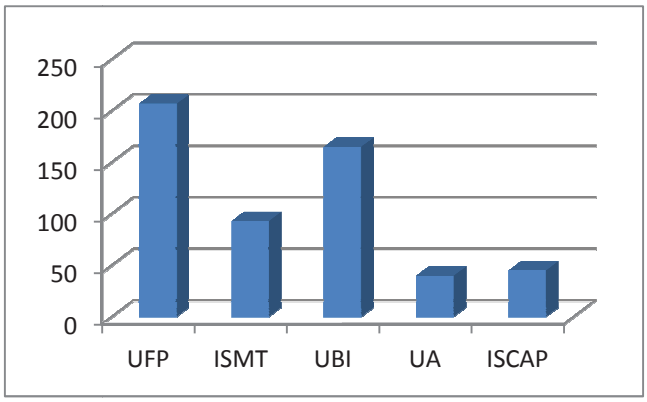

Figure 8.4. Participants' Higher Education Institution

As shown in Figure 8.4, the two institutions that contributed with more students to our sample were Universidade Fernando Pessoa (N=207, 37,6%) and Universidade da Beira Interior (N=165, 30%).

Table 8.22 and Figure 8.5 present the distribution of the students in our sample by the areas of their Majors. In Figure 8.5, it is salient the fact that the Psychology Major wa,s by far, the one which contributed with more participants to our study, providing 43,3% of all the students in the sample (Table 8.22).

Table 8.22. Majoring area

	N	%
Psychology	238	43,3
Computer Science	46	8,4
Criminology	45	8,2
Dental Medicine	40	7,3
Speech Therapy	42	7,6
Aeronautical Engineering	20	3,6
Medicine	20	3,6
Portuguese and Spanish Studies	14	2,5
New Communication Technologies	40	7,3
Accounting and Administration	45	8,2
Total	550	100,0

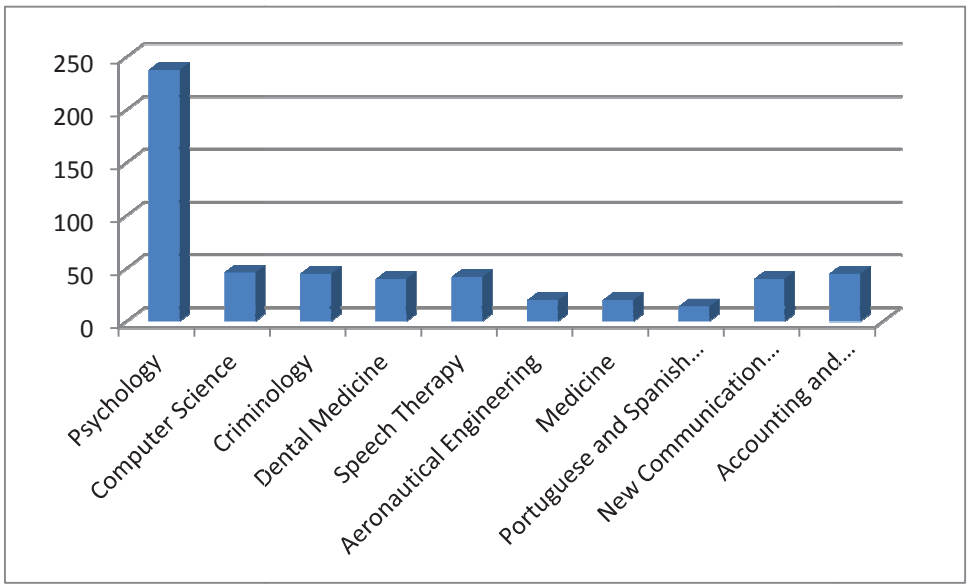

Figure 8.5. Majoring area

Grouping the Majors presented in Table 8.22 by broad scientific and academic areas, the information presented in Table 8.23 and in Figure 8.6 was obtained.

Table 8.23. Academic areas

	N	%
Social and Human Sciences	297	54
Engineering / Technology	106	19,3
Medicine and Health	102	18,5
Business Studies	45	8,2
Total	550	100

Since the "Social and Human Sciences" group included those students enrolled in the Psychology Major, this was the category with a greater number of students (54% of our sample). Students from Engineering and IT-related fields accounted for near 20% of the sample, and students from the Health Sciences also approximated that level of representation (near 20%). The least represented group, among those considered in our study, was that of students from the area of Business Studies, which consisted in less than 10% of our sample.

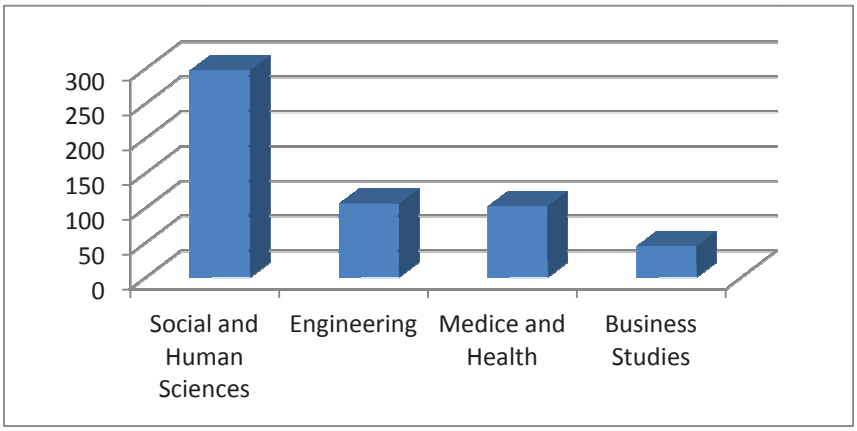

Figure 8.6. Academic areas

As presented in Table 8.24, and in Figure 8.7, the great majority of the students in our sample did not have a professional occupation, at the time the data were collected.

Table 8.24. Working-status of participants

	N	%
Working	88	16,0
Not Working	462	84,0
Total	550	100,0

Even so, a total number of 88 students reported having a job, which accounted for more that 15% of the participants in our study.

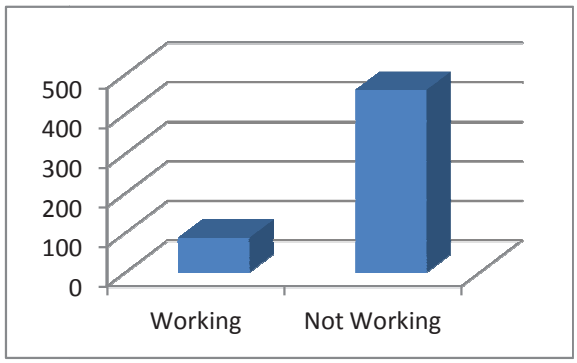

Figure 8.7. Working-status of participants

Although 84% of the students were not working at the time the data was collected, only 70,2% reported not having any previous professional experience, as depicted in Table 8.25 (first line of the table, presenting the number of participants reporting having no previous professional experience).

Table 8.25 Number of working years

	N	%
0	386	70,2
<1	7	1,3
1-2	62	11,3
3-4	25	4,5
5-6	16	2,9
7-9	15	2,7
≥10	39	7,1
Total	550	100,0

Figure 8.8 represents the number of working years of the students that reported having any past professional experience.

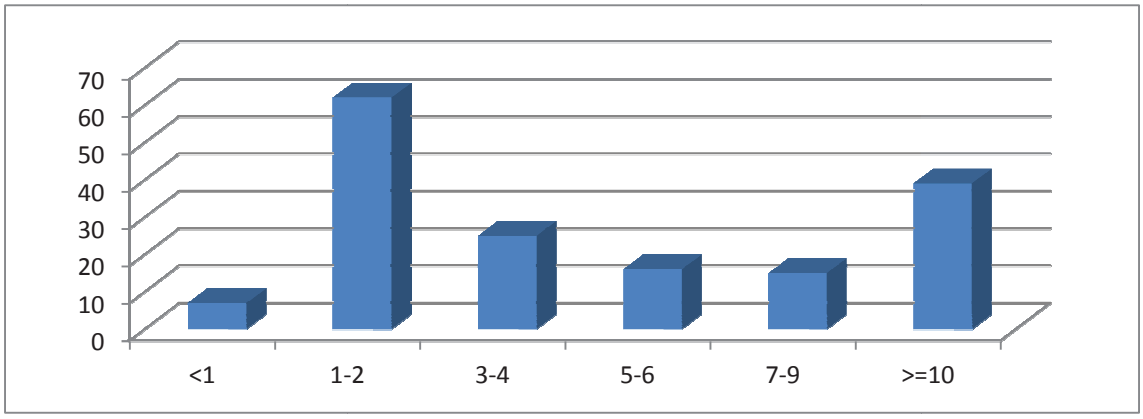

Figure 8.8. Students' professional experience (for the 30% of students who reported having some)

After presenting the general descriptive data concerning demographic aspects of our sample, we now present the results specifically related to Sub-study B1, related to students use of Web 2.0 to complement their in-class learning. The complete results concerning the educational usage of Facebook by students (including the descriptive results concerning the scales related to Facebook usage), are presented in the section which describes Sub-study B2.

8.4. Sub-study B1 – Students' Educational use of Web 2.0 (in General)

8.4.1. Descriptive results

The first set of descriptive results concerning our study about students' use of Web 2.0 to supplement their in-class learning is presented in Table 8.26 and depicted in Figure 8.9.

The scale of the answers varied from 1 to 4, with higher values indicating greatest comfort levels and level of use, respectively.

The level of use indicator refers *specifically* to the reported actual use of each tool to supplement in-class learning.

Table 8.26. Students' reported comfort level and actual use regarding selected Web 2.0 tools[1]

	Comfort level		Actual use[2]	
	Mean	StdDev	Mean	StdDev
Facebook	**3,23**	1,06	**1,57**	0,84
Twitter	**1,21**	0,55	**1,1**	0,36
Blogs	**1,99**	0,91	**1,9**	0,94
Wikis	**2,8**	0,78	**2,78**	0,92
YouTube	**3,56**	0,57	**2,61**	0,91
Social Bookmarking	**1,2**	0,51	**1,14**	0,44
Messenger	**3,17**	0,86	**2,14**	1,02
Skype	**1,74**	0,95	**1,27**	0,59

Notes: [1]The scale range varied from 1 to 4, with higher values indicating greater levels of comfort and use
[2]Actual use refers specifically to the use of each tool to supplement in-class learning

As can be verified by inspecting Table 8.26 and Figure 8.9, students reported greatest levels of comfort in relation to Facebook, YouTube, and Live Messenger, followed

closely by their comfort level with Wikis.

Twitter and Social Bookmarking were the tools in relation to which students reported feeling less comfortable with.

Students also revealed having relatively low levels of comfort with Skype and with Blogs, although the variability of the answers (represented by the standard deviation measure in Table 8.26) was relatively high.

As presented in Table 8.26, although Facebook was the second of the tools with which students reported feeling more comfortable with, it was also the one for which the variability of the answers was the greatest, contrary to YouTube, for which the standard deviation of the comfort level average was much smaller.

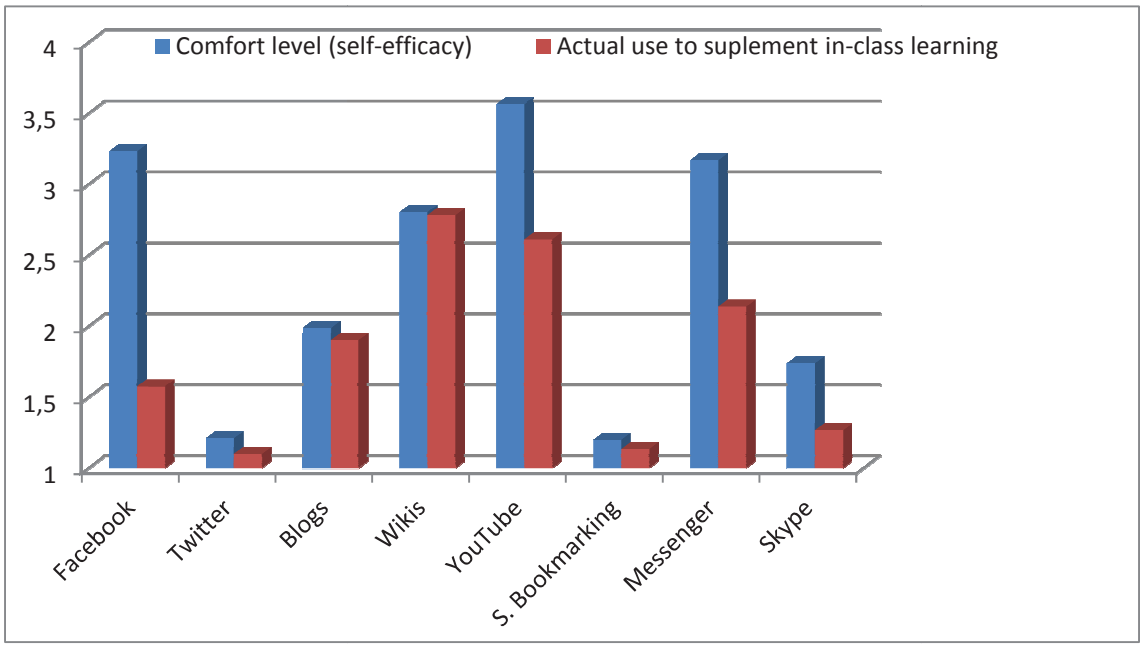

Figure 8.9. Students' reported comfort level and actual use with selected Web 2.0 tools

In terms of the actual use of each tool to supplement in-class learning, Blogs and Wikis presented indicators which coincided with the reported comfort level that students reported in relation to those tools.

However, there were great discrepancies between the degree of comfort that students reported having with Facebook and the reported actual use of this tool to supplement their in-class learning.

The Web 2.0 tools that Students reported as using the most, to supplement their in-class learning, were Wikis and YouTube, although the variability of the answers concerning these tools was relatively high (as reported by the standard deviation measure, in Table 8.26).

In the case of Wikis, the level of educational actual usage was very similar to the reported comfort level manifested for that tool. However, in regard to YouTube, its actual use to supplement in-class learning was significantly lower that the comfort level that students reported having with this tool. These can be considered indicators that Wikis are perceived as a more educationally-related Web 2.0 tool, whereas the uses of YouTube by higher education students are less far restricted to the educational realm.

Twitter, Social Bookmarking, and Skype were the Web 2.0 tools that students used the least *to supplement their in-class learning*, and the variability of the answers concerning the use of those tools (in this context) was relatively low.

Blogs and Live Messenger were mildly used by students to supplement their in-class learning, but in the case of Live Messenger, its actual usage for this purpose was significantly lower than the students' reported degree of comfort with this tool.

For all the Web 2.0 tools analyzed, the reported level of use (to supplement in-class learning) was always lower that the degree of comfort reported for that tool.

The measure of comfort level here explored is closely related to the psychological construct of "self-efficacy" (Bandura, 1977), which represents (summarily) the belief that a person has about being able to perform in a certain manner, in order to achieve her/his goals. Therefore, the data presented in Table 8.26 and Figure 8.9 provide initial clues that point to the relevance of including self-efficacy as one of the important factors influencing the adoption of Web 2.0 tools for educational purposes.

Table 8.27. Educational advantages of Facebook, Twitter, Blogs and Wikis

		Interaction with Teachers	Learning	Course Satisfaction	Interaction with Peers	Enhance Grades	Improve Writing
Facebook	N	200	27	99	412	25	69
	%	36,36%	4,91%	18,00%	74,91%	4,55%	12,55%
Twitter	N	22	4	9	42	4	14
	%	4,00%	0,73%	1,64%	7,64%	0,73%	2,55%
Blogs	N	97	149	142	61	103	177
	%	17,64%	27,09%	25,82%	11,09%	18,73%	32,18%
Wikis	N	42	369	147	9	277	144
	%	7,64%	67,09%	26,73%	1,64%	50,36%	26,18%

Tables 8.27 and 8.28 present the number and proportion (%) of students that felt that using Web 2.0 tools (namely Facebook, Twitter, Blogs, Wikis, YouTube, Messenger, and Skype) to supplement their in-class learning, provided benefits in each of the following domains: a) interaction with teachers, b) enhance learning, c) enhance course satisfaction, d) interaction with peers, c) improving grades, and d) improving writing skills.

Table 8.28. Educational advantages of YouTube, Live Messenger and Skype

		Interaction with Teachers	Learning	Course Satisfaction	Interaction with Peers	Enhance Grades	Improve Writing
YouTube	N	26	213	131	35	93	7
	%	4,73%	38,73%	23,82%	6,36%	16,91%	1,27%
Messenger	N	159	40	47	345	45	116
	%	28,91%	7,27%	8,55%	62,73%	8,18%	21,09%
Skype	N	40	11	6	85	7	6
	%	7,27%	2,00%	1,09%	15,45%	1,27%	1,09%

Figures 8.10a and 8.10b provide a global perspective of the numerical data presented in Table 8.27 and 8.28. The information in both Figures is the same but, whereas in Figure 8.10a each Web 2.0 tool is presented in the horizontal axis, and labels identify the perceived advantages for each tool, in Figure 8.10b the horizontal axis presents each the advantages, and each tool is identified through the labels of the graphic.

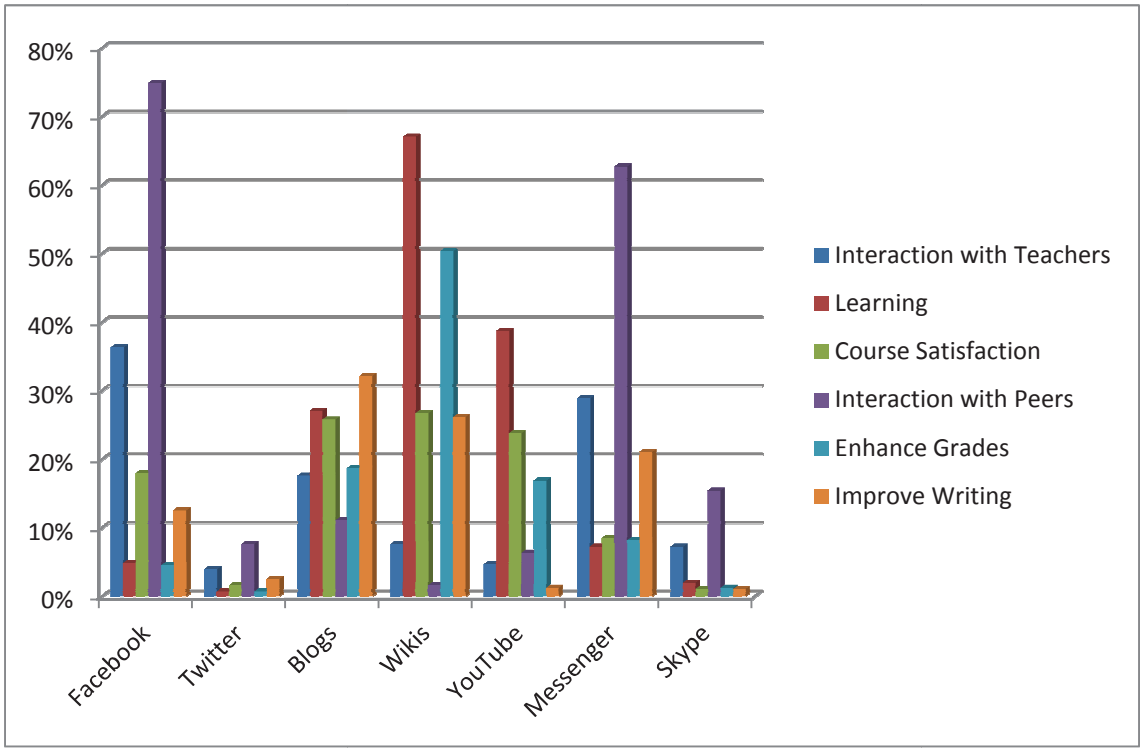

Figure 8.10a. Perceived benefits resulting from the use of each Web 2.0 tool (tool x domain)

The most salient aspect provided by Figure 8.10a is the students' perceived advantages of the use of Facebook and Messenger for interacting with their peers. Skype also appears to have some importance in allowing peer interaction among students, but to a much lesser extent than Facebook and Messenger. Almost 75% of the students in our sample considered Facebook as providing the advantage of allowing their interaction with their colleagues (Table 8.27), and 62,73% perceived Live Messenger as providing that same advantage (Table 8.28).

Facebook and Messenger were also the Web 2.0 tools to which a greater proportion of

students attributed the advantage of allowing the interaction with teachers, although teacher interaction through these tools was much less frequently perceived as one of the tools' benefits, when comparing to their use to interact with peer-students (Figure 8.10a).

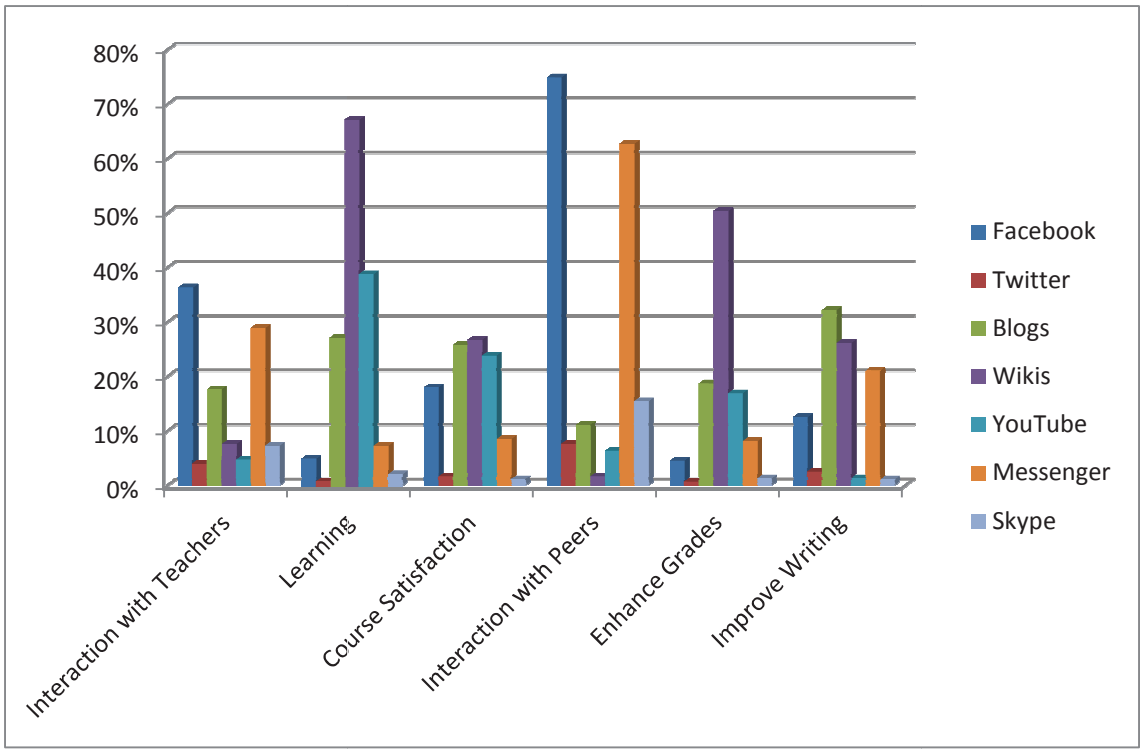

Figure 8.10b Perceived benefits resulting from the use of each Web 2.0 tool (domain x tool)

In Figures 10a/b the advantages perceived by students regarding the use of Wikis to enhance their learning are also particularly salient. In regard to this domain ("enhance learning"), YouTube and blogs are also perceived as providing advantages to students, in complementing their in-class learning.

Concerning "course satisfaction", no tool was mentioned by more than 26,73% of the students in our sample, and this maximum value was obtained by Wikis, nearly followed by the proportion of students that signaled blogs and YouTube as important for this domain (Figures 8.10a/b).

More than half (56,36%; Table 8.27) of the students in our sample reported perceiving wikis as a form to enhance their grades. The other tools that were perceived as potentially being beneficial to grades were blogs and YouTube, although in a significant lesser extent, relative to wikis (Figures 8.10a/b).

In what respects the interaction with teachers, besides Facebook and Messenger (already mentioned above), blogs were perceived as providing advantages (in supplementing in-class learning) by 17,6% of the students.

As depicted in Tables 8.27 and 8.28, blogs were the Web 2.0 tools for which more students perceived advantages in terms of allowing them to improve their writing skills (32,2%), closely followed by Wikis (26,2%) and Live Messenger (21,1%).

Table 8.29 and Figure 8.11 present the participants' opinion about the Learning Management System (LMS) provided by their higher education institution being "as good or better than any Web 2.0 tool".

The answers to this question were provided through a 7-points Likert-type scale, and varied from 1, for "totally disagree" to 7, for "totally agree".

Table 8.29. Institution's LMS "as good or better than any Web 2.0 tool"

	N	%
1="Totally disagree"	27	4,9
2	22	4,0
3	76	13,8
4	164	29,8
5	127	23,1
6	78	14,2
7="Totally agree"	56	10,2
Total	550	100,0

As depicted in Table 8.29 and Figure 8.11, the greatest number of responses (N=164 / 29,8%) were given in the neutral region of the scale (middle value provided by option 4), and although there were 125 (22,7%) participants choosing an option among the

items representing disagreement (1-3), almost half of the answers were situated in the right side of the scale (items 5-7, depicting agreement (47,5%).

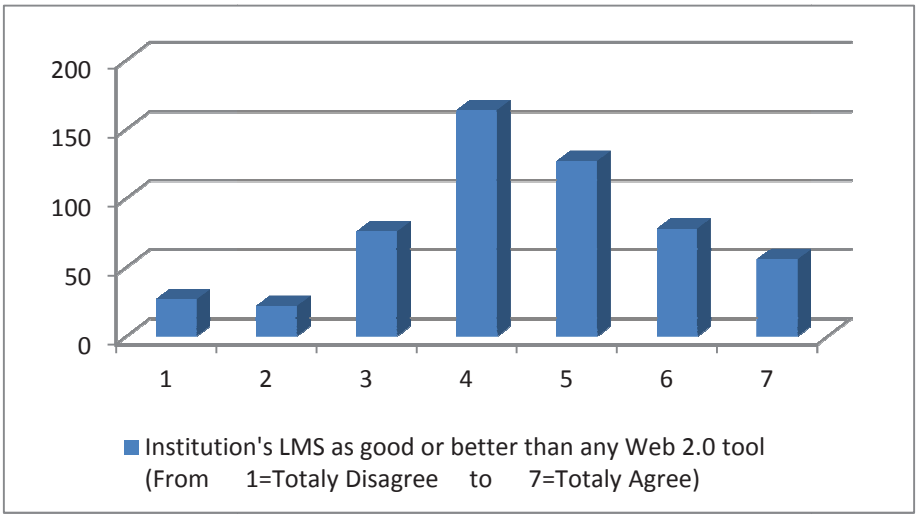

Figure 8.11. Institution's LMS *versus* Web 2.0

Table 8.30 and Figure 8.12 present the students' answers when asked if they wished that their higher education institution's LMS was complemented with the use of Web 2.0 tools.

Table 8.30. Wish that institutional "LMS was complemented with Web 2.0"

	N	%
1="Totally disagree"	20	3,6
2	40	7,3
3	56	10,2
4	111	20,2
5	99	18,0
6	108	19,6
7="Totally agree"	116	21,1
Total	550	100,0

As Table 8.30 and Figure 8.12 depict, only a minority of the students manifested disagreement regarding using Web 2.0 tools to complement their institutions' LMS (21,1% answers in choices 1-3 of the scale).

Although 20,2% of the students remained neutral regarding this topic, 58,7% manifested their agreement to the use of Web 2.0 to complement the LMS used by their institutions.

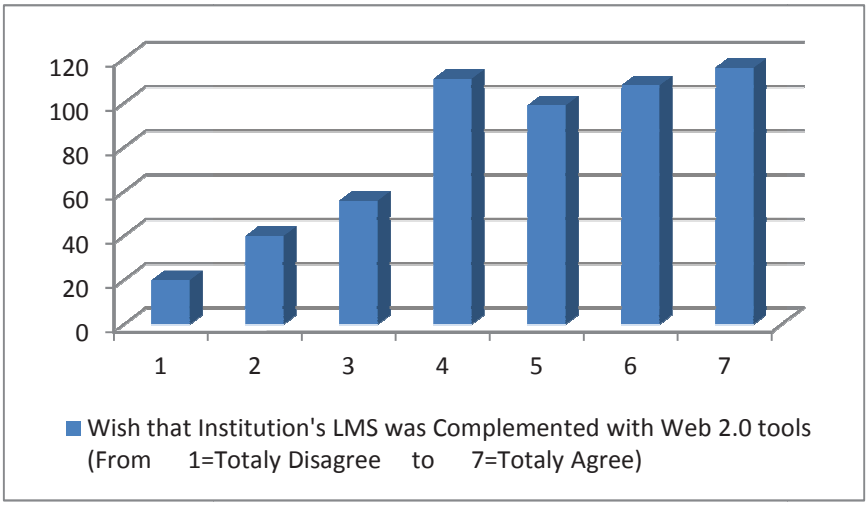

Figure 8.12. Institution's LMS complementation with Web 2.0

In Table 8.31 and Figure 8.13 the students' satisfaction with their institutions' LMS is depicted.

Table 8.31. Students answer to being "satisfied" with institutions' LMS

	N	%
1="Totally disagree"	24	4,4
2	38	6,9
3	67	12,2
4	131	23,8
5	121	22,0
6	107	19,5
7="Totally agree"	62	11,3
Total	550	100,0

As described in Table 8.31 and Figure 8.13, only 23,5% of the students in our sample, declared not being satisfied with their institutions' LMS, answering within the 1 to 3 range of the scale. About the same amount (23,8%) of the students maintained their neutrality in what respected this item.

However, 52,8% manifested moderate to high levels of satisfaction with their institutions' LMS, providing answers in the 5 to 7 range of the scale.

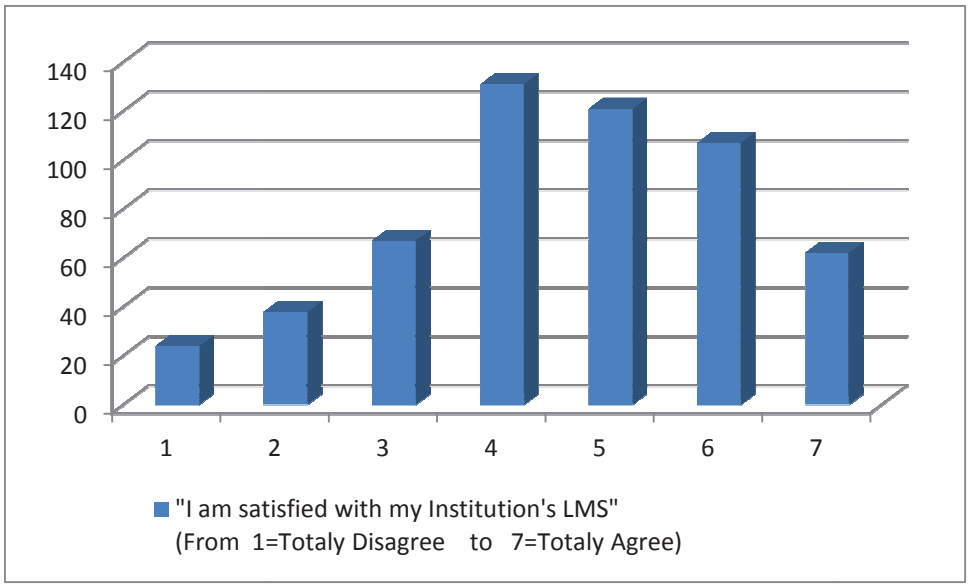

Figure 8.13. Students' satisfaction with institutional LMS

Table 8.32 presents the means and standard deviations for the items of the scale used to assess the core constructs of the models that will be used to test the research hypotheses of our study, mainly derived from the Theory of Planned Behavior (TPB; Ajzen, 1991), and from the Technology Acceptance Model (TAM; Davis, 1989).

In large samples, such as ours (N=550), normality tests such as the Kolmogorov-Smirnov tend to signal non-normally distributed data even when the scores deviate minimally from the normal distribution (Field, 2009).

All the values obtained for each of the items' kurtosis and skewness were between -1 and 1, but in large sample (N>200), standard errors tend to be small, and therefore

criteria such as the “critical ratio”, resulting from dividing skewness and kurtosis by the standard error, should not be used (Field, 2009).

However, for the structural models that were built based on the data collected by the items of the scale depicted in Table 8.32, multivariate normality was a critically important assumption. For the calculation of multivariate normality, the univariate normality of the variables in the model is taken into account (Byrne, 2010).

In practice most raw empirical data fail to meet the assumption of multivariate normality (Byrne, 2010), and previous research (e.g. Kline; 1998) demonstrated that even in conditions of severe non-normality of data, the parameters obtained in structural equation models (e.g. path estimates) remain fairly adequate.

The most important indicator of the degree of multivariate non-normality present in a model is kurtosis (Byrne, 2010). Therefore, the Mardia’s coefficient of multivariate kurtosis, provided by SPSS/Amos, was used to assess the presence (and degree) of multivariate non-normality in the models built with base in the scores of this scale, and the possible biases resulting from the presence of multivariate non-normality in the model (even if moderate) were assessed.

(Continued on the next page, please turn)

Table 8.32. Means and standard deviations of the items of the scale used to collect data relative to the constructs of the original TPB and TAM frameworks (N=550).

Construct	Item	Models	Mean	SD
Actual Use	AU	TPB, TAM	4,40	1,50
Behavioral Intention	INT	TPB, TAM	4,56	1,71
Attitudes	ATT01	TPB, TAM	4,81	1,69
	ATT02		4,73	1,58
	ATT03		4,89	1,51
Perceived Ease of Use	EU	TAM	4,78	1,52
Perceived Usefulness	PU01	TAM	4,42	1,67
	PU02		4,20	1,66
	PU03		3,95	1,73
	PU04		4,31	1,61
Subjective Norms	SNPeers01	TPB	3,89	1,66
	SNPeers02		4,26	1,61
	SNSup01		3,52	1,72
	SNSup02		3,83	1,76
Perceived Behavioral Control	PBC01	TPB	4,63	1,66
	PBC02		5,03	1,66

8.4.2 Test of the research hypotheses

As presented on Chapter 6, the first set of hypotheses (hypotheses 1 to 5; H1-H5) regarding our study of students' intentions and attitudes concerning the use of Web 2.0 to supplement their in-class learning was based on the Theory of Planned Behavior (TPB; Ajzen, 1991). The schematic representation of these hypotheses is depicted on Figure 8.14. The figure is also intended to provide a straightforward way of relating each of the five hypotheses to the corresponding relation proposed by TPB.

For the testing of the hypotheses represented on Figure 8.14 (H1-H5), the SPSS/Amos model reproduced on Figure 8.15 was formulated.

On the path diagram (Figure 8.15), the standardized regression weights (β's) are provided (represented as numbers above each unidirectional arrow). These values are also depicted in Table 8.34, where they are marked in **bold** type. The maximum likelihood method was used to compute the regression weights, in this and all the other SPSS/Amos models described in this chapter (it is the default method used by SPSS/Amos; Byrne, 2010).

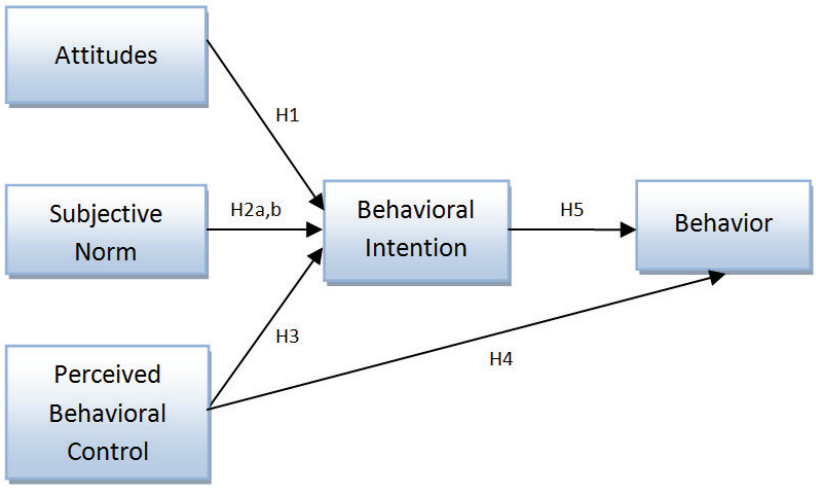

Figure 8.14. Hypotheses 1 to 5 and their relation to the Theory of Planned Behavior (TPB; Ajzen, 1991)

On the left side of the schema, the double-headed arrows represent correlations among the exogenous variables (attitudes, subjective norm, and perceived behavioral control), derived from the framework provided by TPB (Ajzen, 1991). All the correlations depicted were significant, with $p<0,01$ (as predicted by TPB).

The amount of the variance explained by the predictors of each dependent variable (R^2) is represented by the number above the right corner of the rectangle representing that variable (intention and actual use, in this case; Figure 8.15).

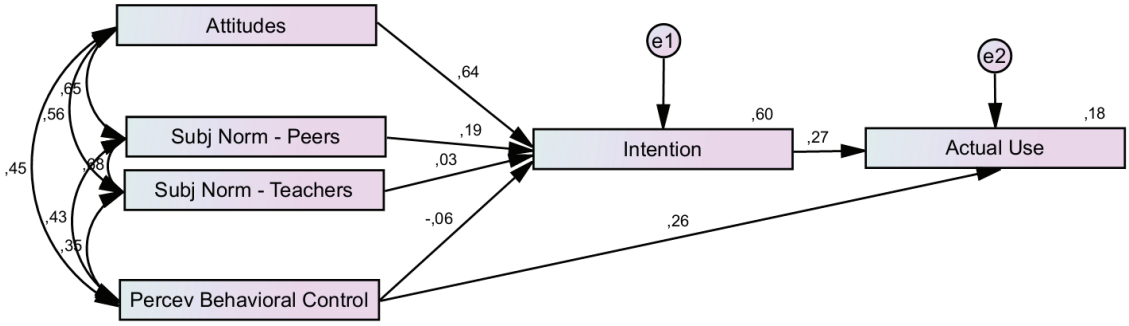

Figure 8.15. SPSS/Amos diagram representing the conceptual model in Figure 8.14

The two variables "e1" and "e2" , inside the small circles above "Intention" and "Actual Usage", represent the error terms associated with those endogenous variables (in SPSS/Amos, any observed endogenous variable must have an error term associated with it).

The fit indicators for the model which was used to test presented on Figure 8.15 are presented on Table 8.33. As can be inspected on that table, the values obtained by the model in terms of usual indices for assessment of goodness of fit reveal its good fit. The χ^2 could indicate a lack of fit of the model (if it was significant), and that would not be problematic given the other indicators presented on Table 8.33, and taking into account the relatively large size of our sample, but that was not the case: χ^2 (3, N=550) =5,477, p=0,14.

Since the Mardia's coefficient of multivariate kurtosis was 12,235, it was important to obtain a confirmation of the χ^2 statistic through an alternative method which adjusted for lack of multivariate normality. For this purpose, the Bollen-Stine bootstrap procedure was performed and a value of p=0,201 was obtained (by being ≥0,05, this indicator supports the goodness of fit of the model, like the equivalent p value of the basic χ^2 test).

This results support the adequacy of the model derived from the Theory of Planned

Behavior presented on Figure 8.15, what is particularly important, since this was the model through which the first five of our research hypotheses were tested.

Also important, given the presence of moderate multivariate kurtosis, was the fact that the bootstrap bias-corrected estimates for unstandardized ("BC Regression"; Tables 8.34 and 8.35) and standardized regressions ("BC Standardized Regression"; Tables 8.34 and 8.35) matched almost exactly the non-corrected estimates produced by SPSS/Amos (Tables 8.34 and 8.35), using the maximum likelihood method, thus confirming the robustness of these estimates, as studied by Kline (1998).

Table 8.33. Goodness of fit indicators for the model presented on Figure 8.15 (N=550)

Fit measure	Good fit	Acceptable fit	Model value
χ^2/df	≤ 2	≤ 3	1,826
RMSEA	≤ 0.05	≤ 0.08	0,039
CFI	≥0.97	≥0.95	0,998
GFI	≥0.95	≥0.90	0,997
AGFI	≥0.90	≥0.85	0,977
IFI	≥0.95	≥0.90	0,998

Note: criteria from Schermelleh-Engel et al. (2003) & Byrne (2010)

In Table 8.34 and Table 8.35, the values corresponding to the regression weights of the model depicted in Figure 8.15 are presented in the column marked with **bold** type.

This information provides the base for testing our first group of hypotheses, concerning students' intentions and attitudes regarding the use of Web 2.0 to supplement their in-class learning.

Table 8.34. Test of Study B1 hypotheses H1-H3: Predictors of Intention

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
Attitudes **(H1)**	0,777**	0,778	**0,638****	0,639
Subj Norm – Peers **(H2a)**	0,223**	0,223	**0,195****	0,194
Subj Norm – Teachers **(H2b)**	0,035	0,034	**0,034**	0,033
Perceiv. Behav. Control **(H3)**	-0,064	-0,063	**-0,055**	-0,055

Note:.* p<0,05. ** p<0,01

The four predictor variables of intention depicted in Table 8.34 explained 60% of that variable's variance (R^2=0,60; Figure 8.15).

Table 8.35. Test of Study B1 hypotheses H4 and H5: Predictors of Actual Use

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
Perceiv. Behav. Control **(H4)**	0,259**	0,26	**0,256****	0,257
Intention **(H5)**	0,233**	0,232	**0,265****	0,263

Note:.* p<0,05. ** p<0,01

The two predictors of actual use presented in Table 8.35 explained 18% of the variance of that variable (R^2=0,18; Figure 8.15).

The described levels of variance explained by the predictors of intention (60%) and actual use (18%) are similar to those found by Hartshorne and Ajjan (2009) in their study with the student population. In fact, in that study, the authors found that the factors proposed for predicting Intention explained 63% of the variance in that variable, and that only 26,9% of the variance of behavior (actual use) was explained by intention (in the authors model, based on a derivation of TPB, perceived behavioral control was not considered a direct predictor of behavior; Hartshorne & Ajjan, 2009).

Therefore, applying the model depicted on Figure 8.15 to test the validity of our research hypotheses 1 to 5 (H1-H5; earlier presented in Chapter 6, and here summarized in Figure 8.14, and signaled in **bold** type on Tables 8.34 and 8.35), we can say that:

Hypothesis 1 **(H1)**, stating that students' attitude towards Web 2.0 has a significant positive effect on behavioral intention of using Web 2.0 tools to supplement their in-class learning was confirmed (β=0,638, p<0,01).

General hypothesis 2 (**H2**), stating that subjective norm has a significant positive influence on students' intention to use Web 2.0 to supplement their in-class learning was partially confirmed, given that:

Hypothesis 2a **(H2a)**, postulating that peers' subjective norm has a significant positive effect on students' intention to use Web 2.0 to supplement their in-class learning was confirmed (β=0,195, p<0,01).

Hypothesis 2b **(H2b)**, claiming that Faculty's subjective norm has a significant positive effect on students' intention to use Web 2.0 to supplement their in-class learning was rejected.

Hypothesis 3 **(H3)**, affirming that perceived behavioral control has a significant positive effect on students' intention to use Web 2.0 to supplement their in-class learning was rejected.

Hypothesis 4 **(H4)**, stating that perceived behavioral control has a significant positive effect on students' actual usage of Web 2.0 to supplement their in-class learning, was confirmed (β=0,256, p<0,01).

Hypothesis 5 **(H5)**, proposing that intention to use Web 2.0 has a significant positive effect on students' actual use of Web 2.0 tools to supplement their in-class learning was confirmed (β=0,265, p<0,01).

Thus, only one of the five hypotheses proposed by the Theory of Planned Behavior (TPB; Ajzen, 1991) was rejected by the empirical test performed with our sample of students: the effect of perceived behavioral control on students' intention to use Web 2.0

to supplement their in-class learning (H3) was not statistically significant.

However, perceived behavioral control did have a significant positive influence on the actual usage of Web 2.0 to supplement in-class learning (H4), thus confirming the relevance given to this factor in TPB.

Hypothesis 2 (H2) was only partially confirmed: students intentions (about using Web 2.0 to supplement their in-class learning) appear to be influenced by their peers, but not by their teachers. Thus, social norms were confirmed as an important factor influencing intentions, although the influence of social norms provided by peers and by teachers were distinct.

In order to test our next group of hypotheses, we used a model whose core constructs and relations were derived from the Technology Acceptance Model (TAM; Davis, 1989), as described in Chapter 6.

In Figure 8.16, hypotheses 6 to 9 (H6-H9) are represented as relations among the constructs of the research model that was used.

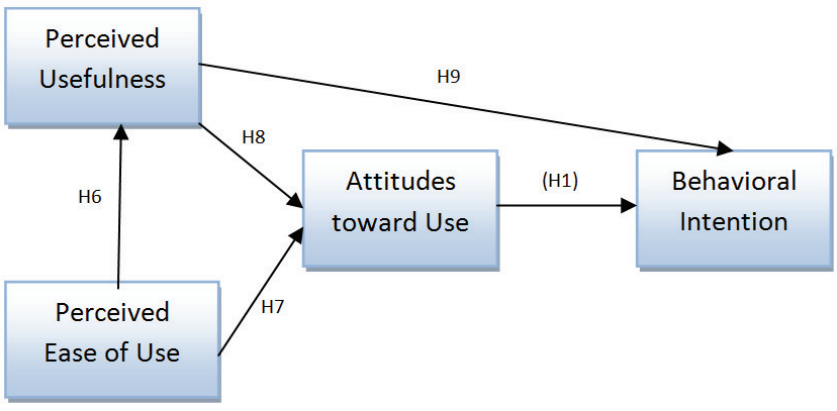

Figure 8.16. Schematic representation of hypotheses 6 to 9 (H6-H9).

The SPSS/Amos model corresponding to the scheme presented on Figure 8.16 is presented in Figure 8.17.

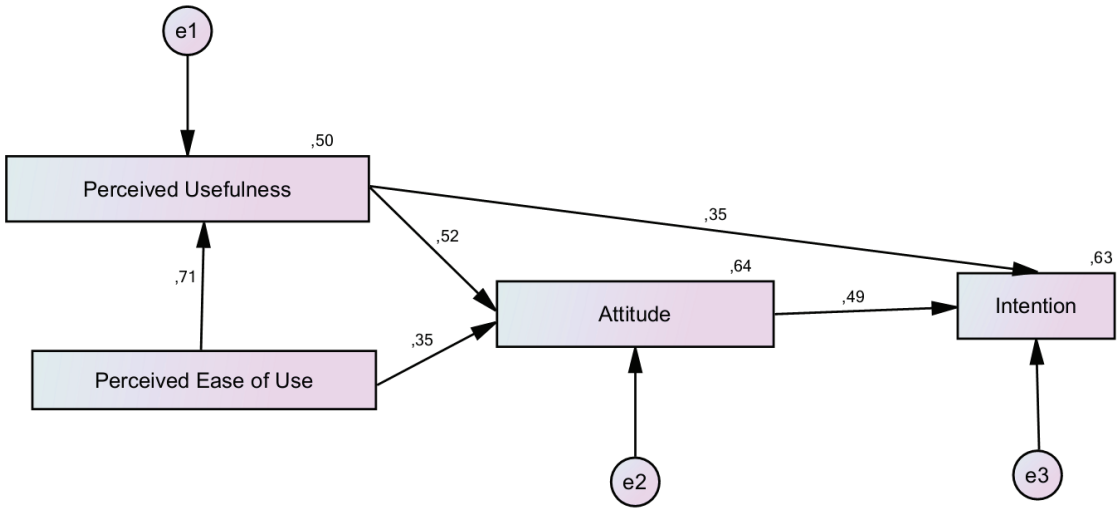

Figure 8.17. SPSS/Amos model corresponding to scheme presented in Figure 8.16

The numbers on the arrows of the model depicted on Figure 8.17 represent the standardized regression weights among the respective variables. All of the regression weights were significant, with p<0,01 for each one.

Table 8.36 provides further details regarding the regression estimates presented on Figure 8.17. The estimates displayed on the figure correspond to the table column labeled “Std Estimate” (marked with **bold** type).

The same table (Table 8.36) displays regression estimates and standardized regression estimates, as well as bias-corrected (“BC”) versions of those measures. In Table 8.36, the symbol “->” is used to represent regression: the variable on the right of that symbol is dependent from that on the left.

The meaning of the acronyms used in Table 8.36 is explained in Table 8.37

Table 8.36. Regression estimates for the model represented in Figure 8.17

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
PEOU->PU **(H6)**	0,721**	0,722	**0,71****	0,71
PEOU->ATT **(H7)**	0,322**	0,324	**0,348****	0,35
PU->ATT **(H8)**	0,471**	0,469	**0,517****	0,514
PU->INT **(H9)**	0,384**	0,382	**0,346****	0,344
ATT->INT ((H1))	0,602**	0,604	**0,495****	0,496

Table 8.37. Alphabetically-ordered list of the acronyms used in Table 8.36 and their meaning

Acronym	Corresponding Construct
ATT	Attitudes / Using Web 2.0 to supplement in-class learning
INT	Intention to use Web 2.0 to supplement in-class learning
PEOU	Perceived Ease of Use of Web 2.0 Tools
PU	Perceived Usefulness of Web 2.0 Tools

The amount of the variance explained by the predictors of each dependent variable (R^2) is represented by the number above the right corner of the rectangle representing that variable (perceived usefulness, attitude, and intention, in this case; Figure 8.17).

The amount of variance explained for the variable "perceived usefulness" in the context of the model presented in Figure 8.17 was 50% (R^2=0,50)

The amount of variance explained for the variable assessing students' attitudes towards using Web 2.0 tools to supplement their in-class learning was 64% (R^2=0,64; Figure 8.17).

The predictors of students intentions to use Web 2.0 to supplement their in-class learning were able to explain 63% of the variance observed for that variable (R^2=0,63; Figure 8.17).

In what regards the goodness of fit of the model (Figure 8.17), statistical testing

revealed that it presents adequate fit to the data, with χ^2 (1, N=550) =1,290, p=0,256. A non-significant (i.e. p≥0,05) χ^2 indicates a good fit of the model. The other indicators of goodness of fit were also indicative that the model fitted our data well, as can be examined in Table 8.38.

Table 8.38. Goodness of fit of model in Figure 8.17 (N=550)

Fit measure	Good fit	Acceptable fit	Model value
χ^2/df	≤ 2	≤ 3	1,290
RMSEA	≤ 0.05	≤ 0.08	0,023
CFI	≥0.97	≥0.95	1
GFI	≥0.95	≥0.90	0,999
AGFI	≥0.90	≥0.85	0,988
IFI	≥0.95	≥0.90	1

Note: criteria from Schermelleh-Engel et al. (2003) & Byrne (2010)

The Mardia's coefficient of multivariate kurtosis was 8,029, which is indicative of the existence of moderate multivariate non-normality in the data of the model. Therefore, in order to verify the χ^2 statistic, the Bollen-Stine bootstrap procedure was performed and a value of p=0,340 was obtained, thus supporting the goodness of fit of the model.

Also, as is depicted from the values presented in Table 8.36, the difference between the bias corrected estimates and the default estimates provided by SPSS/Amos is very small: the absolute value of the difference between the default standardized estimates and their bias-corrected counterparts is less or equal than 0,003.

Therefore, applying the model depicted on Figure 8.17 to test hypothesis 6 to 9 (earlier presented in Chapter 6, and here summarized in Figure 8.16, and signaled in **bold** type on Table 8.36), we can say that:

Hypothesis 6 **(H6)**, which states that students' perceived ease of use (PEOU) of Web 2.0 has a significant positive effect on their perceived usefulness (PU) of Web 2.0, in respect to supplementing their in-class learning was confirmed (β=0,710, p<0.01).

Hypothesis 7 **(H7)**, stating that students' perceived ease of use (PEOU) of Web 2.0 has a significant positive effect on attitudes (ATT) towards using Web 2.0 to supplement their in-class learning was confirmed (β=0,348, $p<0.01$).

Hypothesis 8 **(H8)**, stating that students' perceived usefulness (PU) of Web 2.0 has a significant positive effect on attitudes (ATT) towards using Web 2.0 to supplement their in-class learning was confirmed (β=0,517, $p<0.01$).

Hypothesis 9 **(H9)**, stating that students' perceived usefulness (PU) of Web 2.0 has a significant positive effect on their intention (INT) to use Web 2.0 to supplement their in-class learning was confirmed (β=0,346, $p<0.01$).

Hence, all the hypotheses derived from the reduced TAM model depicted in Figure 8.16 were confirmed. The effect of perceived ease of use on perceived usefulness (H6) was remarkably robust (β=0,710, $p<0.01$), and all the other relations predicted by TAM were found statistically significant.

Taking into account the complete set of statistical indicators provided in Table 8.36, and the adequate values presented by the goodness of fit indicators (χ^2, Bollen-Stine bootstrap p, and those depicted in Table 8.38), it can be concluded that the model presented on Figure 8.17, based on TAM (Davis, 1989), represents a statistically solid starting point to explore the influence of additional (psychological) variables on students' attitudes and behavioral intentions concerning the use of Web 2.0 tools to supplement their in-class learning.

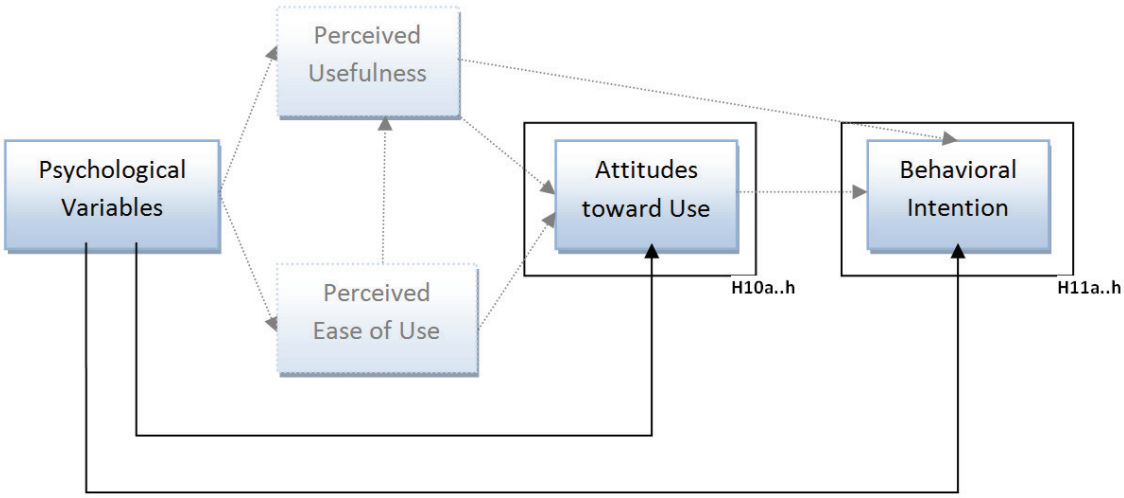

Figure 8.18. TAM-based model used to test Hypotheses 10 and 11 (H10 and H11).

One advantage of the original TAM framework is the fact that it provides clear guidelines on how external variables (such as personality factors or demographic indicators) can be related to the constructs of the model: TAM postulates that perceived usefulness and perceived ease of use (of a technological tool) mediates people's attitudes and behavioral intentions (regarding that technological tool).

Nevertheless, since its proposal, by Davis (1989), the TAM model has been used as the base for many studies that, while taking it as a starting point, extend it by proposing alternative ways in which external variables can influence attitudes and intentions (Wixom & Todd, 2005).

As depicted in Figure 8.18, and earlier presented in Chapter 6, hypotheses 10 and 11 (H10 and H11) were formulated to study the relevance of a group of psychological constructs for understanding students' attitudes (H10) and intentions (H11) in respect to the use of Web 2.0 to supplement their in-class learning.

Table 8.39 presents the constructs associated with each of H10 and H11 sub-hypotheses, as well as the variables measuring unique dimensions of those constructs.

Table 8.39.Psychological variables assessed in study B1 (cf. Figure 8.18)

Hypothesis	Construct	Dimension	**Variable**	Instrument[1]
H10a, H11a	Self-concept	Social acceptance/rejection	**icacf1**	ICAC
		Self-efficacy	**icacf2**	ICAC
		Psychological maturity	**icacf3**	ICAC
		Impulsivity/activity	**icacf4**	ICAC
H10b, H11b	Satisfaction with Life	Satisf. with academic life	**swalstot**	SWALS
		Satisfaction with life	**swlstot**	SWLS
H10c, H11c	Satisfaction with Social Support	Social activities	**esssas**	ESSS
		Intimacy	**esssin**	ESSS
		Satisf. with friends	**essssa**	ESSS
		Family support	**essssf**	ESSS
H10d, H11d	*Personal* Self-esteem	Self-esteem	**rsestotal**	RSES
H10e, H11e	*Collective* Self-esteem	Identity	**cseIdent**	CSEp
		Public	**csePubl**	CSEp
		Private	**csePriv**	CSEp
H10f, H11f	General Self-efficacy	Efficacy on adversity	**aeeficadver**	AE
		Social efficacy	**aeeficsoc**	AE
		Initiative and persistence	**aeinipersist**	AE
H10g, H11g	Academic Experiences	Career	**qvacarreira**	QVA-r
		Study	**qvaestcurso**	QVA-r
		Institutional	**qvainstituc**	QVA-r
		Interpersonal	**qvainterpes**	QVA-r
		Personal	**qvapessoal**	QVA-r
H10h, H11h	Self-perception of competence	Academic competence	**selfpercca**	SPP-CS
		Intellectual competence	**selfpercci**	SPP-CS

[1] The names of the instruments mentioned on the right column, and information regarding their respective authors, are presented in Table 8.3.

Using Figure 8.18 for illustration, it is important to emphasize that hypotheses 10 and 11 depend on the *set of relations* represented inside the rectangles that surround

attitudes (H10) and intention (H11). Therefore, the sum of direct (solid-line arrows) and indirect (dashed-line arrows) effects will be considered in rejecting or accepting each of H10 and H11 sub-hypotheses (these hypotheses are related to *total* effects, which result from the sum of direct and indirect effects).

The first step taken to test hypotheses 10 and 11 was to select, among the relatively large number of available variables (depicted in **bold** in Table 8.39), the ones that presented indicators of being relevant, in the context of our research model (schematically depicted in Figure 8.18).

Although the use of stepwise regression is widespread in the scientific literature, as a method to select predictive variables among several possible candidates (Whittingham, Stephens, Bradbury, & Freckleton, 2006), its limitations have been emphasized by several authors (e.g. Whittingham et al., 2006; Flom & Cassell, 2007).

Therefore, for the identification of the important psychological variables, we opted by a theoretical-driven approach, based on the framework provided by TAM to guide the selection of our variables, instead of relying on stepwise regression, or similar "theoretically-blind" computational intensive methods.

First, we tested the predictive strength of each psychological variable in relation to each of the two mediators that TAM defines as entry points for external variables into the model: perceived usefulness (PU) and perceived ease of use (PEOU). All psychological variables whose regression estimates with PU or PEOU were statistically significant ($p<0,05$) were selected. Appendix 12 details this procedure, and provides information regarding the variables which were selected by this step.

In relation to the variables that were not selected by the above step (i.e. that did not directly predicted PU or PEOU), we further selected all the variables whose indirect effect on *either* attitudes (ATT) *or* behavioral Intention (INT) was statistically significant.

By taking this step we intended to select all psychological variables that were (indirectly) significant for ATT or INT, even if (eventually) the direct relations of those variables to any of the mediators proposed by TAM (PU and PEOU) were not statistically significant. Appendix 12 provides detailed information concerning this

procedure and the results obtained through it.

Following the selection procedures described above, from an initial group of 24 psychological variables, 12 were considered promising in terms of their influence on students' attitudes and intentions towards the use of Web 2.0 to supplement their in-class learning. The selected variables are presented in Table 8.40.

Table 8.40. Selected psychological variables

Acronym	Corresponding Construct	Instrument[1]
aeEficAdver	General Self-efficacy – "efficacy on adversity"	AE
aeEficSoc	General Self-efficacy- "social efficacy"	AE
aeIniPersist	General Self-efficacy – "initiative and persistence"	AE
cseIndent	Collective Self-esteem – "identity"	CSEp
csePubl	Collective Self-esteem – "public"	CSEp
esssas	Satisfaction with Social Support – "social activities"	ESSS
essssf	Satisfaction with Social Support – "family support"	ESSS
icacf2	Self-concept - self-efficacy	ICAC
icacf4	Self-concept – "impulsivity/activity"	ICAC
qvainterpes	Students' Academic Experiences – interpersonal	QVA-r
selfpercca	Self-perception – academic competence	SPP-CS
selfpercci	Self-perception – intellectual competence	SPP-CS

[1] Note: the names of the instruments mentioned on the right column, and information regarding their respective authors, are presented in Table 8.3.

The selected psychological variables (Table 8.40) were integrated in the TAM-based model previously studied (Figures 8.16 and 8.17), and the resulting model is presented in Figure 8.19.

The variables in Table 8.40 are depicted on the left side of Figure 8.19 (in the same alphabetical order used in the table). Since these variables are exogenous, the correlations among them were taken into consideration, and those correlations found significant ($p<0,05$) are represented by the rounded double-headed arrows on the

leftmost part of Figure 8.19.

As mentioned on the steps used for variable selection, initially all the selected psychological variables were linked directly only to the mediators proposed by TAM: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU).

The complete set of regression and covariance estimates of the model represented in Figure 8.19 is provided in Appendix 13.

This initial model provided good fit indicators, as can be inspected on Table 8.41.

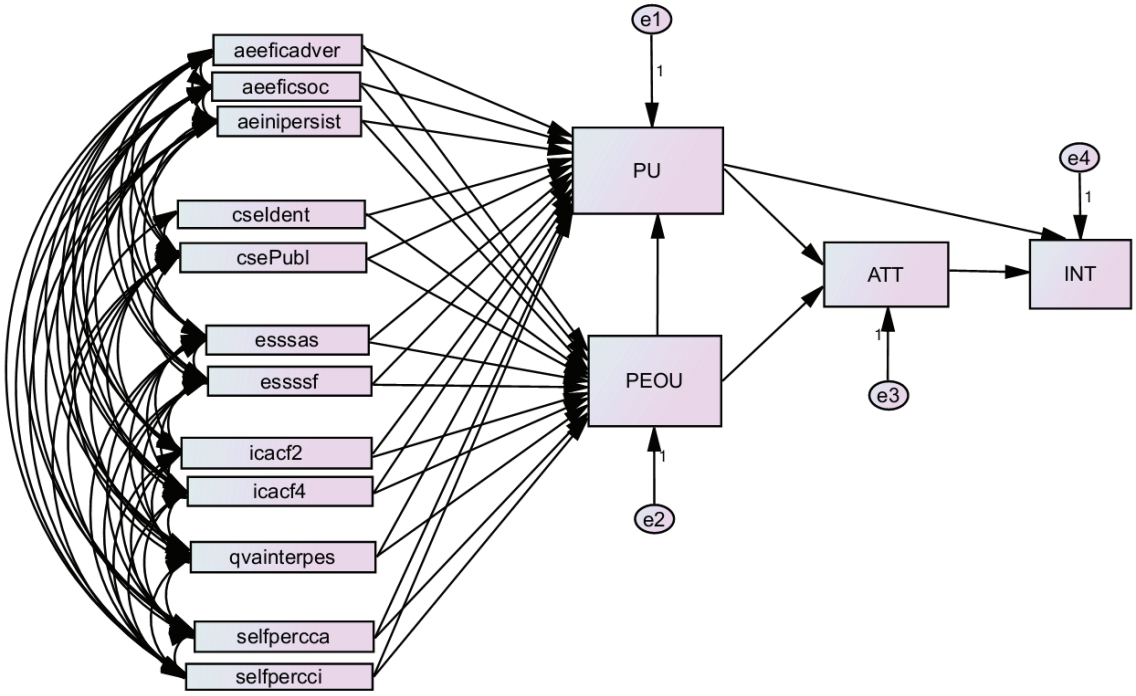

Figure 8.19. Integration of selected psychological variables in TAM – first step

Table 8.41. Goodness of fit indicators for the model represented on Figure 8.19 (N=550)

Fit measure	Good fit	Acceptable fit	Model value
χ^2/df	≤ 2	≤ 3	1,491
RMSEA	≤ 0.05	≤ 0.08	0,03
CFI	≥0.97	≥0.95	0,996
GFI	≥0.95	≥0.90	0,988
AGFI	≥0.90	≥0.85	0,955
IFI	≥0.95	≥0.90	0,996

Note: criteria from Schermelleh-Engel et al. (2003) & Byrne (2010)

The χ^2 was significant (χ^2 [35, N=550] =52,198, p=0,031) but, taking into account that the Mardia's multivariate kurtosis coefficient for the model was 35,376, it was important to use the Bollen-Stine bootstrap p to confirm this result. The Bollen-Stine p was 0,101, therefore adding to the other favorable fit indicators presented in Table 8.41.

The total variance explained by the predictors of each endogenous variable in the model represented in Figure 8.19 is presented in Table 8.42.

Table 8.42. Explained variance for endogenous variables in model of Figure 8.19

Endogenous Variable	Variance Explained (%)
PEOU (Perceived ease of use)	11
PU (Perceived usefulness)	54
ATT (Attitudes)	64
INT (Intention)	63

In interpreting the values of explained variance presented on Table 8.42, it is important to take into consideration that PEOU was an exogenous variable in the original TAM (Davis, 1989) model (cf. Figure 8.16).

Therefore, whereas all the other three variables (PU, ATT, INT) had as predictors other

variables belonging to TAM, the predictors of PEOU are all external variables (to TAM), and as such it is not surprising that the variance explained for PEOU is much less than for the other TAM variables.

This model (Figure 8.19) represents just an intermediate step to obtain the one that was used to test our research hypotheses 10 and 11 (H10 and H11).

The model respects the role of PU and PEOU proposed by TAM (Davis, 1989), in mediating the influence of external psychological variables and ATT and INT.

However, in the formulation of H10 and H11 we included not only mediated (indirect) effects of the psychological variables on ATT (H10) and on INT (H11), but also any possible direct (not mediated by PU and PEOU) effect that might exist between each of the external psychological variables and ATT or INT.

Hence, having tested the good fit of a model (Figure 8.19; Table 8.41) which respects the framework proposed by TAM (Davis, 1989), we were interested in exploring if the external variables influenced ATT or INT in other ways than by PU and PEOU mediation.

Direct relations of external variables to ATT and INT have been proposed in the past (e.g. Taylor & Todd, 1995a), and Wixom and Todd (2005) provide a good schematic representation of the main ways in which TAM has been expanded in the literature.

In order to investigate which (if any) of the selected psychological variables (Table 8.40; Figure 8.19) had a direct influence on ATT or INT, we used the indicators provided by SPSS/Amos called “modification indices” (“MI’s”).

The modification indices provided by SPSS/Amos are helpful in improving model specification (Byrne, 2010). However, it is important for the researcher to verify if the suggested modifications to the model are theoretically meaningful.

For the model proposed in Figure 8.19, we accepted SPSS/Amos suggestions to modify the model in order to account for direct influences of the external psychological variables on attitudes (ATT) and/or intentions (INT), in accordance to past extensions

proposed to TAM in the literature (Wixom & Todd, 2005).

Thus, while in the version of the model that emerged from the procedures of selection of the variables all psychological variables were linked to only PU and PEOU, our final model included some direct connections between some of the psychological variables and ATT ("esssas", "essssf", and "icacf4": these labels are explained in Table 8.40) or INT ("selfpercci", cf. Table 8.40).

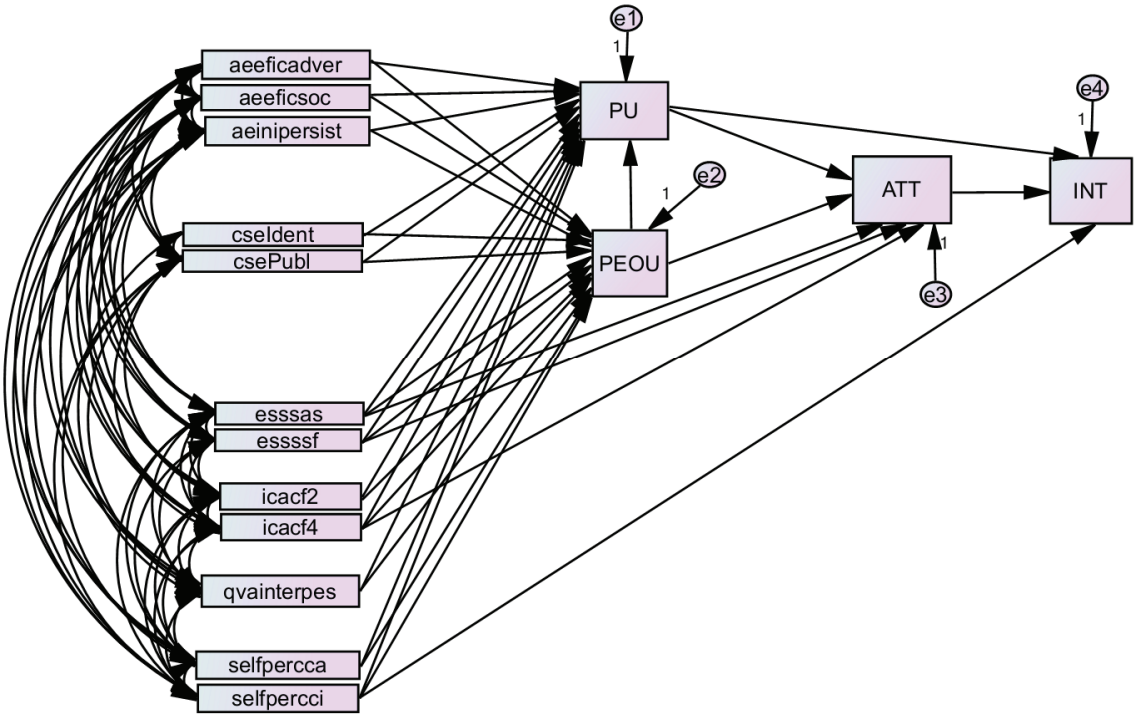

Figure 8.20. Integration of selected psychological variables in TAM – second step

As expected, since the consequence of the use of modification indices is the dropping of the χ^2 value (Byrne, 2010), the χ^2 results for the model represented in Figure 8.20 improved (χ^2 [33, N=550] =36,491, p=0,310), in relation to those presented in Figure 8.19.

Also as expected (for the same reasons as those presented for the improvement of the χ^2

value), the Bollen-Stine bootstrap p improved from the previous model, from p=0,101 to p=0,471.

The remaining fit indicators, provided in Table 8.43, reveal that not only the model has a good fit to the data obtained with our sample, but also that the already adequate values presented by the previous model (Figure 8.19; Table 8.41) improved slightly in this modified version (Figure 8.20).

Table 8.43. Goodness of fit indicators for the model represented on Figure 8.20 (N=550)

Fit measure	Good fit	Acceptable fit	Model value
χ^2/df	≤ 2	≤ 3	1,106
RMSEA	≤ 0.05	≤ 0.08	0,014
CFI	≥0.97	≥0.95	0,999
GFI	≥0.95	≥0.90	0,992
AGFI	≥0.90	≥0.85	0,966
IFI	≥0.95	≥0.90	0,999

Note: criteria from Schermelleh-Engel et al. (2003) & Byrne (2010)

The Mardia's coefficient for multivariate kurtosis remained at the same relatively high value of 35,376, which alerts for the necessity to account for the presence of multivariate non-normality in the data of our model.

As all the other structural models presented in this thesis, the estimates for this model were computed through maximum likelihood (ML) estimation, which has been shown to provide robust estimates, even in the presence of severe non-normality (Kline 1998). Additionally, "bias-corrected" (BC) estimates were calculated using the bootstrap procedure in Amos (with 2000 samples), generally revealing perfect or very close match with the ones computed using ML estimation.

The complete set of regression and covariance estimates for the model presented in Figure 8.20, as well as their bias-corrected counterparts, are presented in Appendix 14.

It is important to notice, however, that although the fit indicators for the modified

model (Figure 8.20) improved significantly from those of its previous version (Figure 8.19), the amount of variance explained for each of the endogenous variables did not change (except for a marginal 1% improvement of the explained variance for attitudes), as depicted in Table 8.44.

Table 8.44. Explained variance for endogenous variables in model of Figure 8.20

Endogenous Variable	Variance Explained (%)
PEOU (Perceived ease of use)	11
PU (Perceived usefulness)	54
ATT (Attitudes)	65
INT (Intention)	63

The main values that were relevant for this step of our study were the *total effects* of each of the selected psychological variables on students' attitudes (ATT) and intentions (INT) concerning the use of Web 2.0 tools to supplement their in-class learning (summarized in Table 8.45), since these are the results that allow the test of our next two research hypotheses.

Therefore, hypotheses 10 and 11 (H10 and H11) were assessed through this model (Figure 8.20), since it allowed us to obtain a measure of the *total* influence of the studied psychological variables on Students' attitudes and intentions toward the use of Web 2.0 to supplement their in-class learning, and fitted our data very well.

Table 8.45 contains the crucial information required to test hypotheses 10 and 11 (H10 and H11).

The relevant information for testing those two hypotheses is presented on the two rightmost columns, regarding the effects of the psychological variables on ATT and INT (these columns are marked in **bold** type).

Although the information on the two mentioned columns is the one required for our specific hypothesis, we also provide the standardized total effects of each of the psychological variables on PEOU and PU, for informative purposes.

Table 8.45. Standardized *total effects* on TAM-related variables (model in Figure 8.20)

Variable [a]	PEOU	PU	**ATT**	**INT**
	Estimate	Estimate	**Estimate (H10)**	**Estimate (H11)**
aeEficAdver	0,179*	-0,016	**0,053**	**0,021**
aeEficSoc	0,101	0,174**	**0,123***	**0,121****
aeIniPersist	-0,064	-0,109	**-0,077**	**-0,076**
cseIdent	0,069	0,128*	**0,089***	**0,088****
csePubl	-0,101*	-0,103*	**-0,087***	**-0,079***
esssAS	-0,089*	-0,034	**-0,09***	**-0,056**
esssSF	0,094*	0,008	**-0,009**	**-0,001**
icacF2	-0,216**	-0,064	**-0,107***	**-0,075**
icacF4	0,188**	0,169**	**0,218****	**0,166****
qvaInterpes	0,093	0,074	**0,07**	**0,06**
selfpercCA	-0,113	-0,079	**-0,079**	**-0,067**
selfpercCI	0,137**	0,04	**0,067**	**-0,02**

Notes: [a]Please, refer to Table 8.40 for information on what each variable's acronym represents
* p<0,05. ** p<0,01

Table 8.46 summarizes the results of testing hypothesis 10 (H10) and each of its sub-hypotheses (H10a to H10h).

Table 8.46. Testing of Hypothesis 10 (H10) based on the indicators presented on Table 8.45

Hypotheses	Influence on Attitude (**ATT**)	Confirmed?	Significant variable[a] (std. estimate)
H10a	**Self-concept**	**Yes**	icacF2 (**-0,107*),** icacF4 (**0,218****)
H10b	Satisf. with Academic Life	No	-
H10c	**Satisf. with Social Support**	**Yes**	esssas (**-0,09***)
H10d	*Personal* Self-esteem	No	-
H10e	***Collective* Self-esteem**	**Yes**	cseIdent(**0,089*),** csePubl (**-0,087***)
H10f	**Self-efficacy**	**Yes**	aeEficSoc (**0,123***)
H10g	Academic experiences	No	-
H10h	Self-Percep Competence	No	-

Notes: [a]Please, refer to Table 8.40 for information on what each variable's acronym represents
* p<0,05. ** p<0,01

Therefore, applying the model depicted on Figure 8.20 to test the validity of our research hypothesis 10 (H10; earlier presented in Chapter 6, and here summarized in Figure 8.18, and signaled in **bold** type in Table 8.45) can say that:

Hypothesis 10 (H10), stating that the overall influence of the studied psychological variables on Students' attitudes toward using Web 2.0 tools to supplement their in-class learning is significant, was partially confirmed, given that sub-hypotheses H10b, H10d, H10g, and H10h were rejected, but its sub-hypotheses H10a, H10c, H10e, and H10f were confirmed.

Dimensions of self-concept (H10a), satisfaction with social support (H10c), collective self-esteem (H10e), and self-efficacy (H10f) were found to have significant total effects on Students' attitude toward using Web 2.0 to supplement their in-class learning.

In the case of the dimensions of self-concept (as assessed by the ICAC instrument, cf. Table 8.39), the two factors whose influence was significant on students attitudes were *self-efficacy* ("icacf2"), and *impulsivity/activity* ("icacf4"). However, the effects of these two factors had *opposite signs* (negative for self-efficacy, and positive for impulsivity/activity.

Also, as depicted in Table 8.46, the (positive) effects of impulsivity/activity ("icacf4") on students' attitudes toward using Web 2.0 tools to supplement their in-class learning was more robust than the (negative) influence of self-efficacy ("icacf2").

One dimension of satisfaction with social support, as measured by the ESSS scale (Table 8.39), revealed a significant *negative* influence on students' attitudes: *social activities* (labeled "esssas" in Table 8.46. as described in Table 8.39).

Two of the three dimensions of collective self-esteem assessed by the CSEp were found to be significantly influent on students' attitudes towards using Web 2.0 tools to complement their in-class learning: public-collective self-esteem ("csePubl") and identity-collective self-esteem ("cseIdent").

The influence of identity collective self-esteem on students' attitudes (towards using Web 2.0 to supplement in-class learning) was positive, but the public dimension of collective self-esteem was found to have a negative effect on students' attitudes. It is important to note, however, that although statistically significant ($p<0,05$), the magnitude of the effects of these dimensions of collective self-esteem on students' attitudes were weak.

Finally, social self-efficacy ("aeEficSoc"), one of the dimensions of general self-efficacy that were assessed, revealed to have a positive influence of students' attitudes regarding using Web 2.0 tools to supplement in-class learning.

In what concerns the test of hypothesis 11 (H11), and of each of its sub-hypotheses, Table 8.47 summarizes the main findings regarding each of the measured psychological variables and their influence on students' intentions to use Web 2.0 tools to supplement their in-class learning.

Table 8.47. Testing of Hypothesis 11 (H11) based on the indicators presented on Table 8.45

Hypotheses	Influence on Intention (**INT**)	Confirmed?	Significant variable[1] (std. estimate)
H11a	**Self-concept**	**Yes**	icacF4 (**0,166****)
H11b	Satisf. with Academic Life	No	-
H11c	Satisf. with Social Support	No	-
H11d	*Personal* Self-esteem	No	-
H11e	***Collective* Self-esteem**	**Yes**	cseIdent (**0,088****), csePubl (**-0,079***)
H11f	**Self-efficacy**	**Yes**	aeEficSoc (**0,121****)
H11g	Academic experiences	No	-
H11h	Self-Percep of Competence	No	-

Notes: [a]Please, refer to Table 8.40 for information on what each variable's acronym represents

* $p<0,05$. ** $p<0,01$

Taking into account the information in Table 8.47, which summarizes the results of applying the model depicted on Figure 8.20 to test the validity of our research hypothesis 11 (H11; earlier presented in Chapter 6, and here summarized in Figure 8.18, and signaled in **bold** type in Table 8.45) can say that:

Hypothesis 11 (H11), stating that the overall influence of the studied psychological variables on Students' intentions to use Web 2.0 tools to supplement their in-class learning is significant, was partially confirmed, given that sub-hypotheses H11b, H11c, H11d, H11g, and H11h were rejected, but its sub-hypotheses H11a, H10e, and H11f were confirmed.

Impulsivity/activity ("icacF4"), one of the factors assessed by ICAC demonstrated a significant positive influence on students' intentions, reproducing the effects that were measured for this variable on students' attitudes.

Such as it was verified for attitudes, identity- and public- collective self-esteem ("cseIdent" and "csePubl") influence students' intentions to use Web 2.0 to supplement in-class learning.

Social self-efficacy, one of the dimensions of general self-efficacy that was measured, was revealed to influence students' intentions in the same positive manner it influenced students' attitudes, regarding Web 2.0 use to supplement in-class learning.

8.4.3. Discussion of Results and Integrative Model: Sub-Study B1

Through the presented model (Figure 8.20), significant influences were found between several of the researched psychological variables and students' intentions and attitudes regarding the use of Web 2.0 to supplement their in-class learning.

The dimension of self-concept that Serra (1986) called "impulsivity / activity" ("icacF4" in Table 8.40) revealed to positively influence students' attitudes and intentions in this domain (H10a and H11a, in Tables 8.46 and 8.47).

The factor of the ICAC called "self-efficacy" ("icacF2" in Table 8.40) appears to have a negative effect on students' attitudes towards the use of Web 2.0 tools to supplement in-class learning (H10a), but its effects on students' intentions was not significant (H11a).

Sub-hypothesis 10b and 11b (H10b and H11b) were effectively rejected in the earlier steps of the process that lead to the construction of the model (Figure 8.20), since the variables assessing satisfaction with life and academic life were excluded in the first stage of variable selection.

There was a negative relation between satisfaction with social support ("esssas", in Table 8.40) and attitudes towards the use of Web 2.0 to supplement in-class learning (H10c, Table 8.46), but we don't find the same effect of that psychological variable to students' intention to use Web 2.0 for these educational purposes (H11c, Table 8.47).

Personal self-esteem was not considered a significant variable to be included in the model, early on the stage of variable selection, for which sub-hypotheses H10d and H11d were rejected.

In what concerns H10e and H11e, there was a positive effect of identity collective self-esteem ("cseIdent", in Table 8.40), in both students' attitudes and intentions concerning the use of Web 2.0 to supplement in-class learning. Public collective self-esteem's ("csePubl", in Table 8.40), had a significant negative effect on attitudes and intentions.

Social self-efficacy ("aeEficSoc" in Table 8.40) seems to be an important factor positively and consistently influencing students' attitudes and intentions, as the acceptance of both sub-hypotheses H10f and H11f attest.

Although the interpersonal dimension ("qvainterpes", in Table 8.40) of "Academic Experiences" was selected to be part of the model presented in Figure 8.20, its total

effect on both students' attitudes and intentions was not significant, for which sub-hypotheses H10g and H11g were rejected.

Finally, although the two variables assessing academic and intellectual self-perception of competence ("selfpercca" and "selfpercci", in Table 8.40) were selected to be included in the model, their influence on students' attitudes and intentions towards using Web 2.0 to supplement in-class learning was found to be non-significant, what led to the rejection of sub-hypotheses H10h and H11h.

Figure 8.21 depicts the simplified model which resulted from the selection of the psychological variables whose influence was found significant on students' attitudes towards academic use of Web 2.0, or to their intention of using Web 2.0 tools to supplement in-class learning.

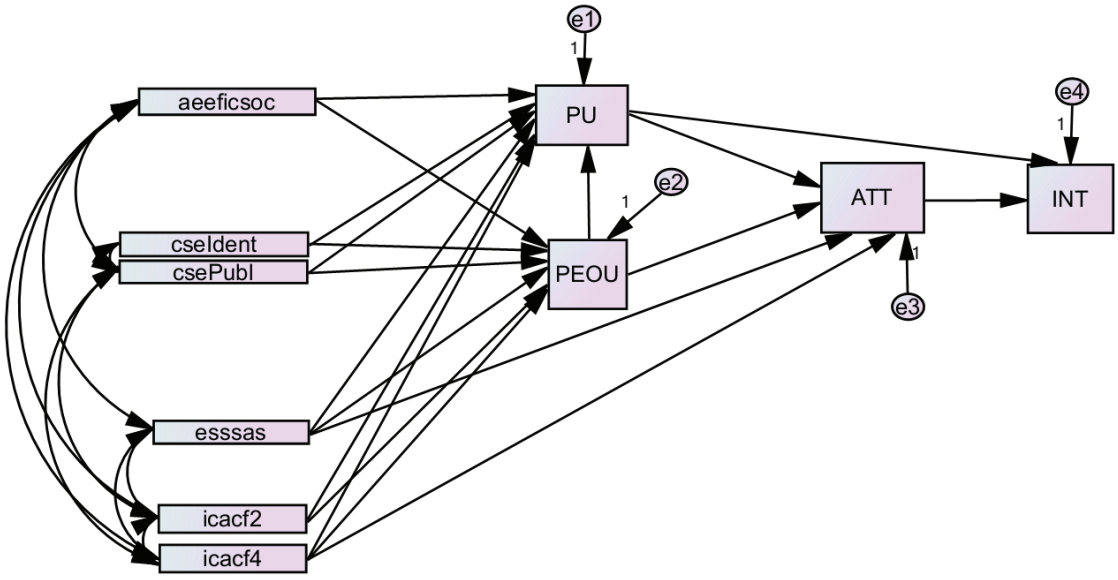

Figure 8.21 Model resulting from the test of hypotheses (H6-H11).

In what regards the fitness of the model (Figure 8.21), statistical analysis revealed a good indicator of fit through the χ^2 statistic: χ^2 (16, N=550) =19,083, p=0,264.

Given the relatively large size of our sample, it would not be unexpected if the χ^2 statistic was significant, but a p of 0,264 reinforces the other indicators (provided in Table 8.48) used in structural equation modeling, given the tendency for the simple χ^2 statistic to misclassify good models when the size of the sample is large.

Taking into consideration that the Mardia's multivariate kurtosis coefficient was 17,248, the Bollen-Stine bootstrap was performed, to confirm the χ^2 results, and the significance level obtained (p) was 0,446, therefore corroborating the model's goodness of fit).

Table 8.48. Goodness of fit indicators for the model represented on Figure 8.21 (N=550)

Fit measure	Good fit	Acceptable fit	Model value
χ^2/df	≤ 2	≤ 3	1,193
RMSEA	≤ 0.05	≤ 0.08	0,019
CFI	≥0.97	≥0.95	0,998
GFI	≥0.95	≥0.90	0,993
AGFI	≥0.90	≥0.85	0,976
IFI	≥0.95	≥0.90	0,998

Note: criteria from Schermelleh-Engel et al. (2003) & Byrne (2010)

This simplified version of the model (Figure 8.21), retaining only the variables whose total effects on students' attitudes and intentions was found significant, was used to explore the effects of two groups of additional variables:

a) one group of four variables concerning demographic, academic, and professional data (gender, age, year of enrolment, professional experience);
b) another group with three variables related to students' opinions about their institution's Learning Management Systems (wish that institutions' LMS was complemented by Web 2.0 tools, satisfaction with institutions' LMS, and degree to which institutions' LMS was seen as "equal or better" than any Web 2.0 tool).

Using TAM (Davis, 1989) guidelines for inclusion of external variables, the seven additional variables described above were included as exogenous variables, linked to

perceived usefulness (PU) and perceived ease of use (PEOU). However, SPSS/Amos modification indices suggested direct links between the variable representing "wish that institutions LMS was complemented by Web 2.0 tools" ("complWeb20", cf. Table 8.50), and attitudes and intentions, for which those non-mediated relations were also explored.

A picture representing that initial version of the model, and all its statistical properties (regression and covariance estimates and goodness of fit measures) are presented in Appendix 15.

Ín Table 8.49, the crucial information obtained from the integration of the seven additional variables in the simplified model presented in Figure 8.21 is provided.

Table 8.49. Standardized total effects

Variable [a]	PEOU	PU	**ATT**	**INT**
	Estimate	Estimate	**Estimate**	**Estimate**
aeEficSoc	0,151**	0,127**	**0,11****	**0,094****
age	0,147	-0,068	**0,015**	**-0,015**
complWeb20	0,352**	0,412**	**0,412****	**0,41****
cseIdent	0,073	0,137**	**0,09****	**0,087****
csePubl	-0,06	-0,099*	**-0,067***	**-0,064***
esssAS	-0,028	-0,007	**-0,058**	**-0,03**
gender	-0,1*	-0,137**	**-0,098****	**-0,091****
icacF2	-0,084	-0,105*	**-0,077***	**-0,071***
icacF4	0,133**	0,103*	**0,147****	**0,103****
satisfLMS	0,013	-0,006	**0,001**	**-0,002**
web20vsLMS	0,06	0,052	**0,044**	**0,038**
wkYears	-0,165*	0,079	**-0,015**	**0,018**
y1to6	-0,064	-0,052	**-0,046**	**-0,038**

Notes: [a]Please, refer to Table 8.40 for information on what each variable's acronym represents
* p<0,05. ** p<0,01

In Table 8.49, those variables whose total effects on students' attitudes and/or intentions towards the use of Web 2.0 to supplement their in-class learning was significant are marked in **bold, and underlined**, in the leftmost column of the table.

The meaning of each of the labels used to represent the variables in Table 8.49 is presented in Table 8.50.

Summarizing the results provided in Table 8.49, we can see that, among the seven new variables introduced to the model, only two demonstrated to influence students' attitudes and intentions concerning the use of Web 2.0 to supplement in-class learning: a) gender, and b) wish that institutions' LMS was complemented with Web 2.0 tools.

Table 8.50 Meaning of variables acronyms

Variable	Assessed Dimension
aeEficSoc	Social self-efficacy (as measured by AE)
age[a]	Age (in years)
ATT	Attitudes towards using Web 2.0 to suppl. Learning (TAM)
complWeb20[b]	Wish that institutions LMS was complemented with Web 2.0
cseIdent	Importance to identity collective self-esteem (as measured by CSEp)
csePubl	Public collective self-esteem (as measured by CSEp)
esssAS	Satisfaction with social support (as measured by ESSS)
gender[a]	Gender (male="1"/female="2")
icacF2	Self-efficacy (as measured by ICAC)
icacF4	Activity-impulsivity (as measured by ICAC)
INT	Intentions towards using Web 2.0 to suppl. Learning (TAM)
PEOU	Perceived Ease of Use (TAM) / Web 2.0 suppl. learning
PU	Perceived Usefulness (TAM) / Web 2.0 suppl. Learning
satisfLMS[b]	Satisfaction with institutions' LMS
web20vsLMS[b]	Institution's LMS "equal or better" than any Web 2.0 tool
wkYears[a]	Years of professional experience
y1to6[a]	Year of Enrolment (from 1st BSc year students to MSc finalists)

Notes: [a]Demographic, academic or professional variable.. [b]LMS-related variable.

In Figure 8.22, the final version of the integrative model for explaining students' attitudes and intentions towards the use of Web 2.0 to supplement their in-class learning is provided.

Besides the core constructs derived from TAM (perceived usefulness/"PU", perceived ease of use/"PEOU", attitudes/"ATT", and intentions/"INT"), the external variables whose influence was found significant on students attitudes and intentions are presented on the left side of the SPSS/Amos diagram (Figure 8.22).

Gender, the only demographic variable found relevant for the model is presented on top of the other external/exogenous variables (left size of Figure 8.22).

The only variable representing LMS-related aspects (wish institutions' LMS was complemented with Web 2.0 tools/"complWeb2.0") is presented on the bottom of the same group of external variables.

The remaining external variables represented on the left side of the diagram (Figure 8.22) are the psychological variables identified earlier, in the hypothesis-testing phase of the study (Figure 8.21).

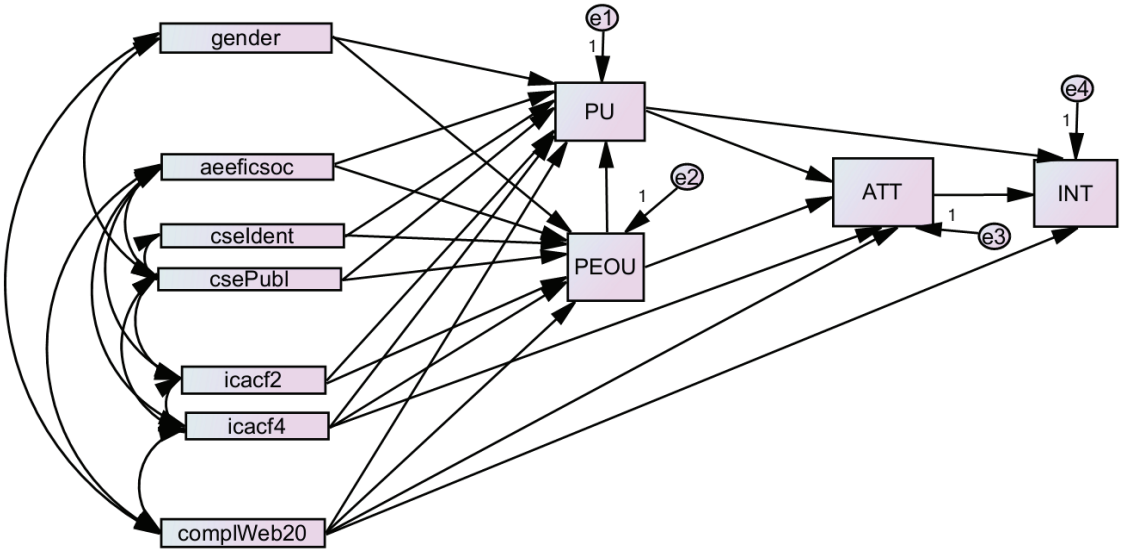

Figure 8.22. Final, integrative model – students and Web 2.0

It is important to note, however, that the two new variables introduced in the model ("gender" and "complWeb20", Table 8.50) were correlated with satisfaction with social support ("essssa" in Table 8.50).

The introduction of these two new variables in the model ("gender" and "complWeb20") led to satisfaction with social support ("essssa") to become a non-significant predictor of students' attitudes and intentions towards using Web 2.0 tools to supplement their in-class learning, and therefore, that variable was excluded from the final version of the model (Figure 8.22).

For the final integrative model depicted in Figure 8.22, the basic χ^2 statistic provided a good indicator of its fit: χ^2 (22, N=550) =23,455, p=0,377.

Taking into account that the Mardia's multivariate kurtosis coefficient was 18,039, it was important to supplement the results of the $\chi^2$with a non-parametric measure of goodness of fit. For this purpose, the Bollen-Stine bootstrap p was computed, and a p value of 0,528 confirmed the goodness of fit of the model.

Other fit indicators concerning the model depicted in Figure 8.22 are shown in Table 8.51. According to those indicators, the model presents a very good fit for the data obtained from our sample.

Table 8.51. Fit indicators of the final integrative mode, represented on Figure 8.22 (N=550)

Fit measure	Good fit	Acceptable fit	Model value
χ^2/df	≤ 2	≤ 3	1,066
RMSEA	≤ 0.05	≤ 0.08	0,011
CFI	≥0.97	≥0.95	0,999
GFI	≥0.95	≥0.90	0,992
AGFI	≥0.90	≥0.85	0,977
IFI	≥0.95	≥0.90	0,999

Note: criteria from Schermelleh-Engel et al. (2003) & Byrne (2010)

The total variance explained by the predictors of each of the endogenous variables in the model is presented in Table 8.52.

Table 8.52. Explained variance for endogenous variables in model of Figure 8.22

Endogenous Variable	Variance Explained (%)
PEOU (Perceived ease of use)	21
PU (Perceived usefulness)	56
ATT (Attitudes)	65
INT (Intention)	63

Each of the regressions and correlations among the model's variables is presented in Appendix 16.

The results that summarize the effects of each of the external variables of the final model (Figure 8.22) on students' attitudes and intentions towards the use of Web 2.0 to supplement their in-class learning are presented in Table 8.53.

As can be inspected in that table (Table 8.53), the total effects of all the external variables included in the model (those on the left side of Figure 8.22) demonstrated a significant influence (positive or negative) on students' attitudes and intentions towards the use of Web 2.0 tools to supplement their in-class learning.

The first pattern that is detectable by inspecting Table 8.53 is that (as expected) there is a consistency on the sign of the effects of each variable on both attitudes and intentions (i.e. when a variable has a positive effect on attitudes, it also affects positively intentions, and vice-versa).

Another aspect of the results is also particularly salient (in Table 8.53): except for the variable assessing the wish that the institutions' LMS was complemented with Web 2.0 tools ("complWeb20"), all the effects detected were relatively weak, although statistically significant.

However, as referred by Glass, McGaw, and Smith (1981), the practical importance of

an effect is intrinsically dependent of its relative costs and benefits. The same authors also refer that in the specific case of education, even an effect size as little as 0,1 can be very important, if that effect involves uniformly a great number of students.

Table 8.53 Standardized total effects on attitudes (ATT) and intentions (INT)

Variable [a]	ATT	INT
	Estimate	Estimate
gender	-0,097**	-0,091**
aeEficSoc	0,114**	0,099**
cseIdent	0,089**	0,087**
csePubl	-0,07**	-0,065**
icacF2	-0,083*	-0,075*
icacF4	0,144**	0,102**
complWeb20	0,417**	0,413**

Notes: [a]Please, refer to Table 8.40 for information on what each variable's acronym represents * p<0,05. ** p<0,01

After this general remarks about some of the most salient global aspects of the results presented in Table 8.53, the next paragraphs detail the effects found for each of the variables presented in that table.

As mentioned in Table 8.50, gender was a dichotomous variable: "1" was used to represent males, and "2" represented females.

Therefore, the negative total effect presented by gender on students' attitudes and intentions reveal that male students have more favorable attitudes regarding the use of Web 2.0 to supplement their in-class learning, and that male students' intentions to use Web 2.0 tools for this purpose are more pronounced than those found among their female peers.

Social self-efficacy ("aeEficSoc"), one of the dimensions of general self-efficacy assessed by the AE scale (Ribeiro, 1995), appears to be an important positive factor in

determining students' attitudes and intentions concerning the use of Web 2.0 tools to supplement learning.

Two representative items of the AE scale assessing social self-efficacy were "*I don't quit easily when I am trying to be friends with someone*" (item 11), or "*The friendships I have were achieved through my own personal ability to make friends*" (item 13).

Taking into account the nature of these items, it seems understandable that students who report higher scores in this dimension of the AE scale also present more positive attitudes and stronger intentions to use Web 2.0 tools to supplement their in-class learning (given the distinctive sociability nature of these tools, as expressed McLoughlin & Lee, 2007).

Thus, the observed positive effect of *social* self-efficacy ("aeEficSoc") on students' attitudes and intentions towards this use of Web 2.0 was somewhat intuitively predictable, but it was important to see it effectively confirmed by the statistical analysis of the data collected from our sample.

However, the factor of the ICAC (Serra, 1986) called "self-efficacy" ("icacF2") demonstrated to have a negative effect on students' attitudes towards the use of Web 2.0 tools to supplement in-class learning, and contrary to what had been found in the model used to test hypothesis 10 and 11, its negative effects on students' intentions were significant.

Examples of items if the ICAC assessing this dimension were "*usually I am fast at performing the tasks that are assigned to me*" (item 5), or "*I am accustomed to face and solve my own problems*" (item 8).

The data revealed that students' reporting higher in these measures of self-efficacy are less prone to have positive attitudes and towards the use of Web 2.0 tools to supplement their in-class learning, and also intend to use those tools less, in this context.

Thus, although the variables "aeEficSoc" and "icacF2" both refer to the concept of *self-efficacy* (i.e. to the believe the person has in her/his own competence), the dimensions of self-efficacy that were measured by these variables were different, and it is not illogical that each may affect students' attitudes and intentions in opposite ways.

The fact that *social* self-efficacy has a specific effect which is contrary to that observed for self-efficacy (in general), is revealing of the importance of the social dimensions of Web 2.0 tools.

Identity collective self-esteem ("cseIdent"), and *public* collective self-esteem ("csePubl"), two of the three dimensions of collective self-esteem assessed by the CSEp scale, were found to have a significant effect on students' intentions and attitudes.

However, whereas identity collective self-esteem ("cseIdent") revealed a positive influence, public collective self-esteem ("csePubl") showed a negative effect, on students' attitudes and intentions about using Web 2.0 tools to supplement in-class learning.

The two items assessing identity collective self-esteem ("cseIdent") were "*Overall, my group memberships have very little to do with how I feel about myself*" (item 4), and "*The social groups I belong to are unimportant to my sense of what kind of a person I am*" (item 12). Note that these two items are meant to be scored in reverse (i.e. higher scores in these items reflect lower identity collective self-esteem; Luhtanen & Crocker, 1992).

On the other side, the items measuring public collective self-esteem ("csePubl") were "*Most people consider my social groups, on the average, to be more ineffective than other social groups*" (item 7), and "*In general, others think that the social groups of which I am a member are unworthy*" (item 15). These items are also scored in reverse (Luhtanen & Crocker, 1992).

Considering the contents of the items used to describe identity and public collective self-esteem, it is not unnatural that these variables may have different effects on students' attitudes and intentions towards the use of Web 2.0 tools to supplement their in-class learning.

When students perceive the social groups to which they belong as important for their identity, they are more prone to have favorable attitudes towards using Web 2.0, and stronger intentions to use Web 2.0 tools, for the purpose of supplementing their in-class learning. This is reflected by the positive effects observed by identity collective self-esteem.

However, when students had higher scores on public collective self-esteem (i.e. when they felt that "others" valued more their belonging to the social groups of which they were members), they tended to be more against the use of Web 2.0 tools to supplement their in-class learning, and had fewer intentions concerning that use of Web 2.0 tools.

The dimension of self-concept labeled "impulsivity / activity" ("icacF4") revealed to positively influence students' attitudes and intentions concerning the use of Web 2.0 in the context under study.

Representative items of the ICAC (Serra, 1986) measuring this dimension were: "*When I have an idea which seems valid, I like to put it in practice*", or "*I am a person who likes to do whatever I want*".

It is interesting to assert the positive effect of this psychological variable on students' attitudes and intentions towards the use of Web 2.0 tools to supplement in-class learning, which reveals that the use of Web 2.0 tools may be useful for those students who are more prone transform ideas into actions: for example, these students may play a key role in initiating and maintaining the group dynamics potentiated by the use of Web 2.0 tools in higher education.

Finally, and as expected, the variable assessing students' wish that Web 2.0 tools were used to complement their institution's LMS ("complWeb20"), had a robust positive effect on students' attitudes and intentions, regarding the use of Web 2.0 to supplement in-class learning.

In respect to this last variable in the model (Figure 8.22), it is important to mention that although the majority of students were satisfied with their institutions' LMS (Figure 8.13), even more students manifested the wish that their institutions' LMS was complemented with the type of functionalities provided by Web 2.0 tools.

8.5. Sub-study B2 – Students' Educational Use of Facebook

8.5.1. Descriptive results

In Section 8.4, we presented results and models related to students' use of Web 2.0 tools (in general), for the purpose of supplementing their in-class learning (Sub-study B1).

In the present Section (8.5), we will focus on Facebook, a specific Web 2.0 tool that has gained much popularity in recent years.

In the sub-study whose results are presented here (Sub-study B2), we were interested in studying the psychological dimensions involved in students' use of Facebook *for educational purposes* (rather than the impact of those variables on the use of Facebook *in general)*. Nevertheless, some general indicators of Facebook will be provided, since they aid in putting the educational uses of this tool in a broader perspective.

In the following pages, a brief descriptive account of the results obtained with the Facebook-related instruments that were used in this sub-study is presented.

Then, in Section 8.5.2, the models and the processes that allowed us to test the research hypotheses concerning this sub-study are detailed (hypotheses 12 to 15 / H12-H15; earlier presented in Chapter 6).

In Table 8.54 the results obtained with the Facebook Intensity Scale (FBI; Ellison et al., 2007) are presented.

The FBI scale was used as a general screening instrument, measuring aspects such as the overall intensity of Facebook usage among students, as well as providing specific indicators, such as the number of Facebook "friends" each students has, and the amount of time spent using this tool.

Table 8.54. Facebook Intensity Scale (FBI) Results (N=550)

Scale Item	Mean[a]	SD
intFB01	3,50	1,57
intFB02	2,31	1,28
intFB03	2,98	1,57
intFB04	1,99	1,27
intFB05	2,85	1,41
intFB06	2,72	1,56
intFB07	4,15	1,54
intFB08	3,52	1,53
Total	3,00	1,19

Note: [a] The scale range was 1 to 5, for which 3 represents the middle of the scale

The (raw) average number of Facebook "friends" reported by students in our sample was 292, and the average number of minutes spent per day on Facebook was 100.

These raw values are obtained by taking the mean of the raw data introduced by students in the fields of the seventh and eighth items of the FBI (note that these averages are based on a linear scale, whereas the means provided in Table 8.54, for items 7 and 8, are calculated from a logarithmic scale).

Male students (N=178) reported an average number 262 friends, whereas female students (N=372) reported an average number of 306 friends.

Female students stated they spent an average of 113 minutes per day on Facebook, which was higher than the 73 minutes reported by their male peers.

The total score for the FBI was higher for female students (3,06) than that obtained by male students in this scale (2,89).

Therefore, in general, the results provided by the FBI scale revealed that students dedicated a significant amount of their time to being online on Facebook.

The results provided by the FBI scale also revealed that female students used Facebook

more intensively than their male peers, whether taking as indicators: a) time spent online on Facebook, b) number of Facebook "friends", or c) the total score of the FBI scale.

In what concerns the results obtained with the Adoption of Facebook scale (AF; translated from Usluel & Mazman, 2009 and Mazman & Usluel, 2010), Table 8.55 provides the descriptive results for all the items included in the instrument.

Table 8.55 Descriptive results obtained from the Portuguese AF scale (N=550)

Construct (Acronym)	Item	Item order on the scale	Mean	SD
Usefulness	U1	1	5,49	3,39
("adopFBUseful")	U2	2	5,63	3,31
	U3	3	4,83	3,06
	U4	4	5,82	2,88
Ease of use and	EU1	5	7,79	3,21
Facilitating conditions	EU2	6	7,56	3,1
("adopFBEuFc")	EU3	7	7,44	3,11
	EU4	8	7,77	3,02
	FC1	13	6,45	3,18
	FC2	14	5,67	3,16
	FC3	15	6,68	2,92
	FC4	16	6,46	3,42
	FC5	17	5,99	3,48
Social influence	SE1	9	3,34	2,77
("adopFBSocInfl")	SE2	10	3,52	2,78
	SE3	11	4,20	2,98
	SE4	12	3,42	2,69
Community identity	CI1	18	3,97	3,34
("adopFBCommId")	CI2	19	5,73	3,5
	CI3	20	4,29	3,07
	CI4	21	4,72	3,14

Note: Items assessed through a Likert-type scale, ranging from 1 to 10

A global descriptive summary of the results obtained with the AF scale is provided in Table 8.56.

Table 8.56 Global descriptive results from the Portuguese AF scale (N=550)

Construct (Acronym)	Mean	SD
Usefulness ("adopFBUseful")	5,44	2,79
Ease of use and Facilitating conditions ("adopFBEuFc")	6,87	2,66
Social influence ("adopFBSocInfl")	3,62	2,45
Community identity ("adopFBCommId")	4,68	2,78
AF Scale Total ("adopFBtot")	5,57	2,26

The results obtained with this scale (AF), were explored and discussed in the context of different structural equation models whose aim was to explain the factors determining the educational use of Facebook. These models are presented Section 8.5.2 (after being introduced in Chapter 6).

The Purposes of Facebook Scale was the second of the instruments whose results were crucial for testing the structural models about educational usage of Facebook that are presented in Section 8.5.2.

The general descriptive results obtained from this scale are summarized in Table 8.57. As presented in the materials section, only 6 of the 11 items of the original version were included in the Portuguese version of the instrument. In parenthesis, the order of the item on the original scale (Mazman & Usluel, 2010) is presented.

Table 8.57 Descriptive results obtained from the Portuguese PFU scale[a] (N=550)

Construct (Acronym)	**Item**	**Item order on the scale**	**Mean[b]**	**SD**
Social relations purposes	SOC01	1	6,71	3,398
("purpFBSocRel")	SOC02	2	4,51	3,312
	SOC03	3	6,94	3,406
	SOC04	4	6,31	3,424
Work related purposes	WK01	5 (8[a])	3,62	2,916
("purpFBWkRel")	WK02	6 (9[a])	3,07	2,630

Note: [a] Order of the item in the original scale (Mazman & Usluel, 2010) [b] The scale ranged from 1 to 10.

Table 8.58 presents the mean results for each of the two dimensions assessed by the Portuguese version of the PFU, as well as the scale total.

Table 8.58 Global descriptive results from the Portuguese PFU scale (N=550)

Construct (Acronym)	**Mean**	**SD**
Social relations purposes ("purpFBSocRel")	6,12	2,922
Work related purposes ("purpFBWkRel")	3,35	2,635
PFU Scale Total ("purpFBtot")	5,21	2,500

The descriptive results of the third scale whose results were crucial to inform our models of Facebook educational usage are presented in Table 8.59.

Since the Portuguese version of the EUF scale only identified a unique factor for all the items composing the instrument, the total result obtained for this dimension coincides with the total score of the scale, and is also included in table 8.59.

Table 8.59 Descriptive results obtained from the Portuguese EUF scale (N=550)

Construct (Acronym)	Item	Item order on the scale	Mean	SD
Educational usage of Facebook ("educUseFB")	EDU01	1	5,79	3,05
	EDU02	2	3,77	2,77
	EDU03	3	3,47	2,65
	EDU04	4	3,45	2,77
	EDU05	5	3,94	2,95
	EDU06	6	2,89	2,53
	EDU07	7	5,25	3,15
	EDU08	8	4,19	3,09
	EDU09	9	4,06	3,02
	EDU10	10	3,30	2,68
	EDU11	11	4,50	3,17
EUF Scale Total ("educFBtot")	**Total**	-	4,08	2,30

Note:The range of the Likert scale used to measure the items ranged from 1 to 10

In large samples (N>200), standard errors tend to be small, and therefore criteria such as the "critical ratio", resulting from dividing skewness and kurtosis by the standard error, should not be used (Field, 2009).

For the structural models that were built based on the data collected by the items of the scales depicted in Tables 8.55/8.56 (AF), Tables 8.57/8.58 (PFU), and Table 8.59 (EUF), multivariate normality was a critically important assumption.

Multivariate normality depends (although not exclusively), from the univariate normality of the variables in the model (Byrne, 2010).

Most raw empirical data fail to meet the assumption of multivariate normality (Byrne, 2010), and previous research has revealed that even in conditions of severe non-normality of data, the parameters obtained in structural equation models (e.g. path estimates) remain fairly adequate (e.g. Kline; 1998).

Given that the most important indicator of the degree of multivariate non-normality present in a model is kurtosis (Byrne, 2010), the Mardia's coefficient of multivariate kurtosis, provided by SPSS/Amos, was used to assess the presence (and degree) of multivariate non-normality in the models built with base in the scores of this scale, and the possible biases resulting from the presence of multivariate non-normality in the model (even if moderate) were assessed.

8.5.2. Hypotheses testing

The framework proposed by Mazman and Usluel (2010), detailed in Section 5.3 of Chapter 5, provided us with the theoretical guidance for the study of the role of the psychological dimensions that our review of the literature signaled as potentially relevant (e.g. the studies by Ellison et al., 2007 and Gangadharbatla, 2008, detailed in Chapter 5).

Instead of using structural equation modeling with latent variables (as Mazman & Usluel, 2010), and since the reliability of the different subscales was verified through the computation of their Cronbach's alphas (and also through confirmatory factor analyses which did include the use of latent variables), we based our models in path analyses with only explicit variables.

Although interested in studying the mediation role of the purposes of Facebook usage, as explored by Mazman and Usluel (2010), we also wanted to investigate the extent in which some of the dimensions of Facebook adoption were directly related with the educational use of Facebook.

In addition, and fundamentally, we wanted to scrutinize which variables, including psychological factors, had a significant influence on the educational use of Facebook, either directly or through the mediatory role of purposes of Facebook usage.

Thus, after having tested our first set of hypotheses concerning students' attitudes and intentions regarding the use of Web 2.0 tools (in general) to supplement their in-class learning (hypotheses 1 through 11 / Sub-study B1), the remaining hypotheses of Study B were formulated to study what factors, among those studied (and including the

psychological variables described), influenced the educational use of a specific Web 2.0 tool: Facebook (Sub-study B2).

The first three hypotheses of Sub-study B2 (which correspond to hypotheses 12 to 14 of Study B), are represented schematically in Figure 8.23.

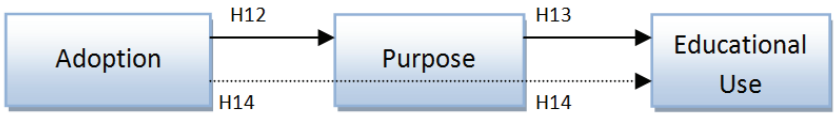

Figure 8.23 Representation of hypotheses 12 to 14 (H12-H14)

The model in Figure 8.24 corresponds to the SPSS/Amos diagram representation of the conceptual schema depicted in Figure 8.23.

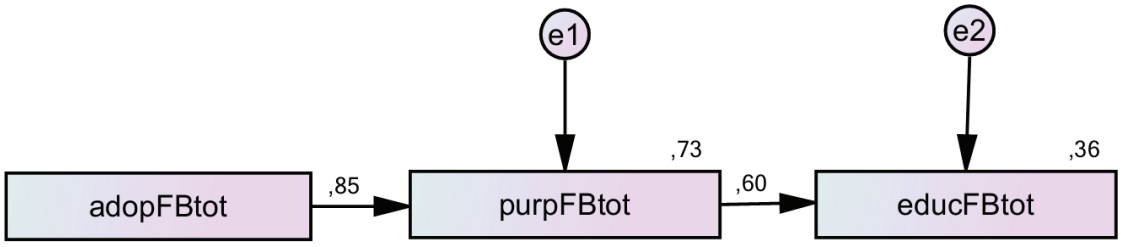

Figure 8.24 SPSS/Amos model for testing hypotheses 12 to 14 (H12-H14).

In this model (Figure 8.24), each of the three rectangles represents the total score obtained in the translated scales assessing Facebook-related constructs: "adopFBtot" represents the total of the AF (adoption) scale, "purpFBtot" depicts the total of the PFU (purposes) scale, and "educFBtot" represents the total of the EUF scale (educational use).

In respect to the goodness of fit of this very simple model, we found the indicators summarized in Table 8.60.

The basic χ^2 statistic, and the alternative non-parametric Bollen-Stine bootstrap p were significant (p<0,05), but this is common in models based on data from large samples, and the alternative indicators of goodness of fit presented in Table 8.56 are usually used in the literature to compensate the tendency of the χ^2 test to reject good fitting models when the size of the sample is large. Additionally, Schermelleh-Engel et al. (2003), consider that a p value for the χ^2situated between 0,01 and 0,05 represent an acceptable level of fit for the model.

For the model presented in Figure 8.24, we obtained the values: χ^2(1,N=550)=4,976, p=0,026 and Bollen-Stine bootstrap p=0,020.

Table 8.60 Goodness of fit indicators for the model in Figure 8.24 (N=550)

Fit measure	Good fit	Acceptable fit	Model value
RMSEA	≤ 0.05	≤ 0.08	0,085
CFI	≥0.97	≥0.95	0,996
GFI	≥0.95	≥0.90	0,994
AGFI	≥0.90	≥0.85	0,964
IFI	≥0.95	≥0.90	0,996

Note: criteria from Schermelleh-Engel et al. (2003) & Byrne (2010)

As can be inspected on Table 8.60, the fit indicators for the model (Figure 8.24) are all within the acceptable ranges usually used by structural equation modeling, except for the value obtained for the RMSEA.

Since four of the goodness of fit indicators situate the model in the "good" fitness region (CFI, GFI, AFI, and IFI), the RMSEA value, slightly above the conventional (but not rigid) cutoff value of 0,080, appears contradictory.

However, the literature on Structural Equation Modeling (e.g. Kenny & McCoach,

2003) indicates that RMSEA is problematic in models with few degrees of freedom, and that when the number of variables is low, the RMSEA value tends to be artificially elevated.

Therefore, taking into account the complete set of statistical indicators, and having found a plausible explanation for the relatively high value of the RMSEA, the model depicted in Figure 8.24 appears to fulfill the necessary goodness of fit requirements.

The Mardia's coefficient for multivariate kurtosis was 1,235, which indicated the presence of very slight multivariate non-normality in the data of the model. This information was taken into account and bias-corrected ("BC") versions of all the estimates (regressions and covariances)

The numbers above the two horizontal arrows in Figure 8.24 represent the standardized regression coefficients among the two variables connected by each of them, corresponding to the hypotheses 12 and 13 ("H12" and "H13" in Figure 8.23). Further details regarding these regression coefficients are provided in Table 8.61 (where the standardized regression values presented in Figure 8.24 appear in the third column, signaled in **bold**).

Table 8.61. Regression estimates of the model represented in Figure 8.24

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
adopFBtot->purpFBtot (**H12**)	0,945**	0,945	**0,853****	0,852
purpFBtot->educFBtot (**H13**)	0,552**	0,552	**0,601****	0,601

Note: ** p<0,01.

Adoption of Facebook ("adopFBtot", Figure 8.24 and Table 8.61) predicted 73% of the variance of purposes of Facebook usage ("purpFBtot"). This value is represented as a number above the top-right corner of the rectangle depicting "purpFBtot", in Figure 8.24.

Purposes of Facebook adoption ("purpFBtot") predicted 36% of the total variance observed for the variable measuring educational use of Facebook (Figure 8.24).

The indirect effects of adoption on the academic use of Facebook, mediated by purposes of Facebook use, corresponding to hypothesis 14 ("H14" in Figure 8.23) do not have a graphical representation in the SPSS/Amos diagram, but are internally calculated by the program, on request (by selecting the option "indirect, direct & total effects" in the "output" dialog).

The next tables (Tables 8.62 and 8.63) provide the matrices of standardized direct, indirect and total effects, between the variables depicted in Figures 8.23 and 8.24.

As can be examined in Table 8.62, the standardized regression weights presented in the previous table (Table 8.61) reappear (as expected), as direct effects between the variables involved (0,853 for the relation between "adopFBtot" and "purpFBtotMed", and 0,601 for the relation among "purpFBtotMed" and "educUseFB").

The new relevant information that Tables 8.62 and 8.63 summarize is the existence of a significant indirect effect between adoption of Facebook and its use for educational purposes. That effect is represented as the value 0,513 (significant for p<0,01), that appears in the section of Table 8.58 describing indirect effects, and in the section which present the total effects among the three variables in question, in Table 8.63.

For the simple model represented in Figure 8.23 and Figure 8.24, all the effects among the variables were either direct, or indirect (but not both), making the calculation of the total effects straightforward: as SPSS/Amos reports, the values in Table 8.63 result from the simple overlap of the information presented in Table 8.62.

Table 8.62. Direct and indirect effects

	Std Direct Effects		Std Indirect Effects	
	adopFBTotMed	purpFBtotMed	adopFBTotMed	purpFBtotMed
purpFBtotMed	0,853**	-	-	-
educUseFB	-	0,601**	**0,513****	-

Note: ** p<0,01.

Table 8.63. Total effects

	Std Total Effects	
	adopFBTotMed	purpFBtotMed
purpFBtotMed	0,853**	-
educUseFB	**0,513****	0,601**

Note: ** p<0,01.

Taking into account the information presented in Tables 8.61, 8.62, and 8.63, we can state the following, in respect to the first group of hypotheses of this sub-study:

Hypothesis 12 **(H12)**, stating that the direct influence of Facebook adoption on students' purposes of Facebook usage is significant, was confirmed (β=0,853, p<0,01).

Hypothesis 13 **(H13)**, affirming that the direct influence of purposes of Facebook use on students' educational use of Facebook is significant, was confirmed (β=0,601, p<0,01).

Hypothesis 14 **(H14)**, proposing that the indirect influence of Facebook adoption on students' educational use of Facebook, mediated by purposes of Facebook usage, is significant, was also confirmed (indirect, and total, effects of 0,513, p<0,01).

Hence, the three hypotheses (H12-H14) that were derived from the theoretical model proposed by Mazman and Usluel (2010) were confirmed.

Our next step concerned the test of our core hypothesis (H15) and its sub-hypotheses (H15a to H15g), regarding the influence of the studied psychological variables on the educational use of Facebook.

We were interested in providing a detailed perspective of the influence of each of the psychological variables that we measured in the many constructs that were evaluated through the Portuguese versions of the Facebook-related scales (namely the Adoption of Facebook scale [AF]; Usluel & Mazman, 2009, the Purposes of Facebook Usage [PFU]

and Educational usage of Facebook [EUF] scales; Mazman & Usluel, 2010).

Therefore, the total score of the AF scale was decomposed into the four sub-scores provided by the subscales of the Portuguese version of that instrument: a) usefulness ("adopFBUseful"), b) ease of use and facilitating conditions ("adopFBEuFc"), c) social influence ("adopFBSocInfl"), and d) community identity ("adopFBCommId").

Similarly, the global score of the PFU was separated in the scores provided by its two subscales, one assessing "social relations" ("purpFBSocRel"), and the other measuring "work-related" ("purpFBWkRel") purposes concerning Facebook usage.

As mentioned in the section describing the material used in this study (Section 8.2.2), the Portuguese version of the EUF scale proved to have only a unique factor, for which the total score of the scale was used ("educUseFB").

The reliability of the Portuguese versions of the AF, PFU, and EUF scales and of their subscales was previously assessed by computing their respective Cronbach's alpha's, as described in Section 8.2.2.

Confirmatory factor analyses were also performed, which validated the subscale structure proposed for the Portuguese versions of the AF and PFU scales (cf. Section 8.2.2).

Although SPSS/Amos provides useful procedures which allow the researcher to automatically obtain models in which the indicators of goodness of fit indicators are the best possible (through "specification search", or "modification indices", for example), the use of these of these procedures should always be guided by substantive theory (Byrne, 2010).

Therefore, and inspired by the framework proposed by Mazman and Usluel (2010), in which "purposes of Facebook usage" mediate the effects of "adoption of Facebook" on the "educational usage" we built an initial model, which is represented on Figure 8.25.

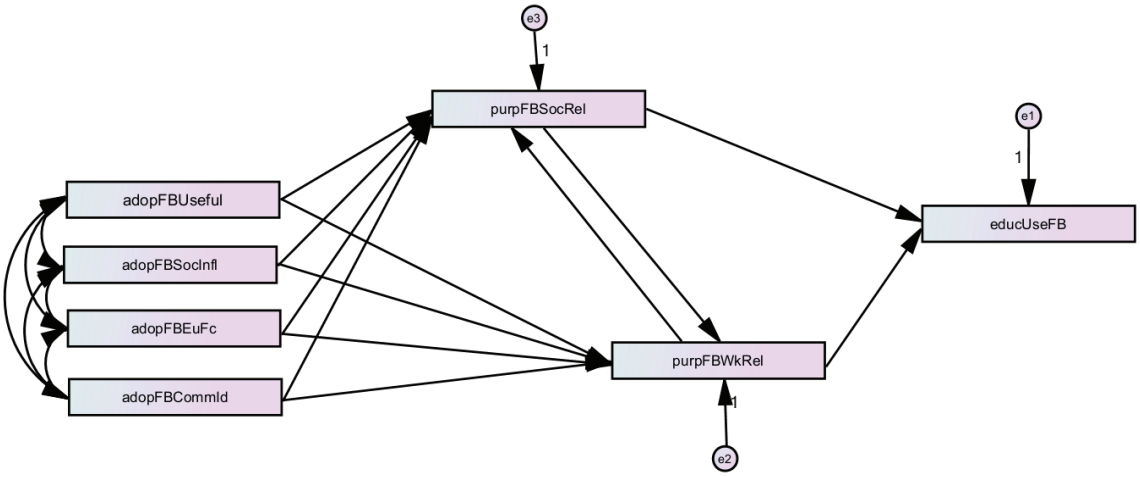

Figure 8.25. Derivation of the model for educational usage of Facebook – step 1

In this initial model (Figure 8.25), all the effects of the several dimensions of "Facebook adoption" on Facebook "educational use" are mediated by "purposes of usage".

As stated in the previous paragraphs, this model is not based on "blind" statistical criteria. In fact, from the statistical point of view, the model even contains an element which, if retained in its final version, would introduce additional complexity in the interpretation of the results obtained by it: the bidirectional linking of the two variables depicting purposes of Facebook usage ("purpFBSocRel" and "purpFBWkRel").

In fact, since we were interested in testing the effects that these two variables had on each other, but not having any theoretical support to choose the direction of that influence, we start by proposing a bidirectional relation between these two constructs (represented by the "up-down" and "bottom-up" arrows linking "purpFBSocRel" and "purpFBWkRel", in Figure 8.25).

These two variables are endogenous (i.e. predicted by other variables in the model), and therefore a simple correlation among them (as used with the exogenous variables regarding "adoption", on the left of Figure 8.25), is precluded by structural equation modeling theory (and by SPSS/Amos).

However, this double-directional link between "purpFBSocRel" and "purpFBWkRel"

turns the model into a "non-recursive" one (as reported by SPSS/Amos), meaning that the causal flow in the model has more than one direction, thus allowing for reciprocal or feedback effects (Byrne, 2010).

Thus, *after* building the model depicted on Figure 8.25, guided by a substantial theoretical framework (Mazman & Uslual, 2010), we turned to the SPSS/Amos tools that allow the researcher to test different variations *among the set that the researcher proposed* (desirably based on valid pre-existing theory).

Conducting a "specification search" (using SPSS/Amos) in which all the combinations of the regression relations depicted on Figure 8.25 were tested, we found that it wasn't possible to obtain a model with acceptable fit by using just those relations.

Confronted with this result, we search for SPSS/Amos suggestions about changes in the model that could improve its adequacy to the information collected with the Portuguese versions of the AF, PFU and EUF scales. The "modification indices" indicator advised to establish direct causal connections among some of the "adoption" variables and the variable measuring the "educational use" of Facebook.

Therefore, we conducted a second "specification search" analysis, but this time we used the model represented in Figure 8.26.

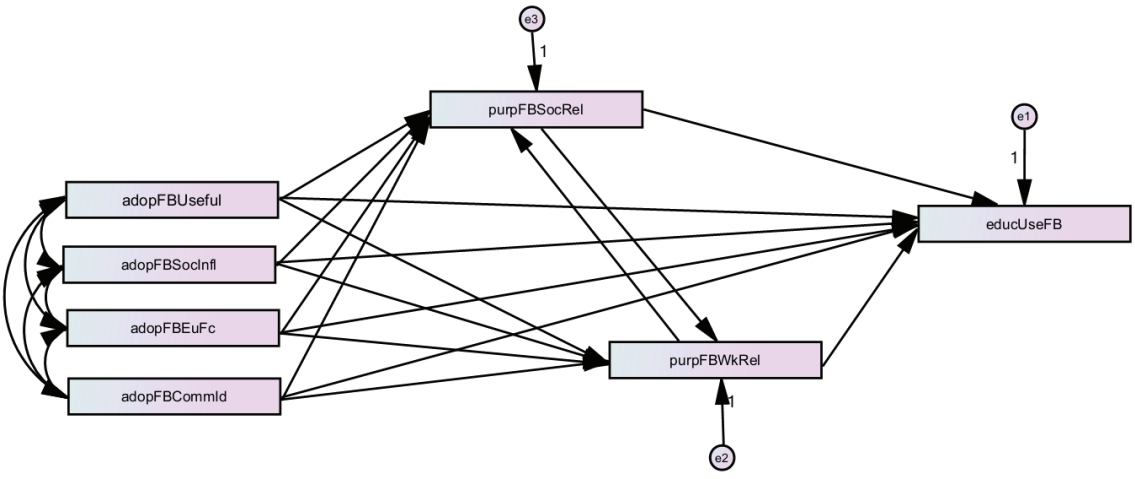

Figure 8.26. Derivation of the model for educational usage of Facebook – step 2

The only difference between the models presented in Figure 8.25 and Figure 8.26 is the addition of direct links between the four "adoption" variables, on the left, and the variable measuring educational usage of Facebook, on the right ("educUseFB").

The second "specification search" (testing all possible combinations among the causal paths presented on Figure 8.26), did provide several alternative models with adequate fit indicators, among which were five "best" models.

Three of those five best-fitting models retained the bidirectional effects among the "purpose"-related variables ("purpFBSocRel" and "purpFBWkRel"), and were, because of that, non-recursive.

However, two of the best solutions had excellent fit indicators (they were classified precisely *ex-aequo* with the other three), and were recursive. One of these solutions is presented in Figure 8.27, and the other is depicted in Figure 8.28.

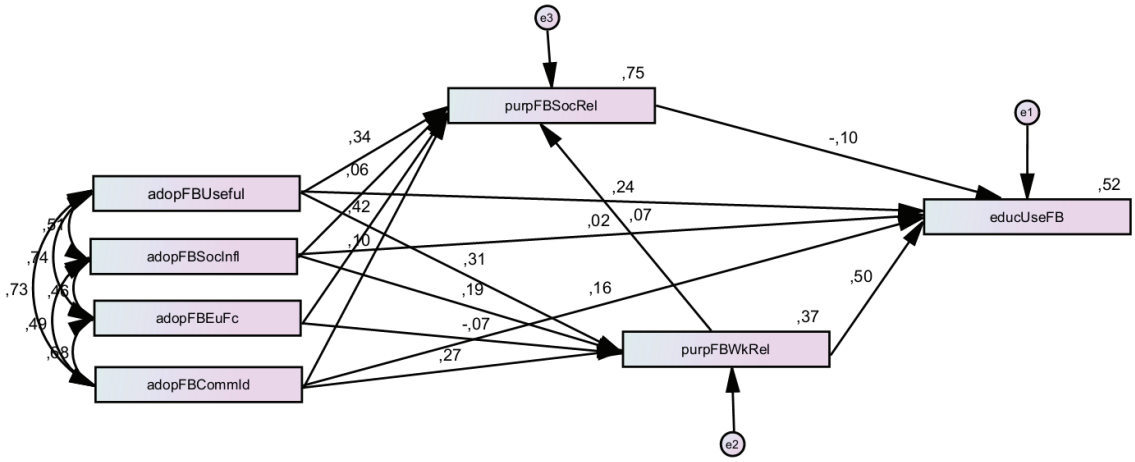

Figure 8.27. First of the two recursive candidate models (standardized estimates)

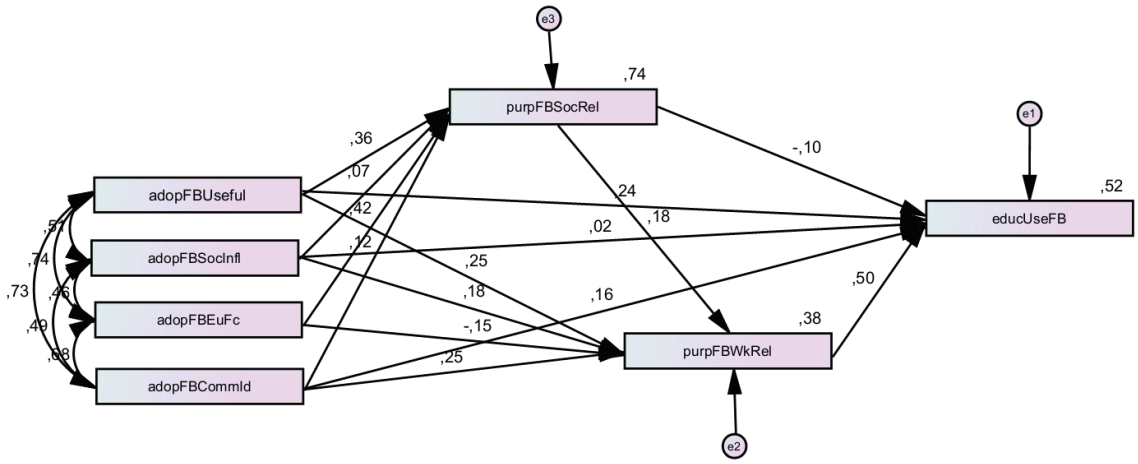

Figure 8.28. Second of the two recursive candidate models (standardized estimates)

Since the models represented in Figure 8.27 and Figure 8.28 were among the group of the five best fitting models, and since they were the only recursive models in that group, we made a detailed analysis of these two candidates, in order to select one of them for the next steps of our analysis.

The results of the $\chi 2$ statistic were exactly the same for both models: $\chi 2$ (1, N=550) <0,001, p=0,985, and the other fit indicators provided by SPSS/Amos were also indistinguishable (e.g. the RMSEA<0,001 and GFI, AGFI, CFI, IFI all equal to 1,000, in both cases).

Also, in both of the models depicted on Figure 8.27 and Figure 8.28, two relationships were found to be statistically non-significant: a) the one linking the variables "adopFBSocInfl" and "educUseFB", and b) the relationship between "purpFBSocRel" and "educUseFB".

However, the relationship between the purpose-related variables ("purpFBSocRel" and "purpFBWkRel") was stronger in the case of the model presented in Figure 8.28. This was one of the two factors which made us select this model, instead of the one presented in Figure 8.27.

There was a second reason for our selection of the model shown in Figure 8.28. Indeed,

the next step of our analysis was the removal of the non-significant relationships from the model (as can be seen in Figure 8.29). If we had chosen the model in Figure 8.27, there would be two causal endpoints in our model: "educUseFB" and "purpFBSocRel". Since our intention was to provide a model for the educational use of Facebook (assessed by "educUseFB"), selecting the model in Figure 8.28 assured the convergence of the causal flow in the model to the variable it proposes to predict ("educUseFB").

Therefore, selecting the model in Figure 8.28, and after removal of the two non-significant paths, the model depicted on Figure 8.29 was found.

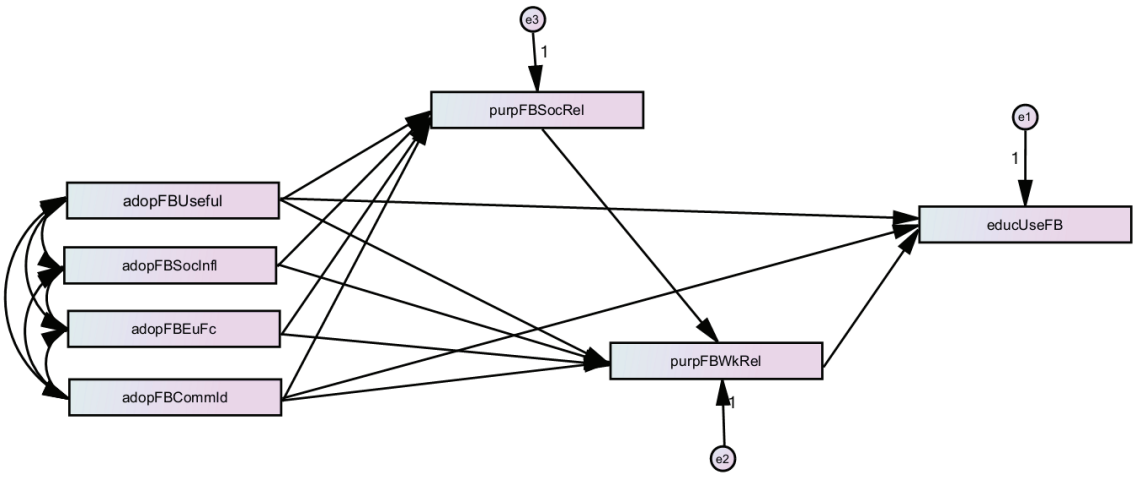

Figure 8.29. Last version of the model, after removing non significant paths

In the context of the model presented in Figure 8.29, the four predictors of the variable assessing the use of Facebook for the purpose of creating or maintaining social relations ("purpFBSocRel") explained 74% of the variance observed for that variable.

The five predictors of the variable measuring the use of Facebook for work-related purposes ("purpFBWkRel") explained 38% of the variance observed for that variable.

The three predictors of educational use of Facebook ("educUseFB") explained 52% of the total variance observed for that variable.

Detailed regression and covariance estimates concerning this model are presented in Appendix 17. In the main text of this chapter, those indicators will be discussed in the end, for the final version of the model, which integrates the effects of additional

(psychological) variables (illustrated in Figure 8.30).

In what respects the model presented in Figure 8.29, the "modification indices" indicator of SPSS/Amos didn't suggest any additional relations between the variables, in order to improve its fit.

The goodness of fit indicators of this model (Figure 8.29) are summarized in Table 8.64.

Table 8.64.Goodness of fit indicators for the model on Figure 8.29 (N=550)

Fit measure	Good fit	Acceptable fit	Model value
χ^2/df	≤ 2	≤ 3	1,288
RMSEA	≤ 0.05	≤ 0.08	0,023
CFI	≥0.97	≥0.95	1,000
GFI	≥0.95	≥0.90	0,998
AGFI	≥0.90	≥0.85	0,981
IFI	≥0.95	≥0.90	1,000

Note: criteria from Schermelleh-Engel et al. (2003) & Byrne (2010)

Additionally to the indicators provided in Table 8.64, the simple χ^2 statistic, which normally isn't much helpful when the size of the sample is large, in this case provides support for the model: χ^2 (3, N=550) =3,865, p=0,276.

Since the Mardia's coefficient for multivariate kurtosis was 8,2 (indicating the presence of mild multivariate non-normality in the data of the model), it was important to confirm the χ^2 results with an equivalent non-parametric indicator. For that purpose, the Bollen-Stine bootstrap p was calculated, and a p value of 0,393 was obtained, thus reinforcing the evidence that the model fits the data well.

Taking into account its good statistical properties, this model (Figure 8.29), was chosen as the one that best depicted the relations among the constructs assessed by the Portuguese versions of the Facebook scales (AF, PFU, and EUF). Therefore, it was used as the base for testing the last of the research hypothesis, which, as presented in Chapter 6, had been enunciated as:

Hypothesis 15 (**H15**): *The overall influence of the studied psychological variables on Students' educational use of Facebook is significant (direct influence and/or mediated by purposes of Facebook use).*

Accordingly to the conceptual model used to formulate hypothesis 15 (H15; Figure 8.30), each of the twenty-four psychological variables that were assessed by the instruments presented in Table 8.3 (at the start of the chapter), was incorporated into the model presented in Figure 8.29.

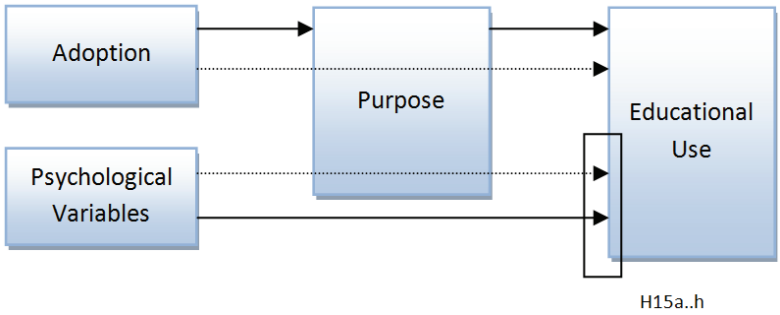

Figure 8.30. Extended model of educational usage of Facebook

The model that we used to in sub-study B1, concerning the impact of the psychological variables on students' educational use of Web 2.0 (in general), was based on TAM (Davis, 1989). The TAM framework contains an explicit indication of how external (including psychological) variables could be added to the model (by linking them with perceived usefulness and perceived ease of use).

However, in the context of sub-study B2, focusing on the educational use of a specific Web 2.0 tool (Facebook), a more exploratory approach was used in order to incorporate the studied psychological variables in the model presented in Figure 8.29 (derived using the guidelines provided by Mazman & Usluel, 2010).

Therefore, all the psychological variables were introduced as direct predictors of educational usage of Facebook, taking into account their correlations with the dimensions of adoption of Facebook, but also their relation with the dimensions of

purposes of Facebook usage.

After removal of all the non-significant relations resulting from the variable selection procedure, the model depicted in Figure 8.31 emerged (Appendix 18 provides the complete set of results, and a more detailed account on the selection procedure).

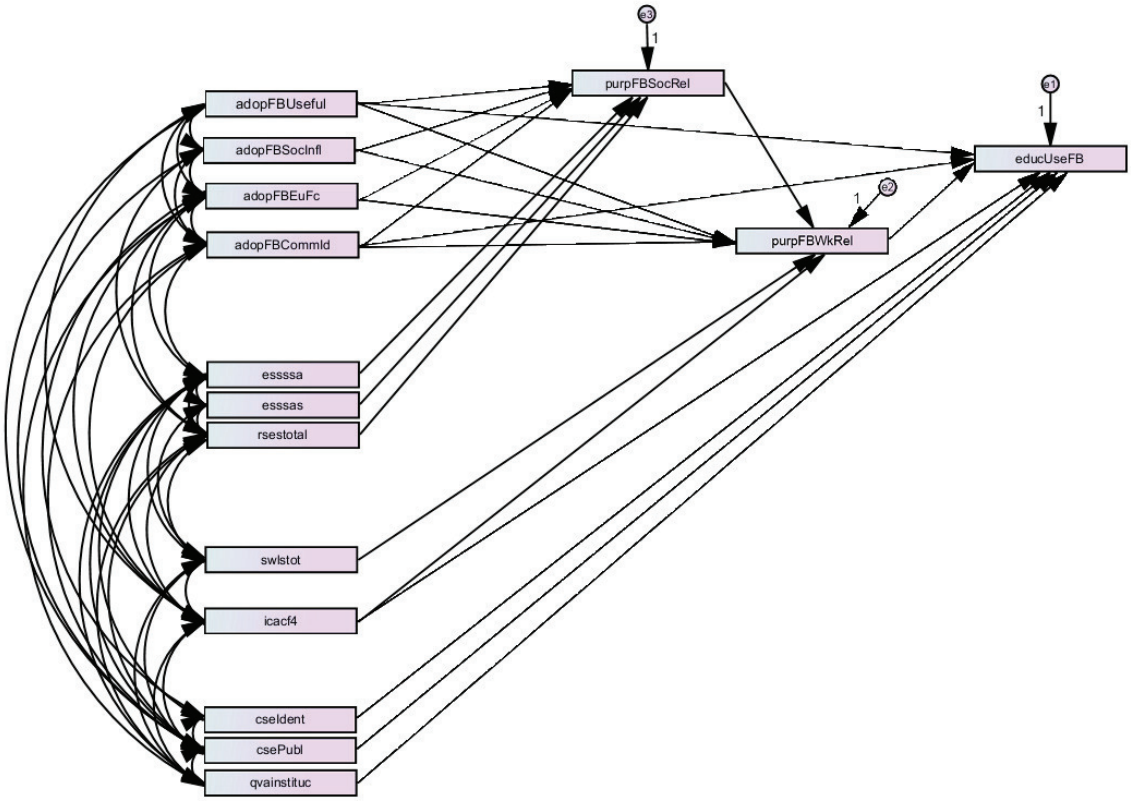

Figure 8.31. Educational usage of Facebook - integrative model

All the relations among the variables represented in Figure 8.31 were statistically significant (since this was the criteria for their selection).

The goodness of fit indicators for this model, presented in Table 8.65, supported its adequacy to our data.

Table 8.65. Goodness of fit for model on Figure 8.31 (N=550)

Fit measure	Good fit	Acceptable fit	Model value
χ^2/df	≤ 2	≤ 3	1,521
RMSEA	≤ 0.05	≤ 0.08	0,031
CFI	≥0.97	≥0.95	0,993
GFI	≥0.95	≥0.90	0,984
AGFI	≥0.90	≥0.85	0,957
IFI	≥0.95	≥0.90	0,993

Note: criteria from Schermelleh-Engel et al. (2003) & Byrne (2010)

The simple χ^2result was significant, at a p<0,05 level: χ^2(46,N=550)=69,954, p=0,013, but in large samples the χ^2test tends to reject good fitting models, and this is the reason why alternative indicators of fit (such as those provided in Table 8.65) are commonly used in the literature (Byrne, 2010). In addition, Schermelleh-Engel et al. (2003), consider that a p value for the χ^2situated between 0,01 and 0,05 represent an acceptable level of fit.

The Mardia's coefficient of multivariate kurtosis was 22,838, thus revealing the existence of multivariate non-normality in the data of the model. This result was not unexpected, since most raw empirical data are unable to meet the assumption of multivariate normality (Byrne, 2010).

The Bollen-Stine bootstrap, a non-parametric alternative for the χ^2provided a significance (p) value of 0,028, a compatible result with that obtained by the χ^2.

The estimates for this model were computed using the maximum likelihood (ML) method, which has been shown to provide robust estimates, even in the presence of severe non-normality (Kline 1998). Additionally, "bias-corrected" (BC) estimates were calculated using the bootstrap procedure in Amos (with 2000 samples), generally revealing perfect (or near perfect) match with the ones computed using ML estimation.

In the following three tables (Table 8.66 to 8.68) the regression estimates for each of the endogenous variables in the model (Figure 8.31) are presented. Subsequently, a

selection of correlations depicted in the model is provided in Table 8.69.

Globally, by looking at the overall data provided by Table 8.66 to 8.68 (regression estimates), some general aspects can already be discussed.

One aspect that the inspection of Tables 8.66 and 8.67 reveals is that each of the two variables depicting different dimensions of purposes of Facebook usage (social relations ["purpFBSocRel"] and work-related ["purpFBWkRel"]) is predicted by all the four variables assessing dimensions of adoption of Facebook.

As depicted in Table 8.66 (column in **bold** type) social relational purposes for using Facebook ("purpFBSocRel") are predicted by the way students perceived Facebook's: a) usefulness ("adopFBUseful", β=0,373, $p<0,01$), b) social norms / influence towards using Facebook ("adopFBSocInfl", β=0,058, $p<0,05$), c) ease of use /facilitating conditions ("adopFBEuFc", β=0,425, $p<0,01$), and d) importance for community identity ("adopFBCommId", β=0,106, $p<0,01$).

The influence of the variables assessing dimensions of Facebook adoption on those assessing dimensions of purposes of Facebook use is positive, which is consistent with Mazman and Usluel (2010) findings.

The stronger predictors of Facebook use for social relation purposes were: a) ease of use /facilitating conditions, and b) usefulness (cf. Table 8.66).

Among the twenty-four tested psychological variables whose predictive effects on the use of Facebook for social relation purposes were investigated, only three revealed significant. Two of those variables are dimensions of satisfaction with social support (assessed by the ESSS; Ribeiro, 1999): a) satisfaction with friendships ("esssSA"), and b) satisfaction with social activities ("esssAS"). The influence of satisfaction with friendships on using Facebook for social relation purposes was positive (β=0,073, $p<0,01$; cf. "esssSA", in Table 8.66), but satisfaction with social activities had a negative influence of exactly the same (opposite) size (β=-0,073, $p<0,01$; cf. "esssAS", in Table 8.66). Both these effects were weak, although significant at the $p<0,01$ level.

The third psychological variable whose effect was found significant in predicting students' use of Facebook for social relational purposes was personal self-esteem

("rsesTotal", cf. Table 8.66), as measured by the RSES scale (Santos, 2008). The influence of personal self-esteem was found to be negative, although the size of the effect was very small, and only significant at the p<0,05 level: (β=-0,056, p<0,05).

Table 8.66 summarizes the findings described above.

Table 8.66. Predictors of Social Relation Purposes ("purpFBSocRel ")

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
adopFBCommId	0,111**	0,11	**0,106****	0,105
adopFBEuFc	0,464**	0,465	**0,425****	0,426
adopFBSocInfl	0,069*	0,068	**0,058***	0,057
adopFBUseful	0,389**	0,389	**0,373****	0,373
esssAS	-0,071**	-0,071	**-0,073****	-0,073
esssSA	0,056**	0,056	**0,073****	0,073
rsesTotal	-0,035*	-0,035	**-0,056***	-0,055

Note: ** p<0,01; * p<0,05

The seven predictors of social relation purposes ("purpFBSocRel"; Table 8.66) explained 74% of the total variance observed for this variable.

In Table 8.67, the predictors of students' use of Facebook for work-related purposes ("purpFBWkRel") are presented.

(Continued on the next page, please turn)

Table 8.67. Predictors of Work-related purposes ("purpFBWkRel")

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
adopFBCommId	0,231**	0,23	**0,244****	0,242
adopFBEuFc	-0,132*	-0,131	**-0,134***	-0,133
adopFBSocInfl	0,198**	0,198	**0,184****	0,183
adopFBUseful	0,233**	0,234	**0,247****	0,247
purpFBSocRel	0,154*	0,154	**0,17***	0,17
icacF4	-0,112*	-0,112	**-0,076***	-0,076
swlsTot	0,059*	0,059	**0,085***	0,085

Note: ** p<0,01; * p<0,05

The seven predictors of Facebook use for work-related purposes ("purpFBWkRel"; Table 8.67) explained 38% of the total variance observed for the variable.

By inspecting Table 8.67 (column in **bold** type), it can be verified that work-related purposes for using Facebook ("purpFBWkRel") were predicted by the way students perceived Facebook's: a) usefulness ("adopFBUseful", β=0,247, p<0,01), b) social norms / social influence ("adopFBSocInfl", β=0,184, p<0,01), c) ease of use /facilitating conditions ("adopFBEuFc", β=-0,134, p<0,05), and d) importance for community identity ("adopFBCommId", β=0,244, p<0,01).

The above results revealed that, although the four adoption-related variables were significant predictors of students' work-related purposes for using Facebook, the pattern of their influence was distinct from what was found for social-relational purposes (as the comparison of the first four lines of Table 8.66 and Table 8.67 reveals).

In particular, whereas ease of use / facilitating conditions ("adopFBEuFc"), was the more robust positive predictor of students' use of Facebook for social-relational purposes (β=0,425, p<0,01; Table 8.66), its influence on work-related purposes was significant but negative (β=-0,134, p<0,05; Table 8.67).

Interestingly, the community identity dimension of Facebook adoption

("adopFBCommId") was a more robust (positive) predictor of work-related purposes of Facebook use (β=0,244, p<0,01; Table 8.67) than it was of social-relational purposes for the use of this tool (β=0,106, p<0,01; Table 8.66).

Also revealing of students' attitudes regarding Facebook, it was found that the usefulness factor that leads to the adoption of Facebook ("adopFBUseful") was a stronger predictor of the use of Facebook for social purposes (β=0,373, p<0,01; Table 8.66) than it was of work-related motives for Facebook use (β=0,247, p<0,01; Table 8.67).

In addition, the aspects of adoption of Facebook related to the social influence that students perceive regarding the use of this tool ("adopFBSocInfl") are weaker predictors of the use of Facebook driven by social-relational motivations (β=0,058, p<0,05; Table 8.66) than they are of using this tool for work-related purposes (β=0,184, p<0,01; Table 8.67).

In summary, the comparison of the four first lines of Tables 8.66 and 8.67 reveals that: a) aspects of Facebook adoption related to social and community dimensions are stronger predictors of students' use of Facebook for work-related purposes, than they are for predicting the use of Facebook motivated by social-relational factors, b) the perceived ease of use / facilitating conditions of Facebook are the strongest predictor of using Facebook for social-relational purposes, and have a negative significant effect on the using of Facebook for work-related purposes, and c) the social influence dimension of Facebook adoption has a stronger positive effect on students' use of Facebook for work-related purposes, than it has on the use of this tool due to social-relational motivations.

Social-relational motives for the use of Facebook ("purpFBSocRel") were found to be a positive significant predictor of work-related purposes of using this tool (β=0,170, p<0,05; Table 8.67), but the strength of the relationship was relatively weak, thus depicting that the use of Facebook for social-relational purposes is not a very strong predictor of the use of Facebook for work-related purposes.

In what regards the effects of psychological variables on the use of Facebook with work-related purposes, only two (of the twenty-four) variables revealed to be

significantly influent: a) the activity/impulsivity dimension ("icacF4"; Table 8.67) measured by the ICAC (Serra, 1986), and b) satisfaction with life ("swlsTot"), assessed by the SWLS (Neto, 1999).

Representative items of the scale measuring the activity/impulsivity dimension ("icacF4"; Table 8.67) were: "*When I have an idea which seems valid, I like to put it in practice*", or "*I am a person who likes to do whatever I want*" (ICAC; Serra, 1986). According to the results presented in Table 8.67, higher scores obtained in this dimension were predictive of less use of Facebook for work-related purposes.

On the other hand, higher levels of satisfaction with life were predictive of the use of Facebook for work-related purposes ("swlsTot; Table 8.67).

In respect to the measure of "satisfaction with life", it is important to note that the study included another variable assessing satisfaction with *academic* life ("swals"), instead of satisfaction with life in general ("swlsTot", assessed by the SWLS; Neto, 1999). However, the effects of satisfaction with *academic* life ("swals") were not found significant, in the context of the model.

In the next table (Table 8.68), the effects of the predictors of the educational use of Facebook ("educUseFB") are presented.

Table 8.68. Predictors of educational use of Facebook ("educUseFB")

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
adopFBCommId	0,098**	0,097	0,119**	0,118
adopFBUseful	0,143**	0,144	0,175**	0,176
purpFBWkRel	0,43**	0,43	0,498**	0,497
cseIdent	0,156**	0,157	0,089**	0,089
csePubl	-0,162*	-0,161	-0,08*	-0,079
icacF4	0,104**	0,105	0,082**	0,083
qvaInstituc	0,038**	0,038	0,085**	0,084

Note: ** p<0,01; * p<0,05

The seven predictors of educational use of Facebook ("educUseFB"; Table 8.67) explained 52% of the total variance measured for this variable.

As presented in Table 8.68 (column in **bold** type), the stronger predictor of educational use of Facebook ("educUseFB") is the variable assessing the use of Facebook for work-related purposes ("purpFBWkRel", β=0,498, p<0,01).

Therefore, as postulated by Mazman and Usluel (2010), and in the model presented in Figures 8.23 and 8.24, purposes of Facebook use were found to be determinant for predicting the educational usage of Facebook.

However, in the context of our model, and with our sample, it was found that the dimension of purposes of Facebook use that was important to predict the educational use of this tool was that concerning work-related purposes. Social-relational purposes of Facebook use were not predictive of educational usage of this tool.

Significant direct influence on the educational usage of Facebook were found for two of the dimensions related to Facebook adoption: a) community identity ("adopFBCommId" , β=0,119, p<0,01), and b) usefulness ("adopFBUseful" , β=0,175, p<0,01).

As presented in Table 8.68, among the twenty-four psychological variables studied, four were found to be significant direct predictors of the educational usage of Facebook: a) identity collective self-esteem ("cseIdent", β=0,089, p<0,01), b) public collective self-esteem ("csePubl", β=-0,08, p<0,05), c) impulsivity/activity ("icacF4", β=0,082, p<0,01), and d) institutional academic experiences ("qvaInstituc", β=0,085, p<0,01).

Therefore, the results depicted in Table 8.68 reveal that identity collective self-esteem ("cseIdent"; Table 8.68) has a significant positive direct influence on the educational usage of Facebook.

Public collective self-esteem ("csePubl"; Table 8.68), however, demonstrated to have a negative direct effect on the educational use of this tool.

The effects of these two dimensions of collective self-esteem on the educational usage of Facebook are consistent with those found for these variables in the previous study

with the student population, concerning educational use of Web 2.0 tools in general (cf. Table 8.49, reporting some of the final results of sub-study B1).

The fact that two dimensions of collective self-esteem provide different influences in students' educational use of Facebook is not strange, given that Luhtanen and Crocker (1992) found that in some studies the sub-scales of their original collective self-esteem scale (CSES) were not correlated (and therefore advised strongly against calculating a total score for the scale, based on the sum of the each of the subscales scores).

According to the results provided in Table 8.68, it appears that when a person perceives that other people value the social groups to which she/he belongs (i.e. has a high level of public collective self-esteem), that person is less prone to use Facebook in her/his educational activities.

The contrasting effects of *public* collective self-esteem and *community* identity may appear contradictory, but community identity refers to the sense of "belonging" that a person has in relation to being a member of a community (Mazman & Usluel, 2010), which is much different than what is measured by public collective self-esteem, summarized in the previous paragraph, and further detailed in the materials section describing the CSES and the CSEp scales.

On the other hand, *identity* collective self-esteem ("csesIdent"; Table 8.68) measures the importance of a person's social groups' memberships to his/her self-concept (Luhtanen & Crocker, 1992). Given the similarity of this construct with that of community *identity* ("adoptFBCommId"; Table 8.68), it is understandable that the effects of these two variables on the educational use of Facebook had the same (positive) direction.

The dimension of self-concept labeled "impulsivity / activity" ("icacF4") revealed to positively influence the educational usage of Facebook. Representative items of the scale assessing this variable (ICAC; Serra, 1986) were "*When I have an idea which seems valid, I like to put it in practice"* or **"***I am a person who likes to do whatever I want*".

It is important to notice, however, that this same variable ("icacF4") revealed a negative effect on the use of Facebook for work-related purposes (Table 8.67) which, in the context of our model (Figure 8.31), is the stronger predictor of the educational usage of

Facebook (cf. Table 8.68). This issue will be re-addressed in the section of the discussion regarding *total effects* of the variables.

The other psychological variable that was found to predict students' educational use of Facebook was that assessing *institutional adaptation* ("qvaInstituc"; Table 8.68). This variable was measured with the Questionnaire of Academic Experiences (QVA-r; Almeida et al., 1999), and reflected students' interest for their higher education institution, the will to continue their studies in that institution, and students' satisfaction with quality of the institutional structure and services.

As can be inspected in Table 8.68, institutional adaptation revealed a significant *positive effect* on students' educational use of Facebook.

It is noticeable the fact that institutional adaptation ("qvaInstituc"), identity collective self-esteem ("cseIdent"), and community identity (adopFBCommId"), were all found to be significant predictors of the educational usage of Facebook, and that the effects of these three variables were positive (cf. Table 8.68).

Given that Facebook is a social networking service, it is understandable that these particular psychological variables, which concern community-related dimensions, were found relevant to predict the educational usage of this Web 2.0 tool.

The complete covariances matrix for the correlations depicted in the model as bi-directional curved lines (Figure 8.31, on the left) is provided in Appendix 19. Table 8.69 presents the subset of the correlations in which a Facebook-related variable is involved (i.e. excluding the natural correlations that exist among psychological variables, which are presented in Appendix 19).

Table 8.69. Correlations involving Facebook-related variables (model in Figure 8.31)

	Corr Estimate	BC Corr Estimate
adopFBUseful<->adopFBCommId	**0,726****	0,726
adopFBUseful<->adopFBEuFc	**0,733****	0,733
adopFBUseful<->adopFBSocInfl	**0,494****	0,494
adopFBSocInfl<->adopFBCommId	**0,473****	0,473
adopFBSocInfl<->adopFBEuFc	**0,443****	0,443
adopFBCommId<->adopFBEuFc	**0,673****	0,672
adopFBEuFc<->esssSA	**0,072****	0,072
adopFBUseful<->icacF4	**0,13****	0,13
adopFBCommId<->icacF4	**0,119****	0,119
adopFBEuFc<->icacF4	**0,211****	0,211
adopFBEuFc<->qvaInstituc	**0,073****	0,073
adopFBSocInfl<->rsesTotal	**-0,121****	-0,122
adopFBEuFc<->rsesTotal	**0,077****	0,077
adopFBUseful<->csePubl	**-0,119****	-0,118
adopFBSocInfl<->csePubl	**-0,221****	-0,22
adopFBCommId<->csePubl	**-0,116****	-0,114
adopFBCommId<->esssSA	**0,076****	0,075
adopFBEuFc<->cseIdent	**-0,06***	-0,061

Note: ** p<0,01. * p<0,05

The six first lines of Table 8.69 depict correlations among the variables assessing dimensions of Facebook adoption. The strength of these correlations reflects the high internal consistent of the scale (which was already described in Section 8.2.2 where the psychometric propertied of the Portuguese version of the AF scale were presented).

Public collective self-esteem ("csePubl"; Table 8.69) correlated negatively and significantly (p<0,01) with three of the dimensions of Facebook adoption (usefulness/"adopFBUseful", community identity/"adopFBCommId", and social influence/" adopFBSocInfl"; Table 8.69). The correlation between public collective

self-esteem and ease of use/facilitating conditions ("adopFBEuFc"; Table 8.69) was not significant.

These negative relations of *public* collective self-esteem with variables related to Facebook adoption were consistent with the negative influence that public collective self-esteem demonstrated in predicting students' educational usage of Facebook (Table 8.68), and also with the negative total effects of this variable in students' attitudes and intentions towards the use of Web 2.0 to supplement their in-class learning, found in the previous study (Study B1; Table 8.49).

The correlation matrix presented in Table 8.69 also reveals that *identity* collective self-esteem ("cseIdent") presents a slight negative correlation (β=-0,060, $p<0,05$) with the variable assessing the ease of use/facilitating conditions ("adopFBEuFc") dimension of Facebook adoption. However, the direct effect of identity collective self-esteem in the educational usage of Facebook was positive (as depicted in Table 8.68), and therefore consistent with the effects of this variable found for general Web 2.0 educational use (e.g. Table 8.49, depicting results of Study B1).

Personal self-esteem ("rsesTotal"; Table 8.69), correlated negatively with the variable measuring social influences on the adoption of Facebook ("adopFBSocInfl"; Table 8.69), but it correlated positively with the variable measuring the adoption dimensions related to ease of use and facilitating conditions ("adopFBEuFc"; Table 8.69).

In addition to the mixed (negative and positive) correlations of personal self-esteem with dimensions of Facebook adoption, described in the previous paragraph, it is important to take into account the fact that this variable (personal self-esteem) was previously found to be a negative predictor of students' use of Facebook for social-relational purposes (cf. Table 8.66). Therefore, the role of personal self-esteem in predicting the educational use of Facebook depends from sum of all these effects.

As depicted in Table 8.69, satisfaction with friendships ("esssSA") was positively correlated with two factors of Facebook adoption: a) community identity ("adopFBCommId") and b) ease of use/facilitating conditions ("adopFBEuFc").

Also as represented in Table 8.69, institutional adaptation ("qvaInstituc") revealed a positive correlation with Facebook's ease of use / facilitating conditions

("adopFBEuFc").

To finalize the description of the correlation matrix presented in Table 8.69, it is important to note that the dimension of self-concept labeled "impulsivity / activity" ("icacF4") presented positive correlations with three of the four factors of Facebook adoption that were studied: a) usefulness ("adopFBUseful"), b) community identity ("adopFBCommId"), and c) ease of use/facilitating conditions ("adopFBEuFc").

The crucial information to test hypothesis 15 (H15) is presented in Table 8.70.

The results presented in Table 8.70 depict the total effects of each of the variables in the model (Figure 8.31) on the educational use of Facebook ("educUseFB").

Whereas previous Tables 8.66, 8.67, and 8.68 presented just the *direct effects* of the significant predictors of social relation purposes ("purpFBSocRel"; Table 8.66), work-related purposes ("purpFBWkRel"; Table 8.67), and educational use of Facebook ("educUseFB"; Table 8.68), in Table 8.70 the *indirect effects* of all the variables in the model (Figure 8.31) are also considered to calculate the *overall total effects* of each variable on the educational use of Facebook.

Before concentrating on the total effects of the psychological variables related to hypothesis 15 (H15), it is important and useful to discuss the total effects that were found for adoption- and purpose- related variables in the educational use of Facebook (the role of this components on the research model used to test hypothesis 15 is illustrated in Figure 8.30).

Therefore, in relation to the dimensions associated with the adoption of Facebook, robust positive effects were found from perceived usefulness ("adopFBUseful"; Table 8.70), and from community identity ("adopFBCommId"; Table 8.70) on the educational use of Facebook: the total effects of these variables were 0,33 and 0,25, respectively.

The total effects of social influence ("adopFBSocInfl"; Table 8.70), another variable related to the adoption of Facebook, in educational use of this tool, was also positive and significant, although not so strong, approaching 0,1.

However, the total effects of the fourth (and last) variable related adoption of Facebook, ease of use / facilitating conditions ("adopFBEuFc"; Table 8.70), was not significant. This variable had been found to be a significant *negative* predictor of work-related purposes for using Facebook ("purpFBWkRel"; Table 8.67), but it was also revealed as strong *positive* predictor of social-relational purposes for using Facebook ("purpFBSocRel", Table 8.66). Therefore, the positive and negative effects of ease of use / facilitating conditions cancel each other, and turn this adoption-related variable into a (statistically) non-significant predictor of the educational uses of Facebook, in the context of our research model.

In regard to the two variables assessing purposes of Facebook use (social relations / "purpFBSocRel" and work-related / "purpFBWkRel"), the more robust total effects were observed for work-related purposes, as expected, since the direct effects of social-relational purposes had been previously found to be non-significant (as discussed earlier, and illustrated in Figure 8.29).

Thus, the total effects of *social-relational* purposes ("purpFBSocRel") in the educational use of Facebook (Table 8.70), represented *only indirect effects*, mediated by work-related purposes ("purpFBWkRel"). For this reason, it was not unexpected that *social-relational* purposes were, overall, a *much weaker predictor* of educational use of Facebook *than work-related purposes* for using this tool.

The remaining results presented in Table 8.70 are related to the overall effects of the additional psychological variables included in the model (Figure 8.30), and are therefore directly related to the test the last of our research hypotheses (hypothesis 15; H15).

(Continued on the next page, please turn)

Table 8.70. Standardized Total effects on Educational Use of Facebook

Variable	Total effect
swlsTot	**0,042***
rsesTotal	-0,005(*)
esssAS	-0,006(*)
esssSA	0,006(*)
icacF4	0,044
qvaInstituc	**0,085****
cseIdent	**0,089****
csePubl	**-0,08****
adopFBEuFc	-0,031
adopFBCommId	0,25**
adopFBSocInfl	0,096**
adopFBUseful	0,33**
purpFBSocRel	0,084*
purpFBWkRel	0,498**

Note: ** p<0,01; * p<0,05

Table 8.71 summarizes the main findings regarding the total effects of the measured psychological variables on students' educational use of Facebook, and related those findings to Hypothesis 15 (H15), and each of its sub-hypotheses.

Table 8.71. Testing of Hypothesis 15, based on the indicators presented on Table 8.70

Hypotheses	Relation	Confirmed?	Significant variable (std. estimate)
H15a	Self-concept	No	
H15b	**Satisfaction with Life**	**Yes**	swlsTot (**0,042***)
H15c	Satisf. with Social Support	No	
H15d	*Personal* Self-esteem	No	
H15e	***Collective* Self-esteem**	**Yes**	cseIdent (**0,089**), csePubl (**-0,08**)
H15f	Self-efficacy	No	
H15g	**Academic experiences**	**Yes**	qvaInstituc (**0,085****)
H15h	Self-perception of Competence	No	

Therefore, applying the model depicted on Figure 8.31 to test the validity of our research hypothesis 15 (H15; earlier presented in Chapter 6, and here summarized in Figure 8.30, and signaled in **bold** type in Table 8.70) can say that:

Hypothesis 15 (H15), stating that *the overall influence of the studied psychological variables on Students' educational use of Facebook is significant (direct influence and/or mediated by purposes of Facebook use)*, was partially confirmed, given that its sub-hypotheses H15a, H15c, H15d, H15f, and H15h were rejected, but its sub-hypotheses H15b, H15e, and H15g were confirmed.

8.5.3. Discussion of Results: Sub-Study B2

By inspecting Table 8.70, it can be verified that, for those psychological variables which had been identified as direct predictors of *exclusively* the educational use of Facebook their *total effects* are *equal* to their *direct effects*, as would be expected.

Thus, the comparison of the values in Tables 8.70 and 8.68 reveals that the total effects of the following variables on educational use of Facebook are the same as their direct effects: a) identity collective self-esteem ("cseIdent"), b) public collective self-esteem ("csePubl"), and c) institutional dimension of academic experiences ("qvaInstituc"). This happens because these three variables have no significant indirect effect on the educational use of Facebook (i.e. they do not appear in Tables 8.66 and 8.67, only in Table 8.68).

The positive total effects of *identity* collective self-esteem in the educational use of Facebook mimicked the same (positive) effect that was earlier verified for the influence of this variable on students' attitudes and intentions about using Web 2.0 tools to supplement in-class learning (Study B1).

A representative item used to measure *identity* collective self-esteem was "*Overall, my group memberships have very little to do with how I feel about myself*" (item 4 of the CSEp; Table 8.3 at the start of the Chapter: note that this item is scored in reverse, i.e. higher scores indicate less identity collective self-esteem; Luhtanen & Crocker, 1992).

Also, the negative total effects found for *public* collective self-esteem in the educational usage of Facebook reproduced the same (negative) effect that this variable exerted on students' intentions and attitudes concerning the educational use of Web 2.0 (Study B1).

Item 15 of the CSEp (Table 8.3) provides an example of what was measured as public collective self-esteem: "*In general, others think that the social groups of which I am a member are unworthy*" (higher scores in this item depict lower public collective self-esteem; Luhtanen & Crocker, 1992).

It was interesting to verify the consistency of the effects of these two dimensions of collective self-esteem, on both studies (Study B1, and this one, Study B2).

Therefore, as reflected by the positive total effects observed for identity collective self-esteem (Table 8.70), when students perceived the social groups to which they belonged as important for their identity, they were more prone to use Facebook for educational purposes.

However, when students felt that the groups to which they belonged were more valued by "others" (i.e. possessed higher levels of public collective self-esteem), they were more in opposition to the educational use of Facebook.

Institutional adaptation ("qvaInstituc"; Table 8.70) proved to have a significant positive total effect in students' willingness to use Facebook for educational purposes. Therefore, students' interest for their higher education institution, the will to continue their studies in that institution, and their satisfaction with quality of the institutional structure and services (Almeida et al., 1999) were aspects that favored the educational use of Facebook by students.

Satisfaction with life (measured by the variable "swlsTot"; Table 8.70), was not a direct predictor of the educational use of Facebook. However, it was a direct predictor of the use of Facebook for work-related purposes ("purpFBWkRel"; Table 8.67) which, as presented in Table 8.70, was the strongest predictor of educational use of Facebook. Therefore, although the effect of satisfaction with life in the educational use of Facebook was only indirect, it was nevertheless positive and statistically significant.

The *total effects* of the dimension of self-concept labeled "impulsivity / activity"

("icacF4") were non-significant, despite this variable being among the significant *direct* predictors of educational use of Facebook (Table 8.68).

However, as presented in Table 8.67, this variable ("icacF4") revealed a negative effect on the use of Facebook for work-related purposes, which, in the context of our model (Figure 8.31), was the strongest predictor educational usage of Facebook (cf. Table 8.68).

Thus, the lost of statistical significance of the effect of impulsivity / activity ("icacF4") in the educational use of Facebook is explainable by this conflicting roles of this variable, in the context of our theoretical model.

In respect to the total effects of the dimensions of social support represented in Table 8.70 (social activities / "esssAS" and satisfaction with friendships / "esssSA"), although they were found statistically significant, their small effect size (below 0,01) led us to conclude that their effects in the educational use of Facebook are negligible

Kline (1998) considers significant effects bellow 0,1 as small, but the effect observed for dimensions of social support were less than one tenth of this reference point.

A similar negligible effect size was found for the total effects of *personal* self-esteem, represented by "rsesTotal" in Table 8.70, for which the total effects of this variable on the educational use of Facebook were also considered negligible, although statistically significant.

As presented in Appendix 20, and contrary to what was found for the use of Web 2.0 (in general) no significant effects were found for any of the demographic and professional-related variables that were significant for the educational use of Facebook, in the context of the studied model.

Therefore, no further modification was performed, and the earlier presented and discussed version of the model (Figure 8.31), was considered our final integrative model for the educational use of Facebook by higher education students.

8.6. Chapter Summary

This chapter started by applying well known and tested theoretical frameworks (TPB; Ajzen, 1991, and TAM; Davis, 1989), to identify predictors of students' decisions regarding the use of Web 2.0 tools for educational purposes. This initial and general part of the study allowed the answer of Research Question 6.

In what concerns the research related to students attitudes and intentions regarding the use of Web 2.0 (in general) to supplement in-class learning, a framework based in TAM (Davis, 1989), enriched with an extensive set of psychological variables, which had never been integrated in the same model, is proposed. The results obtained with this model provided answers for Research Question 7.

Answers for Research Question 8 were obtained through the model proposed for studying the effects of the selected psychological variables on the educational use of Facebook. The integrative model obtained for the use of Facebook to supplement students' in-class learning contained only psychological variables (in addition to the ones proposed by Usluel & Mazman, 2009 and Mazman & Usluel, 2010): no significant effects were found for any demographic variable.

The results obtained in this rather extensive study B are distilled as concrete answers for research questions 6, 7 and 8, which are presented in the next and final chapter (Chapter 9).

The results obtained with the student population, integrated with those obtained in the research with the faculty population, allowed the presentation of answers for Research Questions 1 and 2, which concerned the influence of Web 2.0 tools in the learning and teaching practices of both students and faculty.

CHAPTER IX – CONCLUSIONS AND FUTURE WORK

9.1. Introduction

In this concluding chapter, the answers obtained for our research questions are presented. The chapter also includes a depiction of the main contributions resulting from the studies that were performed

In the final section of the chapter, directions for future research are delineated.

9.2. Summary of answers to research questions

In this section the main results of the studies that were conducted are summarized, in the form of answers for the concrete research questions that were enunciated at the beginning of our empirical work (as introduced in Chapter 1, and detailed in Chapter 6).

9.2.1. Answers to the General Research Questions

Answers for Research Question 1:

Is the availability of Web 2.0 tools having a significant impact on teaching and learning activities in the context of higher education?

Our results revealed that attitudes of faculty in relation to the use of Web 2.0 tools to supplement their teaching activities were neutral, although attitudes concerning the specific use of both Facebook and Blogs in teaching were generally negative.

The social group from which faculty members perceived receiving more "social pressure" to adopt Web 2.0 tools was that of students (but when social norms were influent in determining Web 2.0 adoption, only the influence of peers revealed to be significant).

Overall, faculty members believed they were competent to use Web 2.0 tools (in

general). In relation to Facebook, their general sense of competence was situated near the neutral point of the scale that was used, but the general sense of competence regarding the specific use of Blogs was situated in the negative region of the scale.

Intention to use Web 2.0 tools (in general) approached the neutral point of the measure, but intention to use specifically Facebook or Blogs were markedly negative.

However, the complex relations between behavioral intentions and actual use have been at the center of long-lasting debates in the literature (e.g. Wong & Sheth, 1985; Armitage & Conner, 2001; Ajzen et al., 2004), and our results revealed that the real use of Web 2.0 (in general) was higher than what would be predicted solely by the intentions reported by faculty members regarding the use of these tools (for the purposes of aiding in teaching activities). The same phenomenon was observed for the specific cases of Facebook and Blogs.

One possible explanation for this discrepancy was provided, based in the fact that, according to the Theory of Planned Behavior (Ajzen, 1991), actual use depends not only of intentions to use, but also of self-efficacy (i.e. perceived competence to use a given tool).

In what respects the student population, our results revealed that, among Web 2.0 tools, students were more familiarized with Facebook, YouTube, and Live Messenger, followed closely by their familiarity with Wikis.

Although Facebook was the second of the tools for which students reported feeling more comfortable with, it was also the one that presented the greatest variability of the answers, contrary to YouTube, for which the standard deviation of the comfort level average was much smaller.

Twitter and Social Bookmarking were the tools in relation to which students reported feeling less comfortable with.

In general, students also revealed having relatively low levels of familiarity with Skype and with Blogs, although the variability of the answers was relatively high.

In terms of the actual use of each tool to supplement in-class learning, Blogs and Wikis

presented indicators which coincided with the reported comfort level that students reported in relation to those tools.

However, there were great discrepancies between the degree of comfort that students reported having with Facebook and the reported actual use of this tool to supplement their in-class learning.

The Web 2.0 tools that Students reported as using the most, to supplement their in-class learning, were Wikis and YouTube, although the variability of the answers concerning these tools was relatively high.

In the case of Wikis, the level of educational actual usage was very similar to the reported comfort level manifested for that tool. However, in regard to YouTube, its actual use to supplement in-class learning was significantly lower that the comfort level that students reported having with this tool. These can be considered indicators that Wikis are perceived as a more educationally-related Web 2.0 tool, whereas the uses of YouTube by higher education students are less far restricted to the educational realm.

Twitter, Social Bookmarking, and Skype were the Web 2.0 tools that students used the least *to supplement their in-class learning*, and the variability of the answers concerning the use of those tools (in this context) was relatively low.

Blogs and Live Messenger were mildly used by students to supplement their in-class learning, but in the case of Live Messenger, its actual usage for this purpose was significantly lower than the students' reported degree of familiarity with this tool.

As expected, for all the Web 2.0 tools analyzed, the reported level of use to supplement in-class learning was always lower that the degree of familiarity reported for that tool.

Answers for Research Question 2:

What benefits do faculty and students perceive from the use of Web 2.0 tools to support teaching and learning in higher education?

For faculty, specific answers to this question were obtained for two representative Web

2.0 tools: Facebook and Blogs.

Our results indicate that faculty regarded Facebook and Blogs very differently, in terms of their potential educational advantages.

Facebook most distinctive educational applications appear to come from it enabling faculty members to contact their peers, and to promote class dynamics.

However, Blogs were perceived as having a greater educational advantage over Facebook, in enhancing students' learning and in allowing the development of writing skills.

In addition, the effectiveness of Facebook and Blogs in enhancing class dynamics was perceived as equal, by Faculty members.

For the student population, information regarding the perceived educational benefits of a larger number of Web 2.0 tools was collected: Facebook, Twitter, Blogs, Wikis, YouTube, Messenger and Skype.

One of the most salient aspects emphasized by our results was the students' perceived advantages of the use of Facebook and Messenger for interacting with their peers. Skype was also considered to have some importance in allowing peer interaction among students, but to a much lesser extent than Facebook and Messenger.

Facebook and Messenger were also the Web 2.0 tools to which a greater proportion of students attributed the advantage of allowing the interaction with teachers, although teacher interaction through these tools was much less frequently perceived as one of the tools' benefits, when comparing to their use to interact with other students.

The advantages perceived by students regarding the use of Wikis to enhance their learning were also particularly salient. In regard to this domain ("enhance learning"), YouTube and blogs are also perceived as providing advantages to students, in complementing their in-class learning.

Concerning "course satisfaction", no tool was mentioned by more than about one-fourth of the students in our sample, and this maximum value was obtained by Wikis, nearly followed by the proportion of students that signaled blogs and YouTube as important for

this aspect.

More than half of the students in our sample reported perceiving Wikis as a form to enhance their grades. The other tools that were perceived as potentially being beneficial to grades were Blogs and YouTube, although in a significant lesser extent, relative to Wikis.

In what respects the interaction with teachers, besides Facebook and Messenger (already mentioned above), Blogs were perceived as providing advantages (in supplementing in-class learning) by a little less than one-fifth of the students.

Blogs were the Web 2.0 tools for which more students perceived advantages in terms of allowing them to improve their writing skills (although only one-third of the students had that perception), closely followed by Wikis and by Live Messenger.

9.2.2. Answers to Specific Research Questions: Faculty and Web 2.0

Answers for Research Question 3:

What factors best predict faculty's decision to adopt Web 2.0 tools to supplement their classroom instruction?

Answers to this question were sought in the context of a model inspired in the Theory of Planned Behavior (TPB; Ajzen, 1991).

Using that model, it was found that faculty's attitude towards Web 2.0 had a significant positive effect on behavioral intention of using Web 2.0 tools in their pedagogical activities.

In particular, when Web 2.0 tools were perceived as useful, and compatible with preferred teaching practices, higher levels of intention of using Web 2.0 in teaching were observed. Perceived usefulness was, however, a much stronger predictor of intentions *and* of actual use, in relation to perceived compatibility.

Subjective norm (social "pressure" and influence) had a significant positive effect on

faculty's intention to use Web 2.0 in their pedagogical activities, but faculty members revealed to be influenced only by their peers in this matter (and not by their superiors, or by the students).

Web 2.0 self-efficacy (i.e. the believes faculty had regarding their competence to use Web 2.0 tools) was found to have a significant positive effect on faculty's intention to use Web 2.0 in their pedagogical activities, and also on faculty's actual usage of Web 2.0 for those purposes.

As expected, and predicted by TPB (Ajzen, 1991), intention to use Web 2.0 in teaching was a predictor of the actual usage of Web 2.0 by Faculty, for the purpose of supplementing their pedagogical activities.

Somewhat surprisingly, age was observed to have a weak positive effect on intention to use Web 2.0 for pedagogical purposes, although this effect disappeared in relation to actually using these tools in teaching activities.

Gender seemed not to influence intentions of using Web 2.0 tools for teaching activities, but being a woman was a small (but statistically significant) predictor of not actually using Web 2.0 tools for teaching purposes.

The effects of: a) the number of years of professional experience, b) the perceived institutions' IT resources compatibility with Web applications desired for teaching, and c) the satisfaction with institutional Learning Management System were not significant, in the context of our TPB-derived research model.

Answers for Research Question 4:

What factors best predict faculty's decision to adopt Facebook in order to supplement their classroom instruction?

In the context of our research, it was found that faculty's attitude towards Facebook had a significant positive effect on behavioral intention of using this tool in their pedagogical activities.

Both perceiving Facebook as compatible with favorite teaching practices, and perceiving Facebook as useful were significant positive predictors of faculty's intention to use this tool to complement their teaching. However, usefulness was a stronger predictor than compatibility, both for intention *and* for actual use of Facebook in teaching activities.

Peers' subjective norm (social influence) was found to have a significant positive effect on faculty's intention to use Facebook in their pedagogical activities, but the social influence of superiors and of students was not significant in determining faculty's intention in respect to the use of Facebook in this context.

Facebook self-efficacy (i.e. the believes faculty had regarding their competence to use Facebook) had a significant positive effect on both faculty's intention to use Facebook in their pedagogical activities, and in their actual usage of Facebook for this purpose.

Gender appears to have no influence in faculty's intention to use Facebook for teaching purposes, but being a woman was a weak negative predictor of Facebook actual usage (in the context of pedagogical activities).

Although, as expected (by TPB; Ajzen, 1991), the intention to use Facebook had a significant positive effect on Faculty's actual use of this tool to supplement their pedagogical activities, the predictive character of intention diminishes to statistical insignificance when attitudes are decomposed (into perceived usefulness and compatibility), and studied as direct predictors of actual use.

The effects of: a) age, b) the number of years of professional experience, c) the perceived institutions' IT resources compatibility with Web applications desired for teaching, and d) the satisfaction with institutional Learning Management System, were all (statistically) non-significant, in the context of research model.

Answers for Research Question 5:

What factors best predict faculty's decision to adopt Blogs in order to supplement their classroom instruction?

The study which was conducted to answer this fifth research question found that, as predicted by TPB (Ajzen, 1991), faculty's attitude towards Blogs influenced positively the intention of using these tools in their pedagogical activities.

Of the attitudes influencing *intentions* to adopt Blogs for teaching purposes, perceived usefulness was the strongest predictor (comparing with the other component of general attitudes that was measured: perceived compatibility of Blogs with preferred pedagogical practices).

However, in the case of Blogs, the influence of the two types of attitudes (perceived usefulness and perceived compatibility with teaching practices) in *actually using* this type of Web 2.0 tool in pedagogical activities were similarly important.

Contrary to what was observed to the complete set of Web 2.0 tools, and in the particular case of Facebook, social influence did not appear to be a predictor of faculty's intention to use Blogs in their pedagogical activities.

It had been already verified that faculty were not significantly influenced by the social "pressure" of students or superiors, in the case of Web 2.0 (in general), and in the specific case of Facebook. But for Blogs, social influence, overall (including that coming from other faculty peers), appears not to be a significant predictor of the intention to use this kind of Web 2.0 tool to supplement teaching practices.

Faculty's believes in their own competence to use Blogs (self-efficacy) was a positive predictor of both intention to use Blogs in teaching, and for actually using Blogs for that purpose.

As expected, from TPB (Ajzen, 1991), the intention to use Blogs as an aid in teaching was a significant positive predictor of the real use of these tools in pedagogical activities, in all the models in which this relation was tested.

In relation to Blogs, gender played the same (weak) negative predictor role that was observed for Web 2.0 (in general), and for Facebook: being a woman did not affect intentions to use Blogs for teaching purposes, but it did influenced (negatively) the actual use of Blogs to supplement classroom instruction.

The effects of: a) age, b) the number of years of professional experience, c) the perceived institutions' IT resources compatibility with Web applications desired for teaching, and d) the satisfaction with institutional Learning Management System, were all (statistically) non-significant, in the context of research model.

9.2.3. Answers to Specific Research Questions: Students and Web 2.0

Answers for Research Question 6:

What factors, among those proposed by the Theory of Planned Behavior (Ajzen, 1991) and the Technology Acceptance Model (Davis, 1989), best predict students' decision to adopt Web 2.0 tools, to supplement their in-class learning?

As predicted by the Theory of Planned Behavior (TPB; Ajzen, 1991), students' intentions to use Web 2.0 tools to supplement their in-class learning were positively influenced by students' attitudes (concerning the academic use of Web 2.0), and by social influences from others (social norm).

However, in what respects the effects of social norm on students' intentions to use Web 2.0 for academic purposes, only the influence of other peer-students was significant, and not that of teachers / faculty.

In addition, TPB (Ajzen, 1991) predicted that perceived behavioral control (i.e. students' perceptions of their ability to use Web 2.0 tools) would have a positive influence on students' intentions to use Web 2.0 academically, but this effect was not found. This variable, nevertheless, *did* predict actual academic use of Web 2.0 by students, albeit its influence on intentions being non-significant.

Also as predicted by TPB (Ajzen, 1991), intention to use Web 2.0 was found to have a significant positive effect on students' actual use of Web 2.0 tools to supplement their in-class learning.

Perceived ease of use (of Web 2.0), one of the constructs used in the Technology Acceptance Model (TAM; Davis, 1989), confirmed its role as a positive predictor of

both perceived usefulness (of Web 2.0) and attitudes (regarding academic use of Web 2.0).

Perceived usefulness (of Web 2.0) was found to positively influence students attitudes and intentions (about academic use of Web 2.0), thus fulfilling the predicted role of this variable in the context of TAM (Davis, 1989).

Therefore, among the variables related to constructs included in TPB (Ajzen, 1991) and TAM (Davis, 1989), only perceived behavioral control failed to demonstrate one of its predicted roles (its effect on students' intentions to use Web 2.0 to supplement their in-class learning was non-significant).

The effects of the other variables assessing the constructs proposed by TPB (Ajzen, 1991) and TAM (Davis, 1989), confirmed the adequacy of these theoretical frameworks for explaining students' acceptance and adoption of Web 2.0 to supplement their in-class learning.

Answers for Research Question 7:

In what extent the studied psychological variables influence students' attitudes and intentions regarding the use Web 2.0 to supplement their in-class learning?

The first pattern that was detectable in our results was the consistency on the sign of the effects of each variable on both attitudes and intentions (i.e. when a variable had a positive effect on attitudes, it also affected positively intentions, and vice-versa).

Another aspect of the results was also particularly salient: all the effects detected for the psychological variables were relatively weak, although statistically significant. However, as referred by Glass et al. (1981), the practical importance of an effect is intrinsically dependent of its relative costs and benefits. The same authors also refer that, in the specific case of education, even small effect sizes can depict very important findings, if those effects involve uniformly a great number of students.

"Social self-efficacy" (AE scale; Ribeiro, 1995), appears to be an important positive factor in determining students' attitudes and intentions concerning the use of Web 2.0

tools to supplement learning.

Two representative items of the AE scale assessing social self-efficacy were "*I don't quit easily when I am trying to be friends with someone*" (item 11), or "*The friendships I have were achieved through my own personal ability to make friends*" (item 13).

Taking into account the nature of these items, it seems understandable that students who report higher scores in this dimension of the AE scale also present more positive attitudes and stronger intentions to use Web 2.0 tools to supplement their in-class learning (given the distinctive sociability nature of these tools, as expressed McLoughlin & Lee, 2007).

However, the factor of the ICAC (Serra, 1986) called "self-efficacy" demonstrated to have a negative effect on students' attitudes towards the use of Web 2.0 tools to supplement in-class learning.

Examples of items if the ICAC assessing this dimension were "*usually I am fast at performing the tasks that are assigned to me*" (item 5), or "*I am accustomed to face and solve my own problems*" (item 8).

The data revealed that students' reporting higher in these measures of self-efficacy are less prone to have positive attitudes and towards the use of Web 2.0 tools to supplement their in-class learning, and also intend to use those tools less, in this context.

Thus, although both the above variables refer to the concept of *self-efficacy* (i.e. to the believes the person has in her/his own competence), the dimensions of self-efficacy that were measured by the AE and the ICAC scales were different, and it is not illogical that each may affect students' attitudes and intentions in opposite ways.

The fact that *social* self-efficacy has a specific effect which is contrary to that observed for self-efficacy (in *general*), is revealing of the importance of the social dimensions of Web 2.0 tools.

Identity collective self-esteem, and *public* collective self-esteem, two of the three dimensions of collective self-esteem assessed by the CSEp scale (adapted from Luhtanen & Crocker, 1992), were found to have a significant effect on students'

intentions and attitudes.

However, whereas identity collective self-esteem revealed a positive influence on students willing to use Web 2.0 tools for educational purposes, public collective self-esteem showed a negative effect, on students' attitudes and intentions about using Web 2.0 tools to supplement in-class learning.

Identity collective self-esteem was assessed through items such as "*Overall, my group memberships have very little to do with how I feel about myself*" (meant to be scored in reverse: higher score in this item reflects lower identity collective self-esteem).

On the other side, one example of an item measuring *public* collective self-esteem was "*In general, others think that the social groups of which I am a member are unworthy*" (also scored in reverse).

Therefore, when students perceive the social groups to which they belong as important for their identity, they are more prone to have favorable attitudes towards using Web 2.0, and stronger intentions to use Web 2.0 tools, for the purpose of supplementing their in-class learning. This is reflected by the positive effects observed by identity collective self-esteem.

However, when students had higher scores on public collective self-esteem (i.e. when they felt that "others" valued more their belonging to the social groups of which they were members), they tended to be more against the use of Web 2.0 tools to supplement their in-class learning, and had fewer intentions concerning that use of Web 2.0 tools.

The dimension of self-concept labeled "impulsivity / activity" (Serra, 1986) revealed to positively influence students' attitudes and intentions concerning the use of Web 2.0 in the context under study.

Representative items measuring this dimension were: "*When I have an idea which seems valid, I like to put it in practice*", or "*I am a person who likes to do whatever I want*".

The positive effect of this psychological variable on students' attitudes and intentions towards the use of Web 2.0 tools to supplement in-class learning appears particularly

relevant, because it seems to indicate that the use of Web 2.0 tools may be useful for those students who are more prone transform ideas into actions. For example, these students may play a key role in initiating and maintaining the group dynamics potentiated by the use of Web 2.0 tools in higher education.

The effects of satisfaction with life (in general), and satisfaction with academic life (in particular), personal self-esteem, self-perception of intellectual and academic competences, and the variables assessing dimensions of academic experiences were found to be non-significant in what concerns their effects on students' attitudes and intentions regarding the use of Web 2.0 in education.

Answers for Research Question 8:

"What factors, including the studied psychological variables, best predict students' decision to adopt Facebook in order to supplement their classroom instruction?"

Robust positive effects were found for perceived usefulness (of Facebook) and for community identity (the feeling of "belonging") on the educational use of Facebook.

The effect of social influence (i.e. "pressure from others"), in the educational use of this tool, was also positive and significant, although not as strong as for perceived usefulness and community identity.

The effect of ease of use / facilitating conditions was, however, non-significant. This variable was found to be a *significant negative* predictor of work-related purposes for using Facebook, but it was also revealed as a strong *positive* predictor of social-relational purposes for using Facebook. Therefore, the positive and negative effects of ease of use / facilitating conditions cancel each other, and turned this variable into a (statistically) non-significant predictor of the educational uses of Facebook, in the context of our research model.

In regard to the two variables assessing purposes of Facebook use (social relations *versus* work-related), the more robust total effects were observed for work-related purposes, as expected, since the direct effects of social-relational purposes were found

to be non-significant.

Thus, the total effects of *social-relational* purposes in the educational use of Facebook represented *only indirect effects*, mediated by work-related purposes. For this reason, it was not unexpected that *social-relational* purposes were, overall, a *much weaker predictor* of educational use of Facebook *than work-related purposes* for using this tool.

A positive total effect of *identity* collective self-esteem in the educational use of Facebook was found, which mimicked the same (positive) effect that was observed for the influence of this variable on students' attitudes and intentions about using Web 2.0 tools to supplement in-class learning (Study B1 which provided the answers to Research Question 7).

A negative total effect was found for *public* collective self-esteem in the educational usage of Facebook, which also reproduced the same (negative) effect that this variable exerted on students' intentions and attitudes concerning the educational use of Web 2.0 (Study B1).

It was interesting to verify the consistency of the effects of these two dimensions of collective self-esteem, on both studies (Study B1, and this one, Study B2).

Therefore, as reflected by the positive total effects observed for *identity* collective self-esteem, when students perceived the social groups to which they belonged as important for their identity, they were more prone to use Facebook for educational purposes.

However, when students felt that the groups to which they belonged were more valued by "others" (i.e. possessed higher levels of *public* collective self-esteem), they were more in opposition to the educational use of Facebook.

Institutional adaptation proved to have a significant positive total effect in students' willingness to use Facebook for educational purposes. Therefore, students' interest for their higher education institution, the will to continue their studies in that institution, and their satisfaction with quality of the institutional structure and services (Almeida et al., 1999) were aspects that favored the educational use of Facebook by students.

Satisfaction with life was not a direct predictor of the educational use of Facebook.

However, it was a direct predictor of the use of Facebook for work-related purposes, which was the strongest predictor of educational use of Facebook. Therefore, although the effect of satisfaction with life in the educational use of Facebook was only indirect, it was nevertheless positive and statistically significant.

The *total effects* of the dimension of self-concept labeled "impulsivity / activity" (Serra, 1986) were non-significant, despite this variable being among the significant *direct* predictors of educational use of Facebook. However, it revealed a negative effect on the use of Facebook for work-related purposes, which, in the context of our model, was the strongest predictor educational usage of Facebook. Thus, the lack of statistical significance of the total effect of impulsivity / activity in the educational use of Facebook is explainable by these conflicting roles played by this variable, in the context of our theoretical model.

Negligible (although statistically significant) total effects on the educational use of Facebook were found for two of the dimensions of satisfaction with social support ("satisfaction with social activities" and "satisfaction with friendships"; Ribeiro, 1999). However the effects of satisfaction with social activities showed a negative effect on the use of Facebook for social-relational purposes, and satisfaction with friendships had a positive influence on the variable assessing the use of Facebook for social-relational purposes. These effects, however, were much attenuated (by the other mediators in the model).

A similar negligible effect size was found for the total effects of *personal* self-esteem on students' use of Facebook for educational purposes, even if the direct effects of personal self-esteem on the use of Facebook for social-relational purposes were negative.

9.3. Main Contributions

In the real world, with all its complexity and diversity, there are no relevant phenomena which are purely psychological.

As any complex real world trend, however, Web 2.0 adoption in higher education does have psychological dimensions (among many others: technological, sociological,

economical, etc), which deserve to be explored, and whose clarification contributes for the understanding of the challenges that higher education is facing today, in a world in permanent change, in which both people and institutions are being influenced by global emergent social, economic, and technological forces (as illustrated in Figure 9.1).

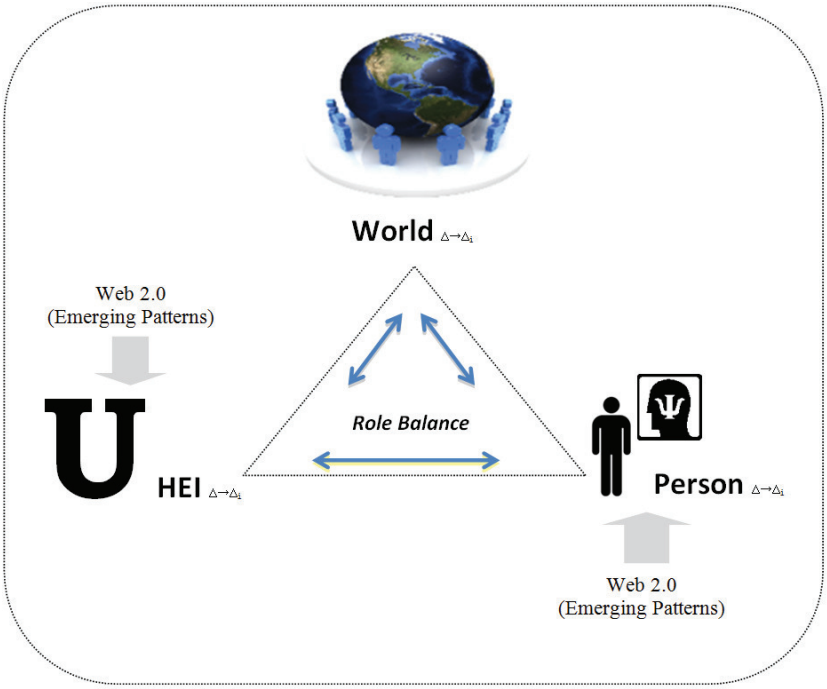

Figure 9.1. Relationships between changes ("Δ→Δ$_i$") in psychological dimensions ("Ψ"), higher education institutions ("U"), and the global world in which they are embedded.

Through the conducted research, it was possible to contribute for a clarification of the extent in which faculty and students perceived Web 2.0 tools as having an important role in teaching and in learning in the context of higher education.

It was also possible to study the role of specific psychological variables on higher education students' attitudes and intentions towards the academic use of Web 2.0, in general, and Facebook, in particular.

From the study with the Portuguese faculty population three integrative models were proposed for explaining faculty's adoption of Web 2.0 (in general), and of Facebook and Blogs (in particular), in the context of their teaching activities. These models

incorporate constructs derived from the Theory of Planned Behavior (Ajzen, 1991) with demographic, professional, and institution's IT-related factors.

Among the contributions resulting from the study with the student population, two of the most important were the two integrative models that were proposed for interpreting the data gathered in the study: one depicting students' use of Web 2.0 tools to supplement their in class learning (extending TAM; Davis, 1989), and another for students' educational use of Facebook (derived from, and extending, the model proposed by Mazman & Usluel, 2010). These models, integrate traditional constructs of theories of technology adoption with the psychological variables that were studied, and also explore the additional influence of other variables such as students' age, gender, previous working experience, and satisfaction with institution's learning management system. Additionally, in the context of this study, a group of five psychological scales were adapted for use with the Portuguese higher education student population, assessing dimensions related to Facebook usage, and to the psychological construct of collective self-esteem.

9.4. Future work

The richness of the data collected in both studies described in this thesis (with the faculty and the student populations) is far from being depleted in the models that were proposed. The role of a model is to present reflections of reality and, although good models can be extremely useful, they are nevertheless simplified depictions of complex real phenomena.

The information gathered from these studies can be explored in many other ways than those that were presented here. This is particularly true in the study with the student population, in which the quantity, diversity, and quality of the psychological measures that were obtained allow the exploration of many potentially relevant and interesting effects.

For example, what will happen if we compare the effects of using Web 2.0 (in general), or Facebook (in particular), on the several dimensions of students' academic

experiences when students are grouped dichotomously according with their levels of personal self-esteem, satisfaction with life or satisfaction with social support? This is an avenue of research that seems very promising, and which deserves to be explored in future work.

Also, the influence of the studied dimensions of collective self-esteem (identity and public) seem to be both robust and consistent, and this construct revealed to be very promising, in terms of its relevance for future studies concerning the psychological dimensions of the use of Web 2.0 tools.

Another promising direction of research is the exploration of the Application Programming Interfaces (API's) which are provided by the Facebook Platform for getting detailed information about the use and relationships between Facebook users and related higher education issues and/or contents. These API's allow the development of software that can interact with the core functionalities of Facebook and allow, with the collaboration of the users, the gathering of relationship data that can be used to produce visualizations and usage patterns discovering.

For example, the "Graph" API can be used to read data from Facebook. Through the use of this API, it is possible to obtain a simple representation of the components of Facebook's social graph, such as people, events, and photos.

The social graph provided by Facebook is a sociogram providing a graphical representation of all the digital links that a given individual has. Through the exploration of these graphs it would be possible to explore the group interactions and the structural patterns emerging from social exchanges taking place in the digital arena provided by Facebook.

As depicted in Figure 9.1, the world, institutions, and people are constantly changing. Therefore, it is important to confirm the proposed models with other groups of faculty members and of students, and it is expected that the influence of the studied variables will change, as technology evolves and newer generations of teachers and students enter the scene of higher education.

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Luís António Morão Pinto Simões da Cunha

Web 2.0 and Higher Education: A psychological perspective

Volume 2 - Appendices

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INDEX OF APPENDICES

APPENDIX 1 – “MAIL MERGE” PROCEDURE DETAILS

In order to send a personalized request for a relatively large number (N=2903) of faculty members, the facilities provided by Mozilla Thunderbird "Mail Merge" were used.

Using this automated procedure, each recipient received a message that was sent individually, and uniquely, to his/her e-mail address, from our own e-mail address.

Therefore, each of the near 3000 messages was sent individually, using a CSV ("Comma Separated Values") file which contained the following fields:

{{email}}

{{Assunto}}

{{SaudacaoNome}}

The information regarding recipients' e-mail, name, and academic degree, was collected from the Internet, on public institutional sites.

Therefore, the personalization of the message included, the person's name, gender (deduced from name, or clarified by web searching, in case of doubts regarding the gender of faculty members with non-Portuguese names), academic degree (when information was available about it).

A PDF file was attached to each message containing the approval of the study by Fernando Pessoa University's Ethical Committee.

Figure 1.1 provides an illustration of the message and of the generic fields used.

This procedure guaranteed complete anonymity of the survey's respondents, since the message contained a link to the Google Forms survey. This link was common to (many) other participants, thus becoming impossible to identify the answers of each one.

It was not even possible to know if a given person answered the online survey or not.

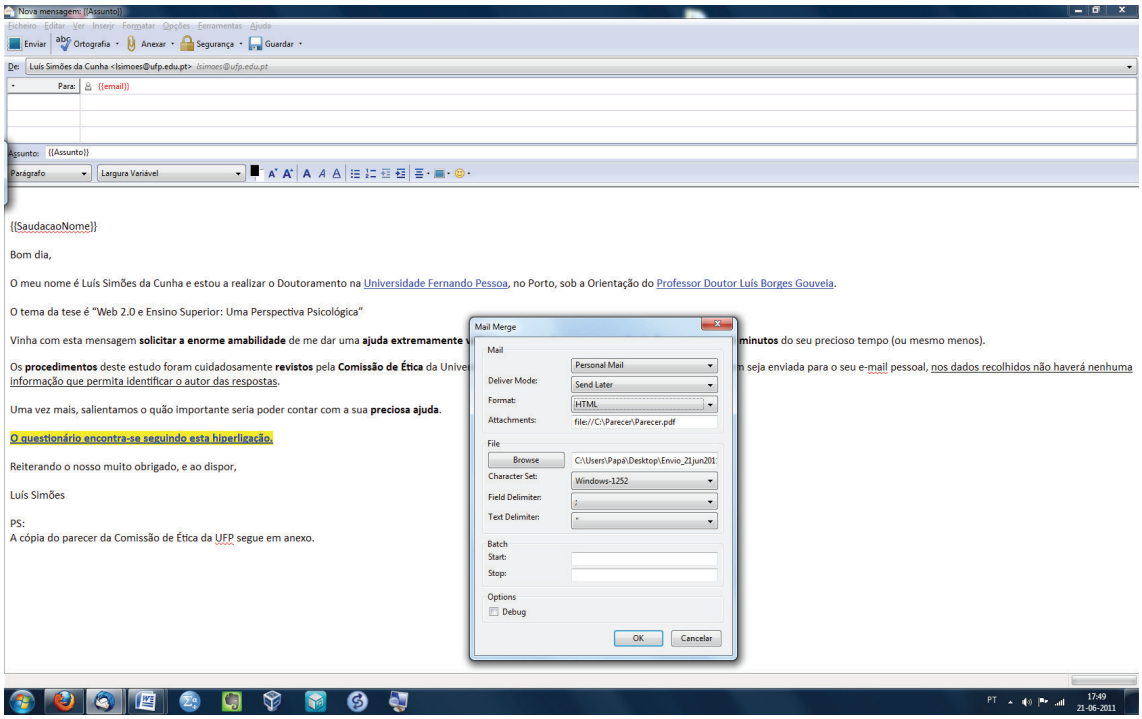

Figure 1.1. Generic message created in Mozilla Thunderbird (for "Mail Merge" use)

In order to control the response rate, and to prevent the flooding of our database with information generated (for example) from an automated form-filling program, 22 different links were provided, for the 2903 messages sent.

This allowed the maintenance of the anonymity of respondents, since each link was sent to over 100 persons, but also allowed for the detection of any disproportionate number of answers in each of the "slots" (which did not happen).

Case the survey whose address was sent to near 100 persons received a suspicious high rate of response (or more responses than the number of recipients for each it was sent, as an extreme example), we would be able to exclude the answeres obtained through that link, with minor damages for our study (excluding one slot would reduce the number of recipients by less than 5%).

However, this cautionary procedure was not needed, since all the links received a comparable number of answers (the average response rate was about 24%, given that 695 persons answer the Survey, of which 681, decided to submit their answers).

APPENDIX 2 - STUDY A ONLINE SURVEY

Web 2.0 e Ensino Superior: Uma Perspetiva Psicológica

Estudo Empírico

(População visada: Docentes)

Submetido para apreciação pela Comissão de Ética da UFP

23 de Maio de 2011

Doutorando: Luís António Simões da Cunha

Orientador: Professor Doutor Luís Manuel Borges Gouveia

Web 2.0 e Ensino Superior

Neste estudo procura-se conhecer as suas opiniões e atitudes em relação à utilização de sítios e serviços de "Web 2.0" no Ensino Superior (Facebook, LinkedIn, Blogues, YouTube, Twitter, Wikis, etc).

Assegurando-lhe a confidencialidade das respostas, solicitamos que preencha os questionários de acordo com a sua experiência de utilização deste tipo de tecnologia no contexto da sua vida Universitária. Agradecemos a honestidade das suas respostas.

* Required

Declaração de Consentimento *

Declaro que compreendi a explicação que me foi fornecida acerca da participação na investigação que se tenciona realizar, bem como do estudo em que serei incluído. Foi-me dada oportunidade de fazer as perguntas que julguei necessárias, e de todas obtive resposta satisfatória. Tomei conhecimento de que a informação ou explicação que me foi prestada versou os objectivos e os métodos. Além disso, foi-me afirmado que tenho o direito de recusar a todo o tempo a minha participação no estudo, sem que isso possa ter como efeito qualquer prejuízo pessoal. Foi-me ainda assegurado que os registos em suporte papel e/ou digital (sonoro e de imagem) serão confidenciais e utilizados única e exclusivamente para o estudo em causa, sendo guardados em local seguro durante a pesquisa e destruídos após a sua conclusão.

- ○ Li e ACEITO participar
- ○ Opto antes por NÃO participar, obrigado.

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Figura 1. Ecrã inicial: Consentimento Informado

Figura 2a: ecrã que aparece após decisão de **não participar**

Figura 2b: ecrã que surge após decisão de **participar**

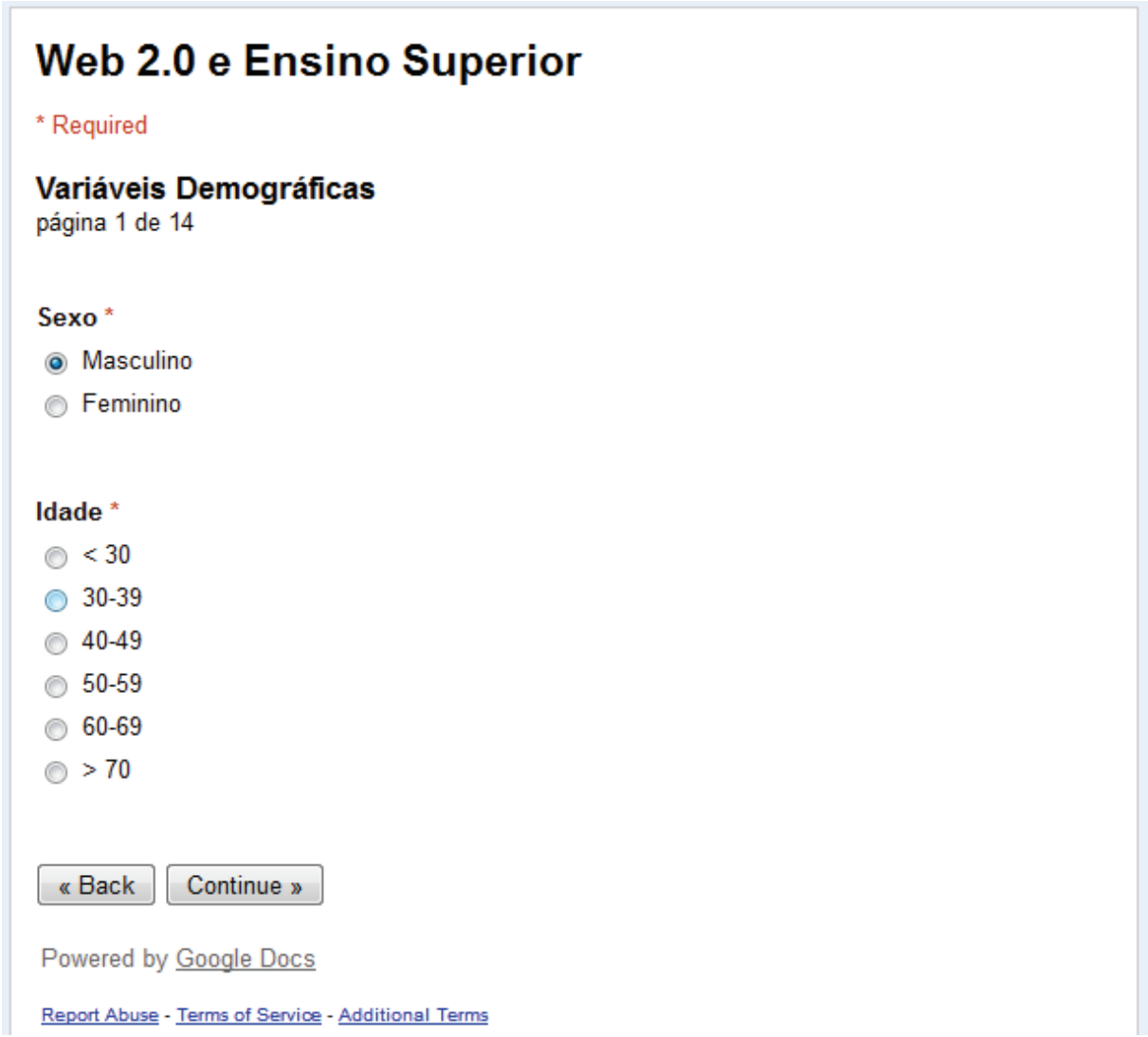


Figura 3. Ecrã de recolha de dados: apresentado após ecrã anterior **(2b)**.

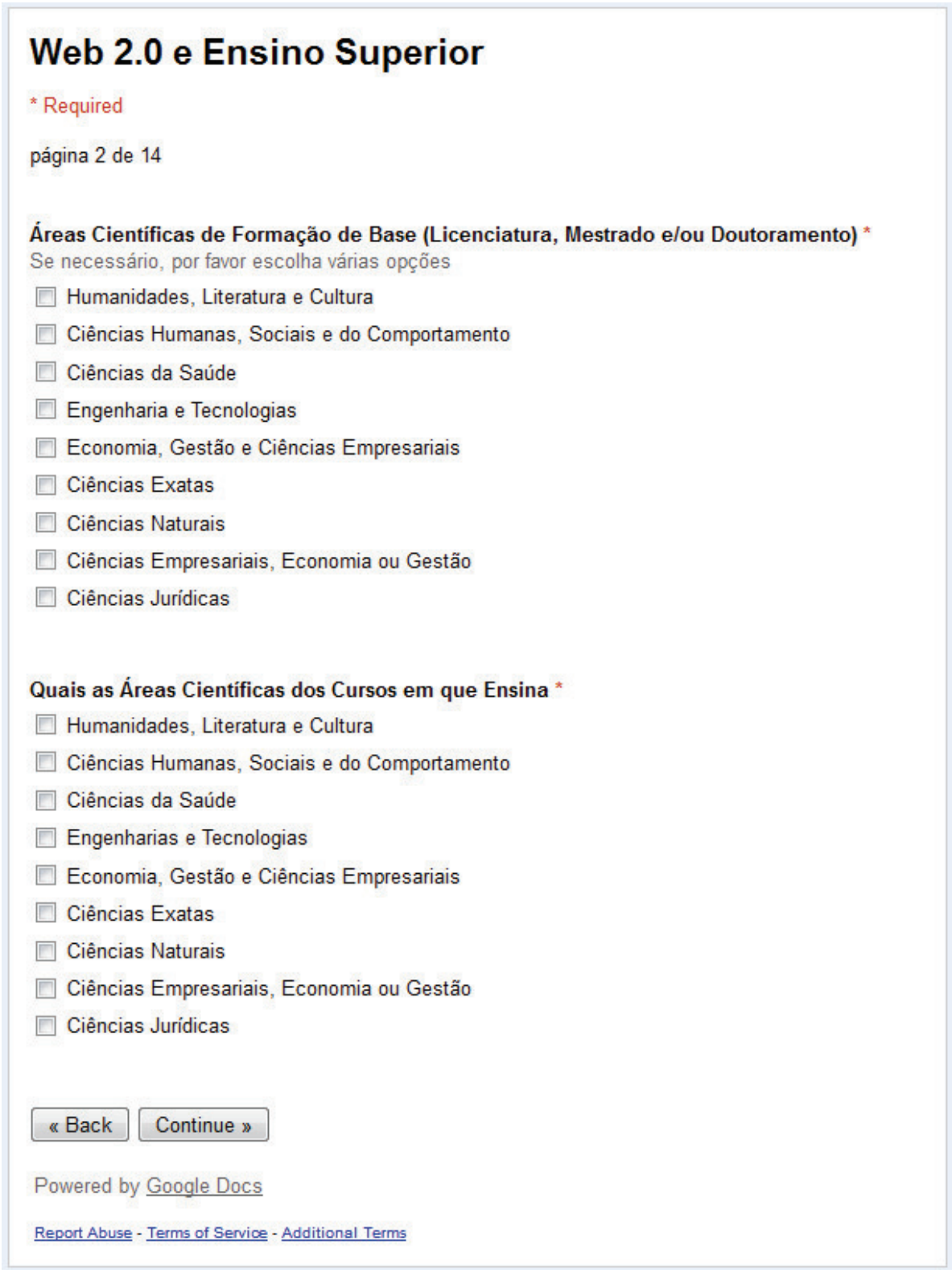


Figura 4. Ecrã de recolha de dados: apresentado após ecrã anterior.

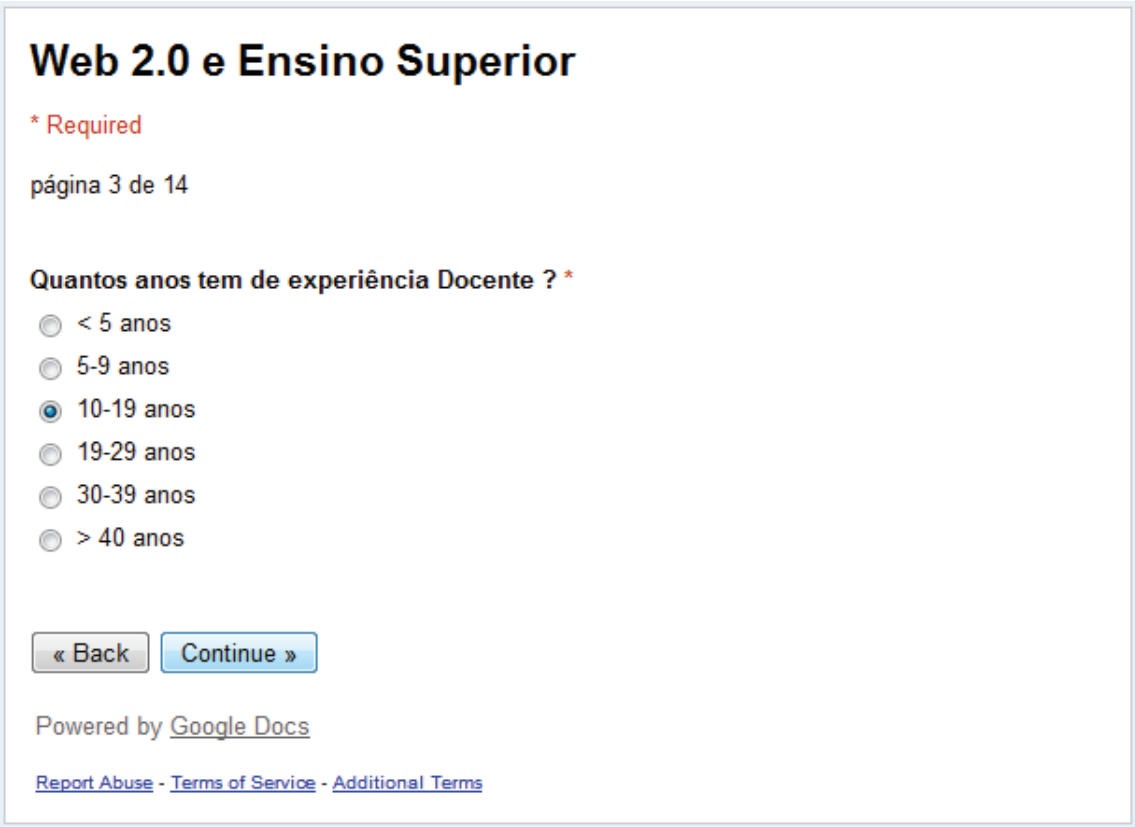
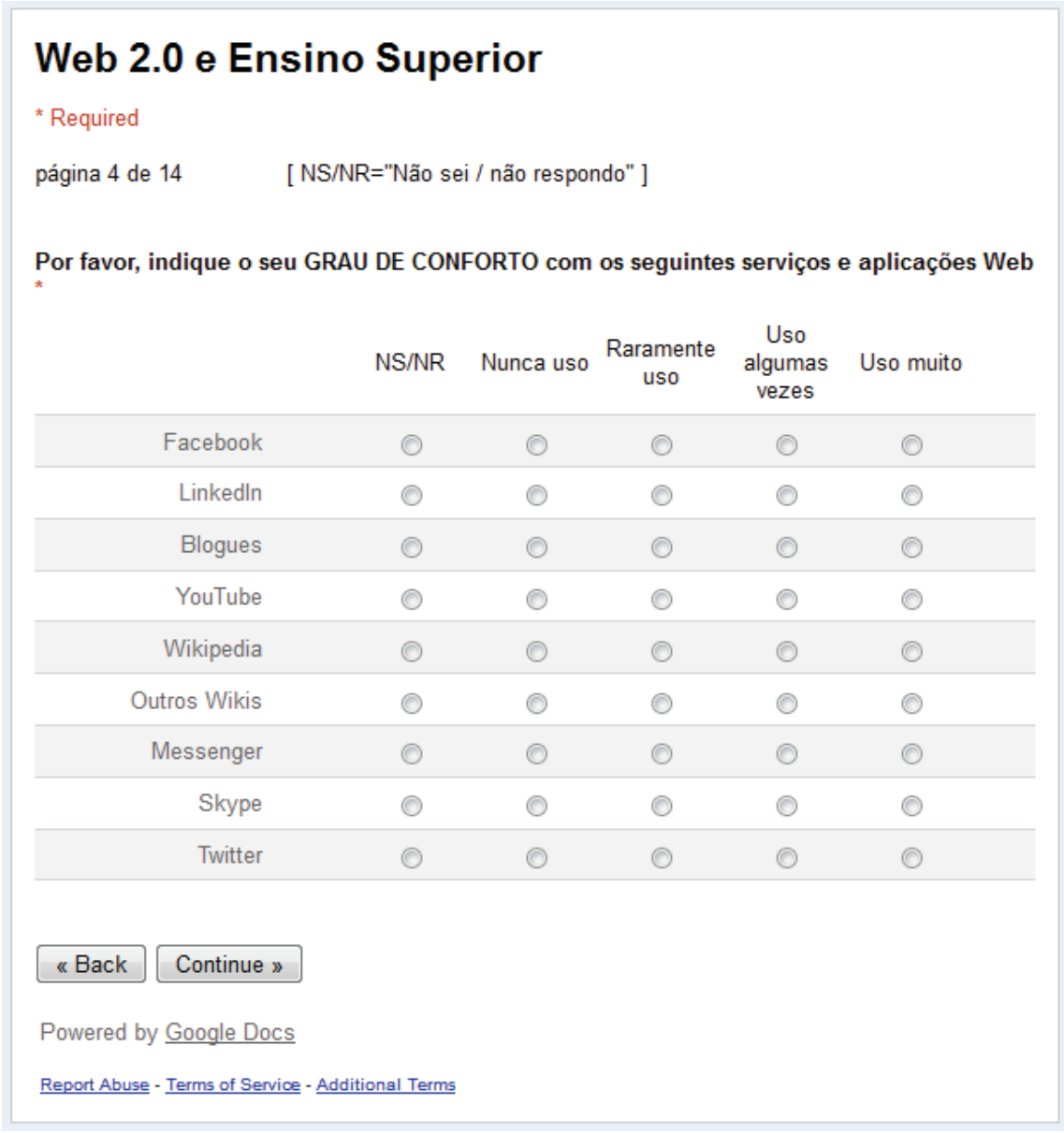


Figura 5. Ecrã de recolha de dados: apresentado após ecrã anterior.



Web 2.0 e Ensino Superior

* Required

página 4 de 14 [NS/NR="Não sei / não respondo"]

Por favor, indique o seu GRAU DE CONFORTO com os seguintes serviços e aplicações Web *

	NS/NR	Nunca uso	Raramente uso	Uso algumas vezes	Uso muito
Facebook	○	○	○	○	○
LinkedIn	○	○	○	○	○
Blogues	○	○	○	○	○
YouTube	○	○	○	○	○
Wikipedia	○	○	○	○	○
Outros Wikis	○	○	○	○	○
Messenger	○	○	○	○	○
Skype	○	○	○	○	○
Twitter	○	○	○	○	○

« Back Continue »

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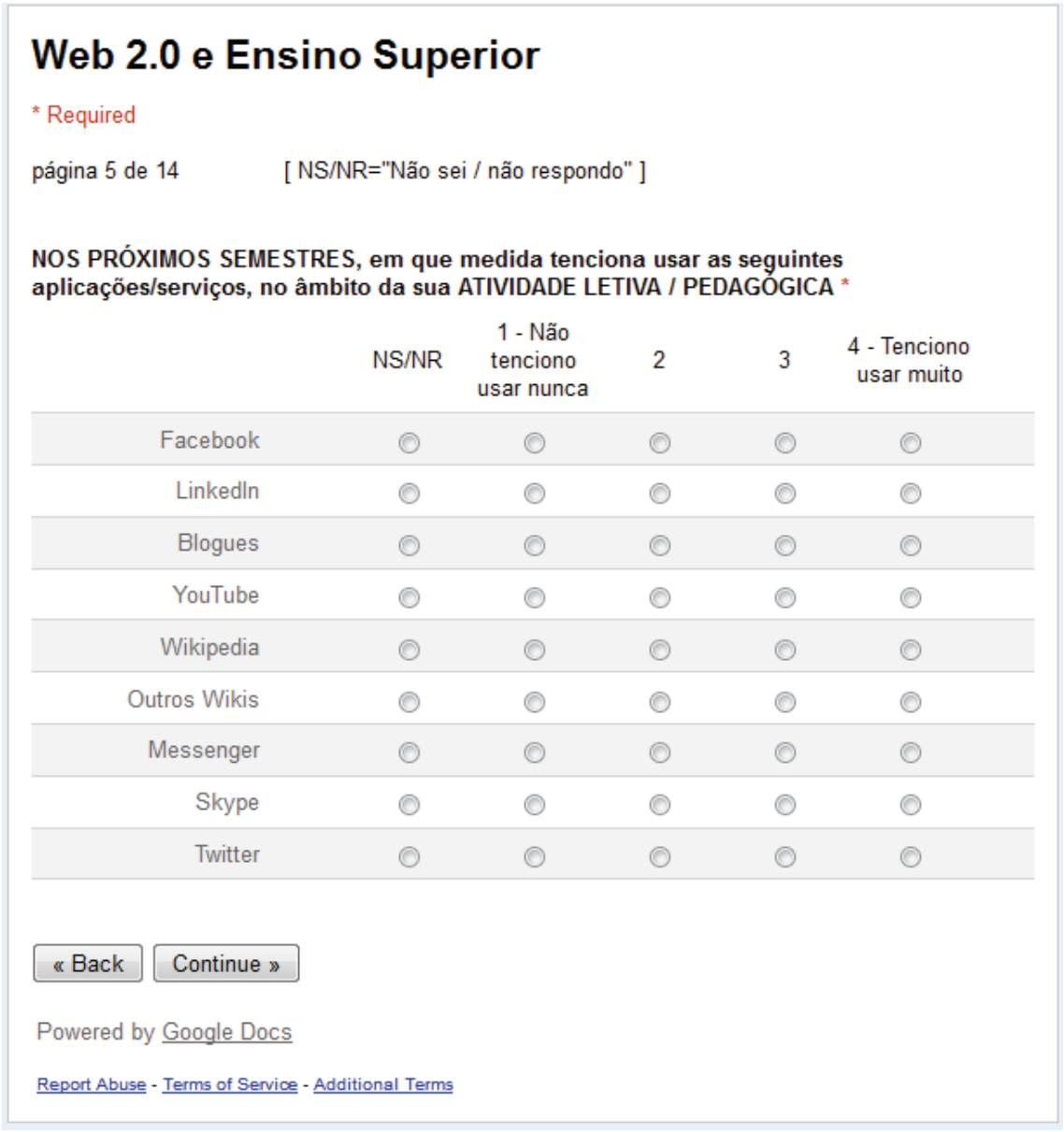
Figura 6. Ecrã de recolha de dados: apresentado após ecrã anterior.



Web 2.0 e Ensino Superior

* Required

página 5 de 14 [NS/NR="Não sei / não respondo"]

NOS PRÓXIMOS SEMESTRES, em que medida tenciona usar as seguintes aplicações/serviços, no âmbito da sua ATIVIDADE LETIVA / PEDAGÓGICA *

	NS/NR	1 - Não tenciono usar nunca	2	3	4 - Tenciono usar muito
Facebook	○	○	○	○	○
LinkedIn	○	○	○	○	○
Blogues	○	○	○	○	○
YouTube	○	○	○	○	○
Wikipedia	○	○	○	○	○
Outros Wikis	○	○	○	○	○
Messenger	○	○	○	○	○
Skype	○	○	○	○	○
Twitter	○	○	○	○	○

« Back Continue »

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Figura 7. Ecrã de recolha de dados: apresentado após ecrã anterior.

Web 2.0 e Ensino Superior

* Required

página 6 de 14 [NS/NR="Não sei / não respondo"]

Em que medida SERIA CAPAZ de EXPLICAR as VANTAGENS/DESVANTAGENS associadas ao uso de cada uma das seguintes aplicações/serviços na sua ATIVIDADE LETIVA / PEDAGÓGICA *

	NS/NR	1 - Não seria capaz de explicar de todo	2	3	4 - Saberia explicar muito bem
Facebook	○	○	○	○	○
LinkedIn	○	○	○	○	○
Blogues	○	○	○	○	○
YouTube	○	○	○	○	○
Wikipedia	○	○	○	○	○
Outros Wikis	○	○	○	○	○
Messenger	○	○	○	○	○
Skype	○	○	○	○	○
Twitter	○	○	○	○	○

« Back Continue »

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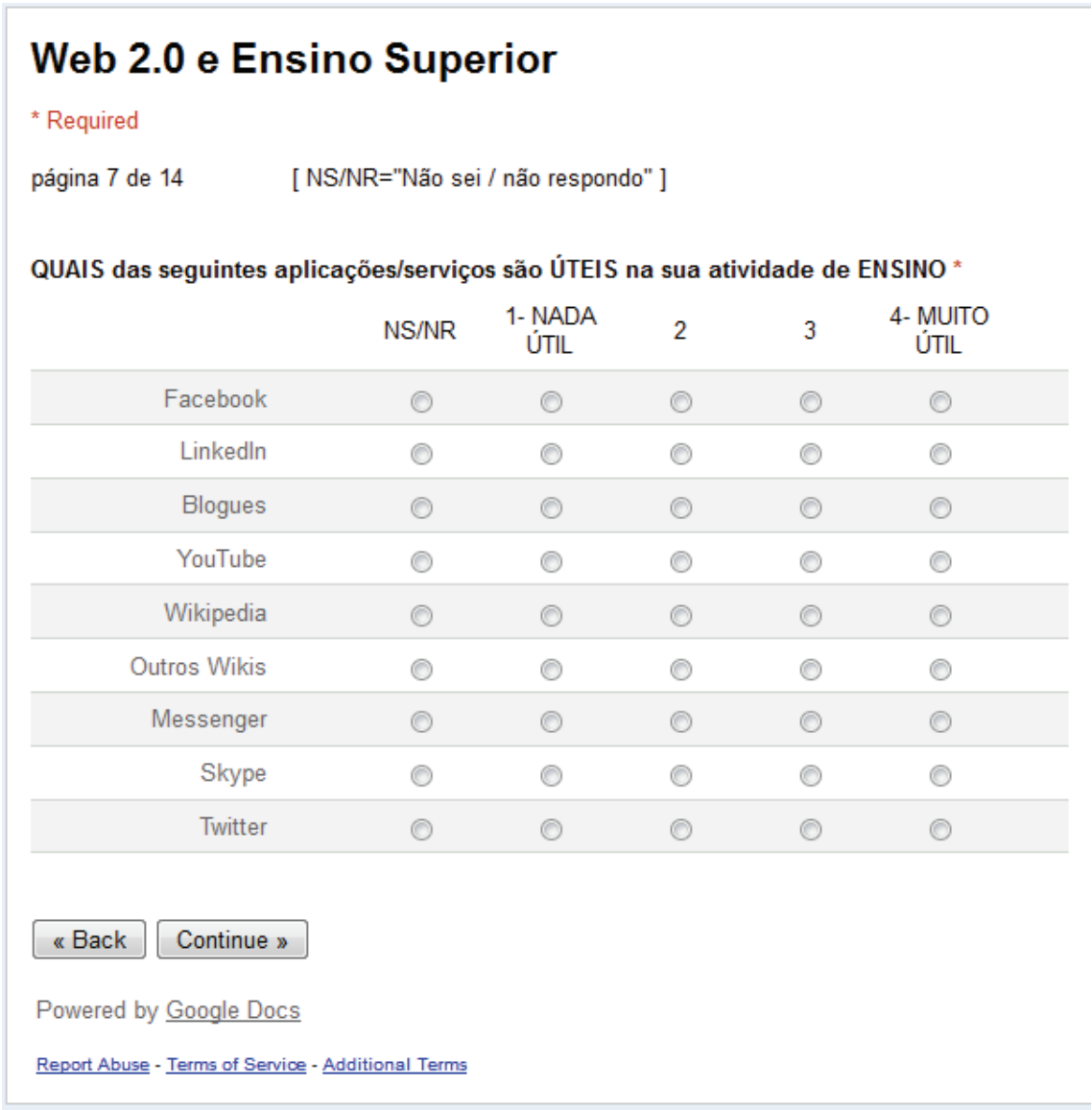
Figura 8. Ecrã de recolha de dados: apresentado após ecrã anterior.



Web 2.0 e Ensino Superior

* Required

página 7 de 14 [NS/NR="Não sei / não respondo"]

QUAIS das seguintes aplicações/serviços são ÚTEIS na sua atividade de ENSINO *

	NS/NR	1- NADA ÚTIL	2	3	4- MUITO ÚTIL
Facebook					
LinkedIn					
Blogues					
YouTube					
Wikipedia					
Outros Wikis					
Messenger					
Skype					
Twitter					

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Figura 9. Ecrã de recolha de dados: apresentado após ecrã anterior.

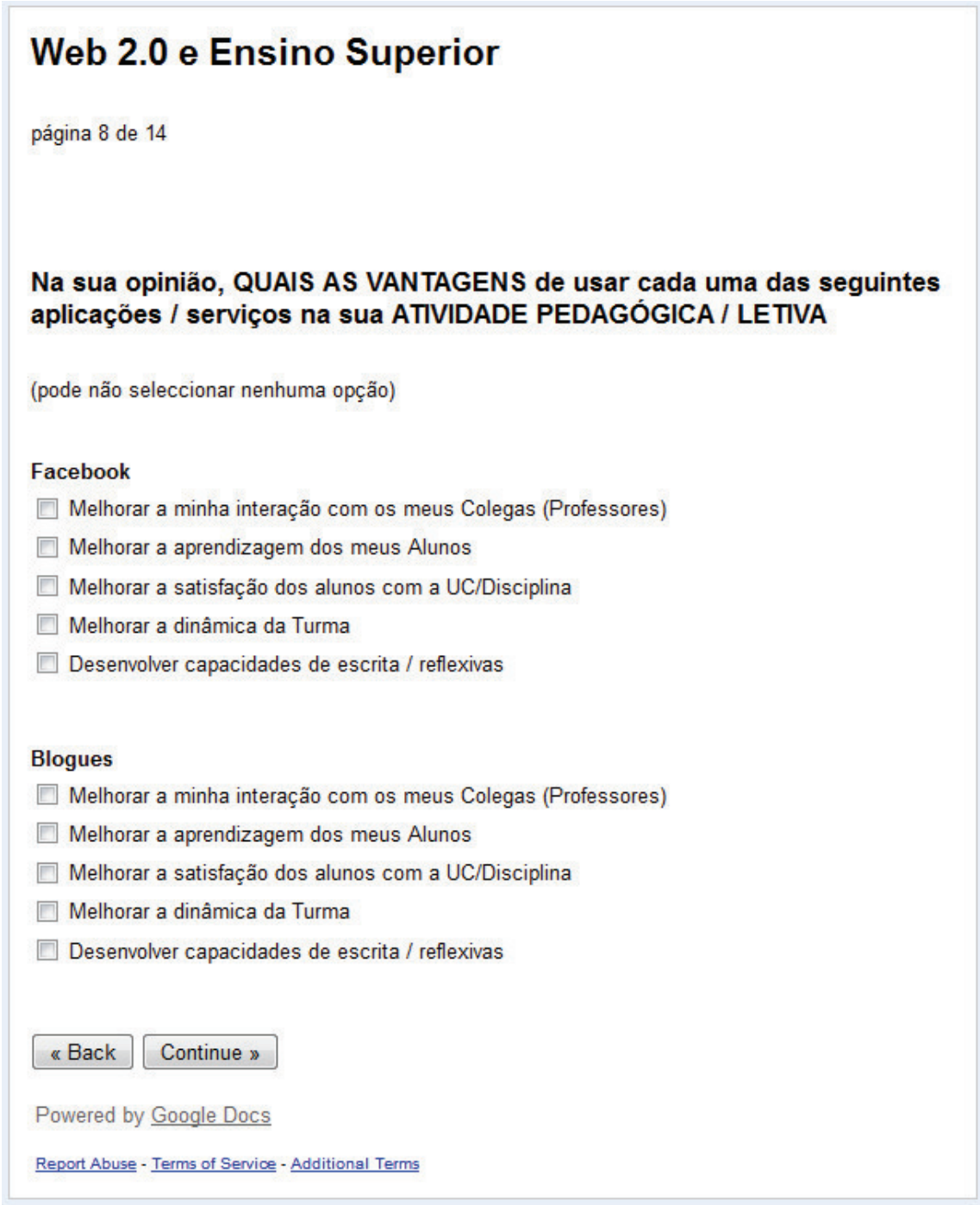
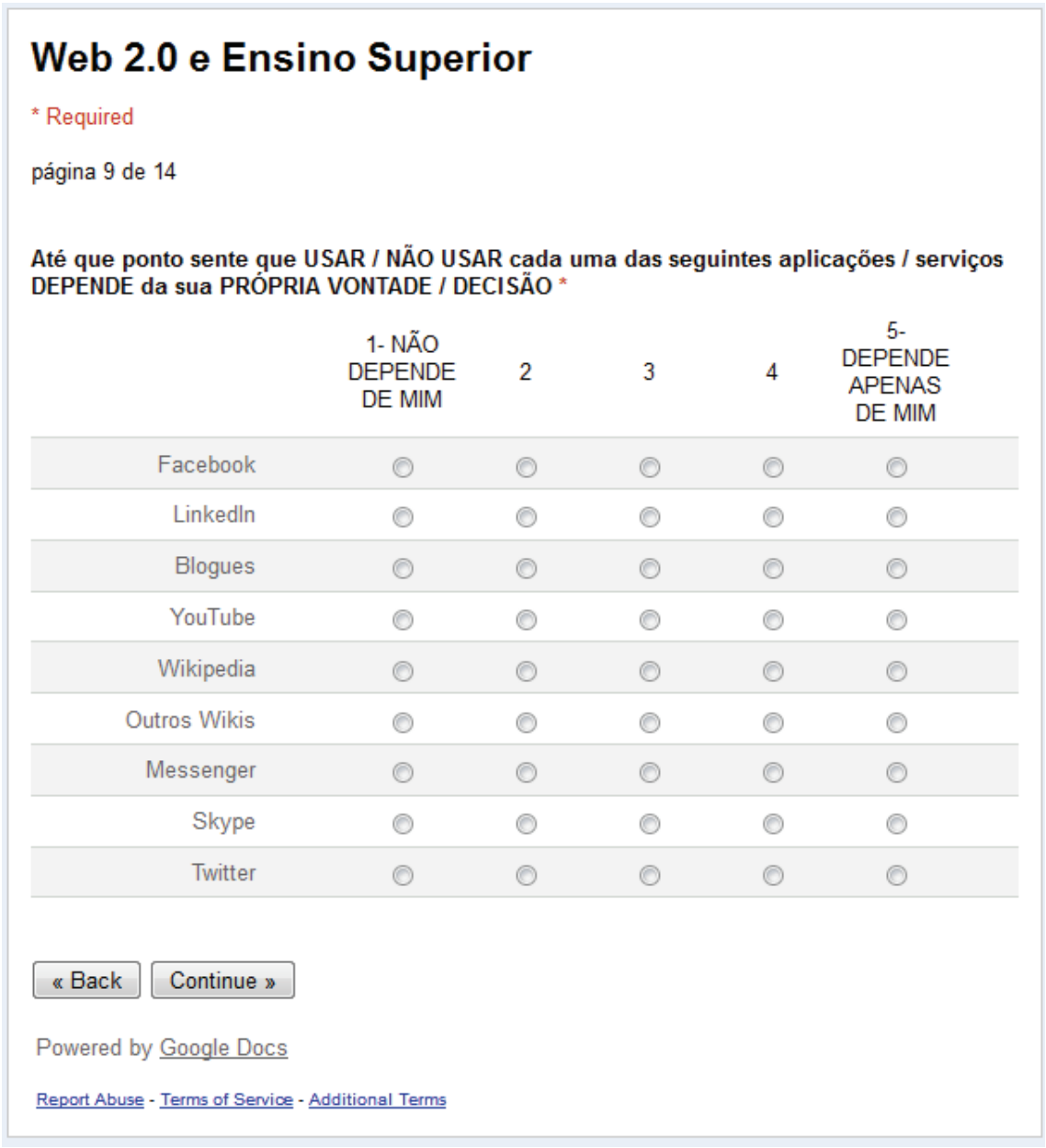


Figura 10. Ecrã de recolha de dados: apresentado após ecrã anterior.



Web 2.0 e Ensino Superior

* Required

página 9 de 14

Até que ponto sente que USAR / NÃO USAR cada uma das seguintes aplicações / serviços DEPENDE da sua PRÓPRIA VONTADE / DECISÃO *

	1- NÃO DEPENDE DE MIM	2	3	4	5- DEPENDE APENAS DE MIM
Facebook					
LinkedIn					
Blogues					
YouTube					
Wikipedia					
Outros Wikis					
Messenger					
Skype					
Twitter					

« Back Continue »

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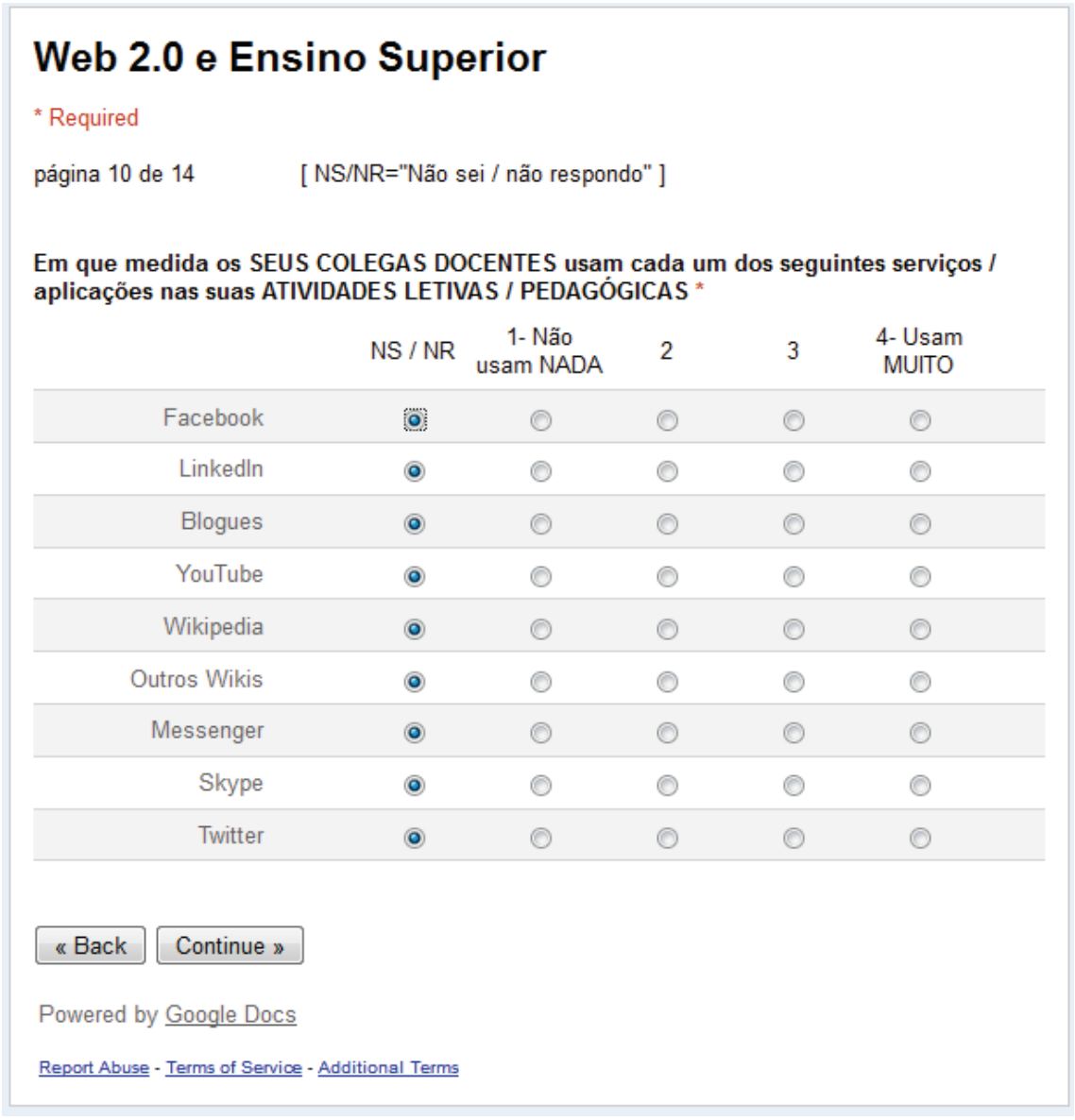
Figura 11. Ecrã de recolha de dados: apresentado após ecrã anterior.



Web 2.0 e Ensino Superior

* Required

página 10 de 14 [NS/NR="Não sei / não respondo"]

Em que medida os SEUS COLEGAS DOCENTES usam cada um dos seguintes serviços / aplicações nas suas ATIVIDADES LETIVAS / PEDAGÓGICAS *

	NS / NR	1- Não usam NADA	2	3	4- Usam MUITO
Facebook	◉	○	○	○	○
LinkedIn	◉	○	○	○	○
Blogues	◉	○	○	○	○
YouTube	◉	○	○	○	○
Wikipedia	◉	○	○	○	○
Outros Wikis	◉	○	○	○	○
Messenger	◉	○	○	○	○
Skype	◉	○	○	○	○
Twitter	◉	○	○	○	○

« Back Continue »

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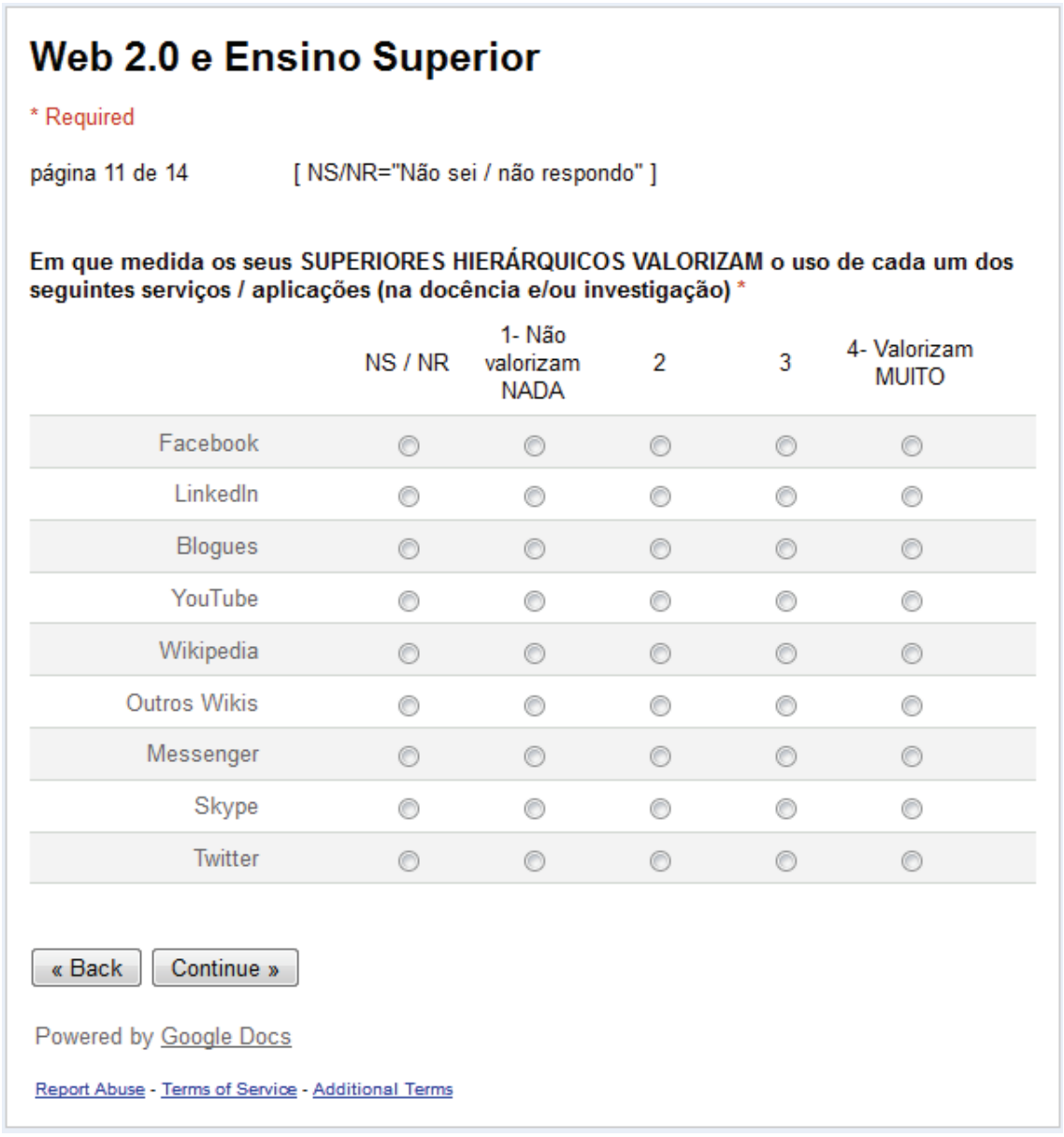
Figura 12. Ecrã de recolha de dados: apresentado após ecrã anterior.



Web 2.0 e Ensino Superior

* Required

página 11 de 14 [NS/NR="Não sei / não respondo"]

Em que medida os seus SUPERIORES HIERÁRQUICOS VALORIZAM o uso de cada um dos seguintes serviços / aplicações (na docência e/ou investigação) *

	NS / NR	1- Não valorizam NADA	2	3	4- Valorizam MUITO
Facebook					
LinkedIn					
Blogues					
YouTube					
Wikipedia					
Outros Wikis					
Messenger					
Skype					
Twitter					

« Back Continue »

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Figura 13. Ecrã de recolha de dados: apresentado após ecrã anterior.

Web 2.0 e Ensino Superior

* Required

página 12 de 14 [NS/NR="Não sei / não respondo"]

Em que medida os seus ALUNOS VALORIZAM o USO de cada um dos seguintes serviços / aplicações nas ACTIVIDADES LETIVAS *

	NS / NR	1- Não valorizam NADA	2	3	4- Valorizam MUITO
Facebook					
LinkedIn					
Blogues					
YouTube					
Wikipedia					
Outros Wikis					
Messenger					
Skype					
Twitter					

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Figura 14. Ecrã de recolha de dados: apresentado após ecrã anterior.

Web 2.0 e Ensino Superior

* Required

página 13 de 14 [NS/NR="Não sei / não respondo"]

Em que medida cada um dos seguintes serviços / aplicações é COMPATÍVEL com as suas ESTRATÉGIAS PEDAGÓGICAS / LETIVAS ? *

	NS / NR	1- NADA compatível	2	3	4- MUITO compatível
Facebook					
LinkedIn					
Blogues					
YouTube					
Wikipedia					
Outros Wikis					
Messenger					
Skype					
Twitter					

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Figura 15. Ecrã de recolha de dados: apresentado após ecrã anterior.

Figura 16. Ecrã de recolha de dados: apresentado após ecrã anterior.

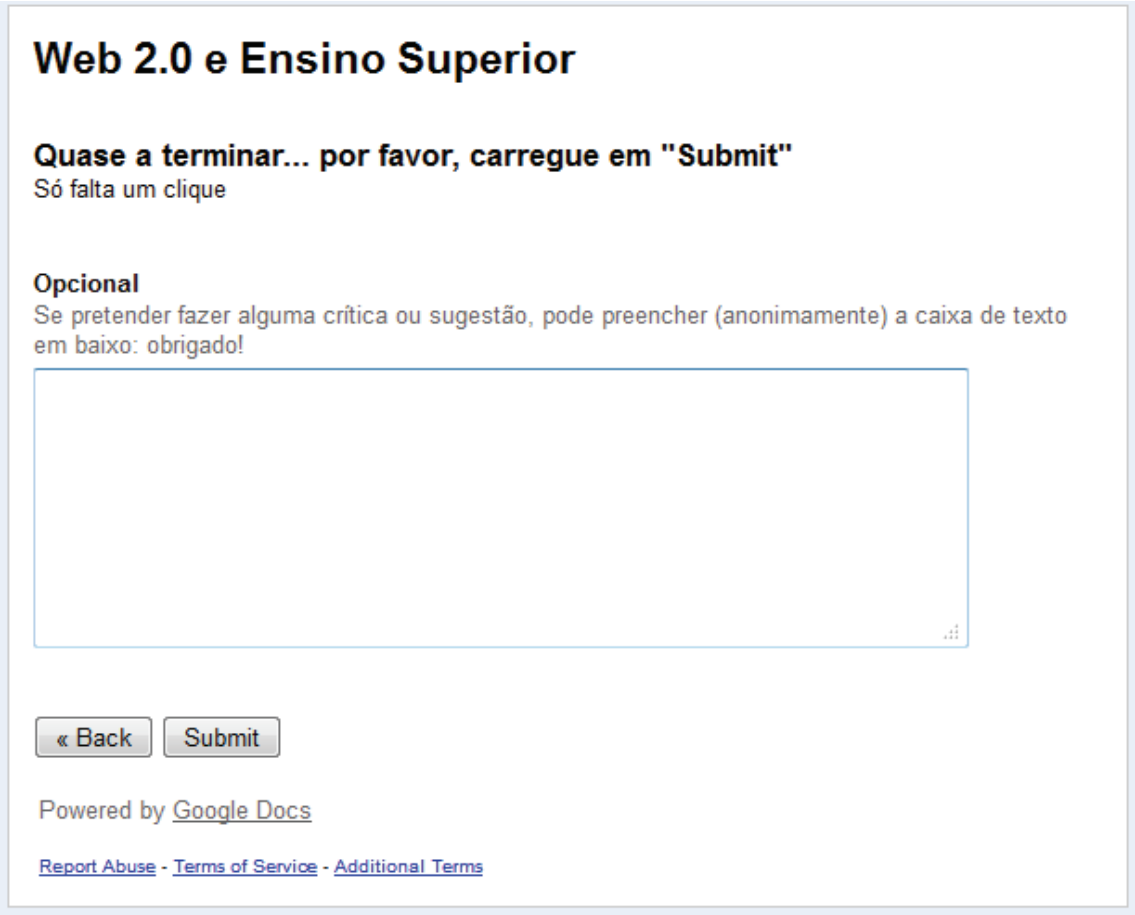

Figura 17. Ecrã apresentado após ecrã anterior.

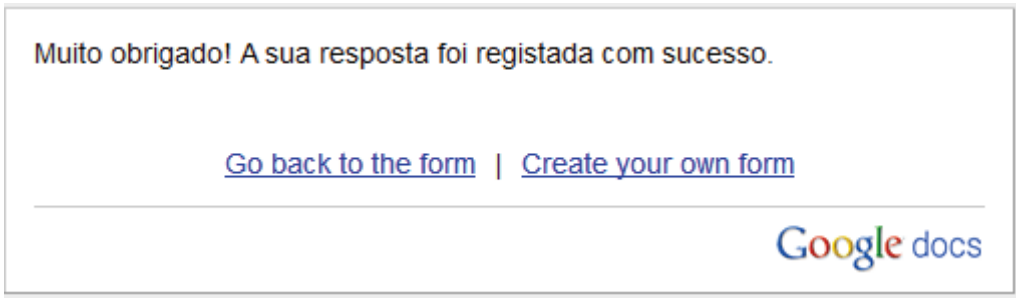

Figura 18. Ecrã final: apresentado após ecrã anterior.

APPENDIX 3 - INTEGRATIVE MODEL FOR FACULTY ADOPTION OF WEB 2.0

The following variables were added to the model: a) gender, b) age, c) years of professional experience ("PROFEXP"), d) institutions' IT resources compatibility with Web applications desired for teaching ("RESOURCES"), and e) Satisfaction with Institutions' LMS ("SATISF_LMS_Inst").

Additionally, the construct "Attitudes towards Web 2.0" was decomposed in two of the constituents of attitudes proposed by Taylor and Todd (1995b): compatibility ("ATT_COMPWeb20") and perceived usefulness ("ATT_PUWeb20").

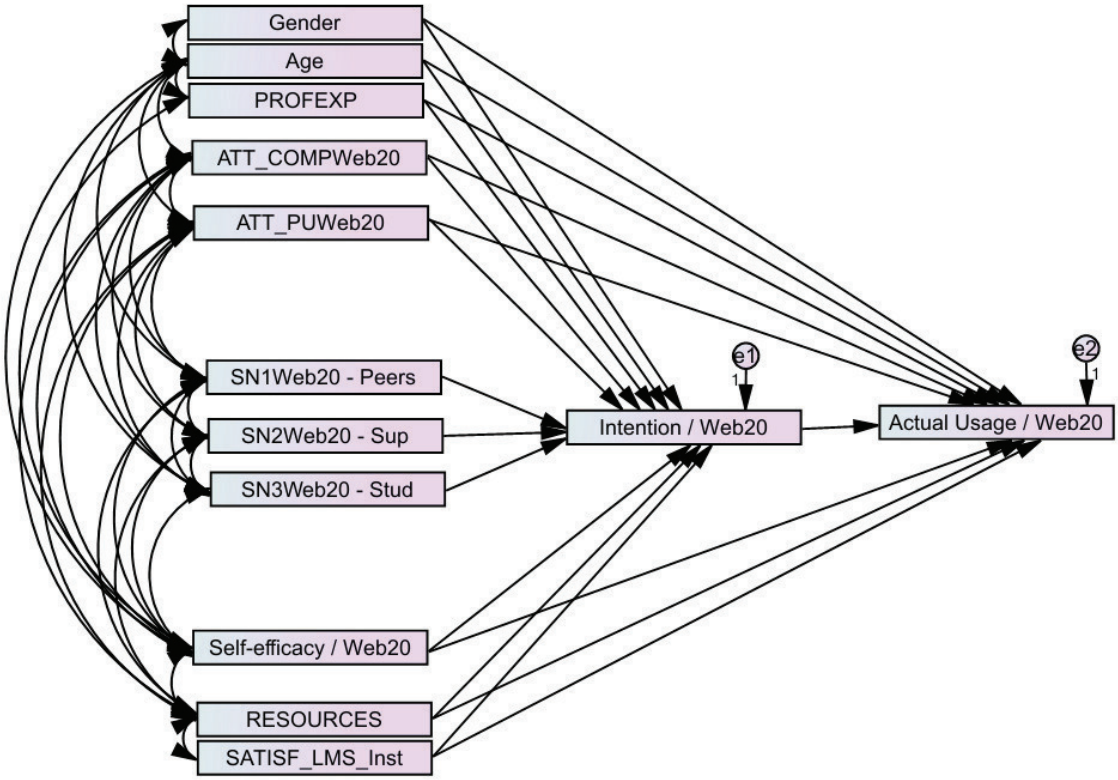

Figure 3.1. Integrative Model for Faculty Adoption of Web 2.0

Table 3.1. Predictors of Intention

	Estimate	BC Estimate	Std Estimate	BC Std Estimate
SN1Web20 – Peers	0,109**	0,109	0,121	0,121
SN2Web20 – Sup	-0,031	-0,031	-0,028	-0,028
SN3Web20 – Stud	0,041	0,041	0,053	0,053
Self-efficacy / Web 20	0,243**	0,243	0,158	0,158
ATT_PUWeb20	0,503**	0,504	0,498	0,498
ATT_COMPWeb20	0,088*	0,087	0,093	0,092
PROFEXP	-0,029	-0,029	-0,038	-0,038
Age	0,098**	0,098	0,111	0,11
Gender	0,049	0,048	0,03	0,03
RESOURCES	0,001	0,002	0,002	0,003
SATISF_LMS_Inst	0,023	0,023	0,028	0,028

Table 3.2. Predictors of Actual Usage

	Estimate	BC Estimate	Std Estimate	BC Std Estimate
Self-efficacy / Web 20	0,121*	0,125	0,074	0,076
Intention / Web 20	0,118*	0,118	0,11	0,11
ATT_PUWeb20pond	0,382**	0,381	0,353	0,353
ATT_COMPWeb20	0,173**	0,173	0,171	0,171
PROFEXP	-0,012	-0,011	-0,015	-0,013
Age	-0,018	-0,018	-0,019	-0,019
Gender	-0,128*	-0,127	-0,073	-0,073
RESOURCES	0,005	0,006	0,007	0,008
SATISF_LMS_Inst	-0,002	-0,001	-0,002	-0,001

APPENDIX 4 - INTEGRATIVE MODEL FOR FACULTY ADOPTION OF FACEBOOK

The following variables were added to the model: a) gender, b) age, c) years of professional experience ("PROFEXP"), d) institutions' IT resources compatibility with Web applications desired for teaching ("RESOURCES"), and e) Satisfaction with Institutions' LMS ("SATISF_LMS_Inst").

Additionally, the construct "Attitudes towards Facebook" was decomposed in two of the constituents of attitudes proposed by Taylor and Todd (1995b): compatibility ("ATT_COMPFacebook") and perceived usefulness ("ATT_PUFacebook").

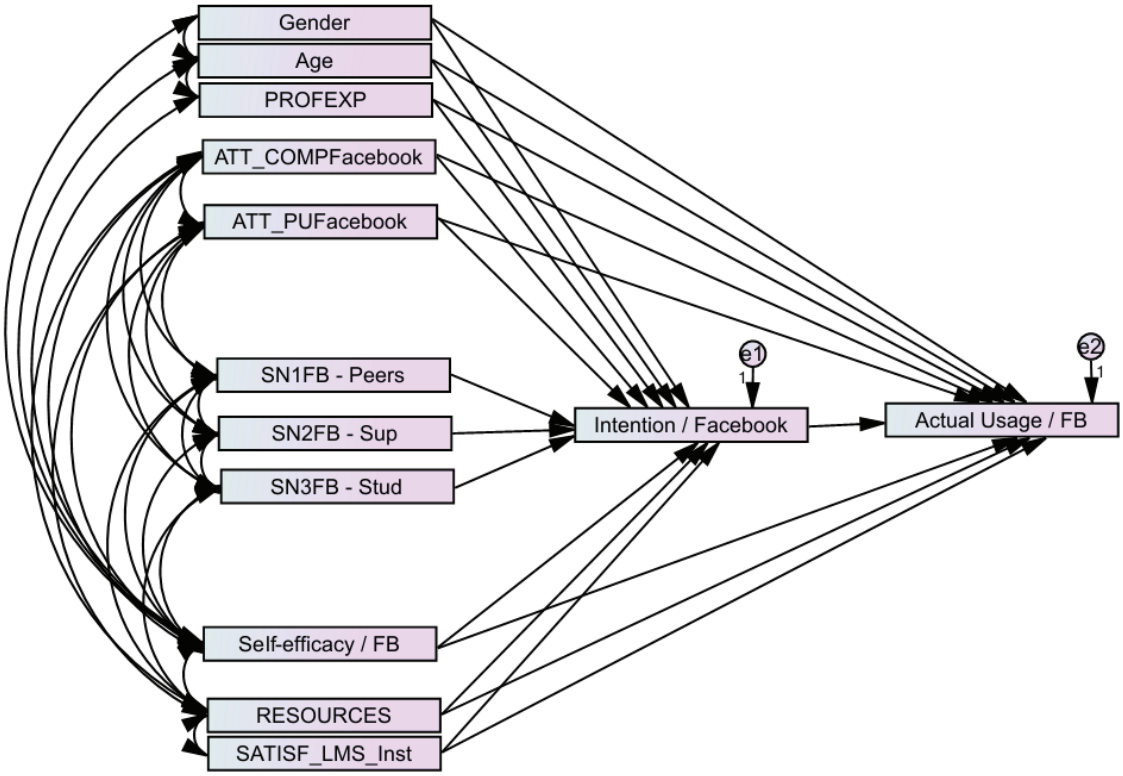

Figure 4.1. Integrative Model for Faculty Adoption of Facebook

Table 4.1. Predictors of intention

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
SN1Facebook - Peers	0,08**	0,08	**0,084**	0,084
SN2Facebook - Sup	0,031	0,032	**0,026**	0,027
SN3Facebook - Stud	0,044	0,044	**0,06**	0,06
Self-efficacy / FB	0,109**	0,109	**0,151**	0,151
ATT_PUFacebook	0,507**	0,506	**0,507**	0,506
ATT_COMPFacebook	0,108**	0,108	**0,119**	0,12
PROFEXP	0,014	0,015	**0,017**	0,018
Age	0,056	0,054	**0,06**	0,059
Gender	-0,003	-0,005	**-0,002**	-0,003
RESOURCES	-0,007	-0,006	**-0,009**	-0,008
SATISF_LMS_Inst	-0,041	-0,041	**-0,048**	-0,048

Table 4.2.Predictors of actual usage

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
Self-efficacy / FB	0,153**	0,153	**0,161**	0,16
Intention / Facebook	0,127*	0,127	**0,096**	0,096
ATT_PUFacebook	0,368**	0,366	**0,278**	0,276
ATT_COMPFacebook	0,136*	0,138	**0,114**	0,116
PROFEXP	-0,048	-0,048	**-0,045**	-0,045
Age	0,044	0,045	**0,036**	0,037
Gender	-0,182*	-0,181	**-0,08**	-0,08
RESOURCES	-0,006	-0,006	**-0,006**	-0,006
SATISF_LMS_Inst	0,03	0,031	**0,027**	0,028

APPENDIX 5 - INTEGRATIVE MODEL FOR FACULTY ADOPTION OF BLOGS

The following variables were added to the model: a) gender, b) age, c) years of professional experience ("PROFEXP"), d) institutions' IT resources compatibility with Web applications desired for teaching ("RESOURCES"), and e) Satisfaction with Institutions' LMS ("SATISF_LMS_Inst").

Additionally, the construct "Attitudes towards Blogs" was decomposed in two of the constituents of attitudes proposed by Taylor and Todd (1995b): compatibility ("ATT_COMPBlogs") and perceived usefulness ("ATT_PUBlogs").

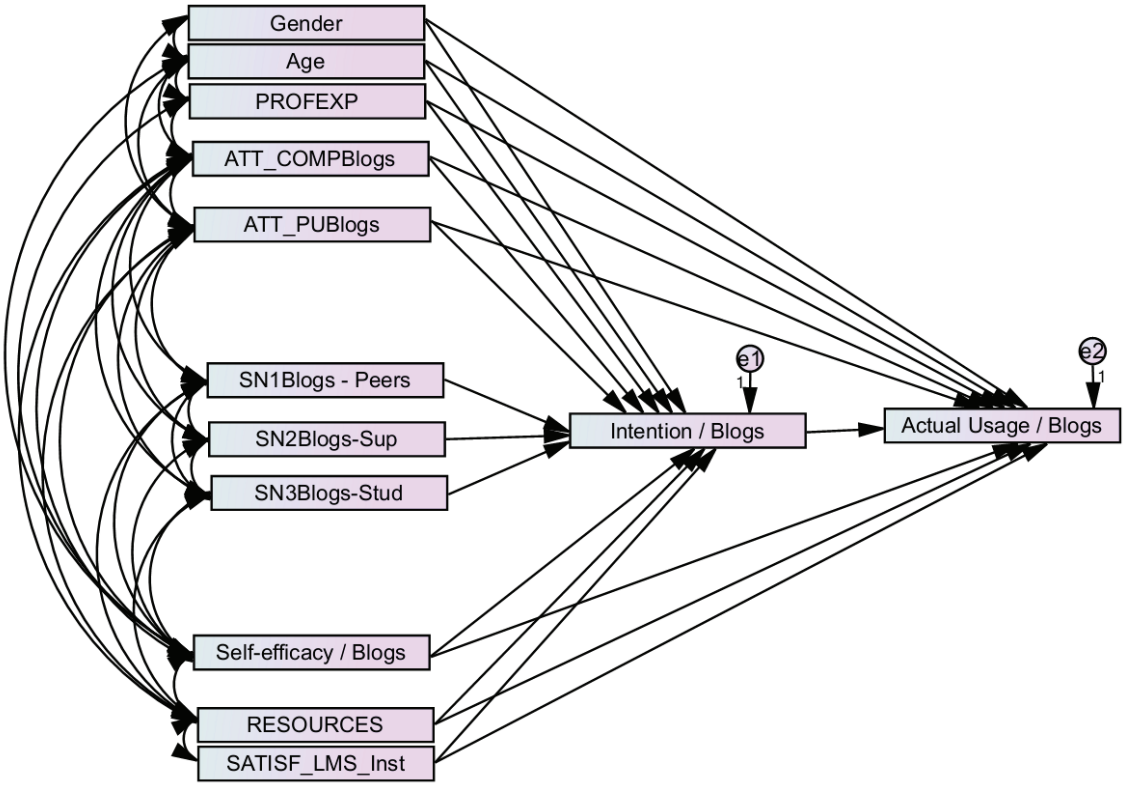

Figure 5.1. Integrative Model for Faculty Adoption of Blogs

Table 5.1. Predictors of Intention

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
SN1Blogs - Peers	0,045	0,044	**0,04**	0,039
SN2Blogs - Sup	0,045	0,045	**0,035**	0,036
SN3Blogs - Stud	0,029	0,029	**0,035**	0,035
Self-efficacy / Blogs	0,181**	0,181	**0,206**	0,205
ATT_PUBlogs	0,421**	0,422	**0,467**	0,468
ATT_COMPBlogs	0,125**	0,125	**0,152**	0,152
PROFEXP	0,02	0,02	**0,025**	0,025
Age	0,037	0,036	**0,04**	0,039
Gender	0,047	0,047	**0,027**	0,028
RESOURCES	0,017	0,017	**0,023**	0,022
SATISF_LMS_Inst	-0,003	-0,003	**-0,004**	-0,003

Table 5.2. Predictors of Actual Usage

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
Self-efficacy / Blogs	0,178**	0,178	**0,159**	0,159
Intention / Blogs	0,16*	0,159	**0,126**	0,125
ATT_PUBlogs	0,204**	0,205	**0,178**	0,179
ATT_COMPBlogs	0,196**	0,196	**0,187**	0,188
PROFEXP	-0,041	-0,041	**-0,04**	-0,04
Age	0,014	0,015	**0,012**	0,013
Gender	-0,168*	-0,168	**-0,077**	-0,078
RESOURCES	0,042	0,042	**0,043**	0,043
SATISF_LMS_Inst	0,034	0,036	**0,032**	0,033

APPENDIX 6 - STUDY B SCALES

Web 2.0 e Ensino Superior

Neste estudo procura-se conhecer as suas opiniões e sentimentos em relação à utilização de sítios e serviços de "Web 2.0" no Ensino Superior (Facebook , Twitter, Blogues, Wikis, YouTube, etc).

...

Assegurando-lhe a **confidencialidade das respostas**, solicitamos que preencha os questionários de acordo com a sua experiência de utilização deste tipo de tecnologia no contexto da sua vida Universitária. Agradecemos a honestidade das suas respostas.

Sexo: M☐ F☐

Idade: _____ (anos)

Estudante de: Licenciatura ☐ Mestrado ☐ Outro ☐ : _____

Nome da Licenciatura / Mestrado _____

Se é Estudante de Licenciatura ou Mestrado Integrado, indique o ano em que está:

1º☐ 2º☐ 3º☐ 4º☐ 5º☐ 6º☐

Se é Estudante de Mestrado (não-Integrado), indique o ano em que está:

1º☐ 2º☐

É Trabalhador(a)-estudante?: Sim ☐ Não ☐

Se trabalha ou já trabalhou, quantos anos tem de experiência profissional: _____ (anos)

Web 2.0 e Ensino Superior

1. Por favor, indique o **seu grau de conforto** com os seguintes serviços e aplicações Web:

	Nunca uso	Raramente uso	Uso algumas vezes	Uso muito
Facebook	☐	☐	☐	☐
Twitter	☐	☐	☐	☐
Blogues	☐	☐	☐	☐
Wikis (como a Wikipedia)	☐	☐	☐	☐
YouTube	☐	☐	☐	☐
Bookmarking social (e.g. Del.icio.us)	☐	☐	☐	☐
Messenger (MSN ou outros)	☐	☐	☐	☐
Skype	☐	☐	☐	☐

2. Até que ponto usa as seguintes aplicações para **complementar a sua aprendizagem nas aulas**:

	Nunca uso	Raramente uso	Uso algumas vezes	Uso muito
Facebook	☐	☐	☐	☐
Twitter	☐	☐	☐	☐
Blogues	☐	☐	☐	☐
Wikis (como a Wikipedia)	☐	☐	☐	☐
YouTube	☐	☐	☐	☐
Bookmarking social (e.g. Del.icio.us)	☐	☐	☐	☐
Messenger (MSN ou outros)	☐	☐	☐	☐
Skype	☐	☐	☐	☐

(continua, vsff)

3. Na sua opinião, quais as **vantagens** de usar **cada uma das seguintes tecnologias** para **complementar a aprendizagem nas aulas**?

	Facebook	Twitter	Blogues	Wikis (Wikipedia,etc)	YouTube	Messenger (MSN, etc)	Skype
Melhorar a minha interacção com os Professores	☐	☐	☐	☐	☐	☐	☐
Melhorar a minha aprendizagem	☐	☐	☐	☐	☐	☐	☐
Melhorar a minha satisfação com o curso	☐	☐	☐	☐	☐	☐	☐
Melhorar a minha interacção com os meus colegas	☐	☐	☐	☐	☐	☐	☐
Melhorar as minhas notas	☐	☐	☐	☐	☐	☐	☐
Melhorar a minha capacidade de escrita	☐	☐	☐	☐	☐	☐	☐

4. Quais das seguintes tecnologias de Web 2.0 **usa mais frequentemente** (**ou tenciona usar** em breve), com o objectivo de complementar a sua aprendizagem nas aulas ?

Facebook ☐ Twitter ☐ Blogues ☐ YouTube ☐ Wikis ☐

Outras (Quais?): _____

5. Até que ponto concorda com cada uma das seguintes frases:

1=Discordo totalmente 7=Concordo totalmente

		1	2	3	4	5	6	7
1.	A tecnologia própria da minha Universidade (Sakai, Moodle, etc) é tão boa ou melhor do que qualquer tecnologia de Web 2.0 para o trabalho académico	☐	☐	☐	☐	☐	☐	☐
2.	Gostaria que o sistema próprio da minha Universidade (Sakai, Moodle, etc) fosse complementado com o uso de mais ferramentas de Web 2.0	☐	☐	☐	☐	☐	☐	☐
3.	Estou satisfeito(a) com o sistema próprio da minha Universidade (Sakai, Moodle, etc)	☐	☐	☐	☐	☐	☐	☐

(continua, vsff)

6. <u>Até que ponto concorda</u> com cada uma das seguintes frases:

1=**<u>Discordo</u> totalmente** **<u>7</u>**=**<u>Concordo</u> totalmente**

		1	2	3	4	5	6	7
1	Não teria dificuldade em explicar a razão das tecnologias de Web 2.0 serem ou não benéficas	☐	☐	☐	☐	☐	☐	☐
2	Tenciono usar Web 2.0 no próximo semestre lectivo para complementar a minha aprendizagem nas aulas	☐	☐	☐	☐	☐	☐	☐
3	As tecnologias Web 2.0 são úteis no meu trabalho académico	☐	☐	☐	☐	☐	☐	☐
4	Há mais vantagens do que desvantagens em usar Web 2.0	☐	☐	☐	☐	☐	☐	☐
5	Usar Web 2.0 é geralmente uma boa ideia	☐	☐	☐	☐	☐	☐	☐
6	Sinto que é fácil integrar tecnologias Web 2.0 no meu ambiente de aprendizagem	☐	☐	☐	☐	☐	☐	☐
7	Sinto que usar Web 2.0 me ajuda a aprender mais sobre as matérias lectivas	☐	☐	☐	☐	☐	☐	☐
8	Sinto que usar Web 2.0 pode melhorar a minha satisfação com as disciplinas	☐	☐	☐	☐	☐	☐	☐
9	Penso que usar Web 2.0 pode melhorar as minhas notas	☐	☐	☐	☐	☐	☐	☐
10	De modo a aprender melhor as matérias, irei usar tecnologias de Web 2.0 para complementar a minha aprendizagem nas aulas	☐	☐	☐	☐	☐	☐	☐
11	Os meus colegas pensam que eu beneficiarei se usar Web 2.0 na minha aprendizagem académica	☐	☐	☐	☐	☐	☐	☐
12	Os meus colegas usam tecnologias Web 2.0 para complementar a sua aprendizagem nas aulas	☐	☐	☐	☐	☐	☐	☐
13	Alguns professores confirmam as minhas capacidades e conhecimentos para usar tecnologias Web 2.0 de forma a complementar a minha aprendizagem académica	☐	☐	☐	☐	☐	☐	☐
14	Alguns professores pensam que é importante que eu use Web 2.0 para complementar a minha aprendizagem nas aulas	☐	☐	☐	☐	☐	☐	☐
15	Usar tecnologias Web 2.0 está totalmente sob o meu controlo	☐	☐	☐	☐	☐	☐	☐
16	Tenho o conhecimento e as capacidades para usar Web 2.0	☐	☐	☐	☐	☐	☐	☐

ESCALA DE INTENSIDADE DE USO DO FACEBOOK

Por favor, assinale a sua concordância / discordância com cada uma das seguintes frases.

1="Discordo Completamente" e 5="Concordo Completamente"

		1	2	3	4	5
1	O Facebook faz parte das minhas actividades diárias					
2	Sinto satisfação por dizer às pessoas que estou no Facebook					
3	O Facebook tornou-se parte da minha rotina diária					
4	Sinto-me "desligado(a)" quando fico algum tempo sem aceder ao Facebook					
5	Sinto-me parte da comunidade Facebook					
6	Teria pena se o Facebook fechasse					
7	No TOTAL, quantos amigos tem no Facebook (aproximadamente):	Resposta:_____amigos				
8	Em média, quanto tempo por dia passou a usar o Facebook, durante a última semana (aproximadamente):	Resposta:____horas/dia				

ESCALA DE ADOPÇÃO DA REDE SOCIAL FACEBOOK

Por favor, assinale a sua concordância / discordância com cada uma das seguintes frases.

1="Discordo Completamente" e 10="Concordo Completamente"

		1	2	3	4	5	6	7	8	9	10
1	Comunico com mais pessoas em menos tempo graças ao Facebook										
2	Partilho mais coisas em menos tempo graças ao Facebook										
3	Pontos de vista diferentes no Facebook melhoram o meu próprio ponto de vista										
4	Acho que o Facebook é útil										
5	Abri uma conta no Facebook facilmente										
6	Aprendo a utilizar os recursos do Facebook facilmente										
7	Uso as funcionalidades do Facebook sem dificuldade										
8	Acho que usar o Facebook é fácil										
9	Uso o Facebook porque pessoas cuja opinião respeito me aconselharam que o fizesse										
10	Uso o Facebook porque ele é usado por pessoas cujas opiniões valorizo										
11	Como as pessoas à minha volta usam o Facebook para comunicar e partilhar materiais entre si, eu também uso										
12	A maioria das pessoas à minha volta usam o Facebook, e por isso eu também uso para me adequar a elas										
13	Encontro a informação e os recursos necessários para usar o Facebook de forma fácil										
14	Consigo ajuda facilmente quando estou a usar o Facebook										
15	O Facebook tem muitas características parecidas com outras redes sociais e plataformas de comunicação que também uso (MSN, e-mail, fóruns, grupos de discussão)										
16	Acedo ao Facebook em qualquer local que tenha acesso à Internet e sempre que quero										
17	Personalizei a minha própria página (o "meu perfil") no Facebook										
18	Criei grupos (comunidades) com pessoas que têm os mesmos interesses e necessidades, no Facebook										
19	Através do Facebook, juntei-me a grupos (comunidades) com base nos meus próprios interesses										
20	Graças ao Facebook, a relação com os membros dos grupos a que me juntei, com base nos meus interesses, fica mais forte.										
21	Aravés do Facebook, trabalho em colaboração com as pessoas com quem partilho interesses e objectivos comuns										

ESCALA DE MOTIVOS PARA USO DA REDE SOCIAL FACEBOOK

Por favor, assinale a sua concordância / discordância com cada uma das seguintes frases.

1="Discordo Completamente" e 10="Concordo Completamente"

		1	2	3	4	5	6	7	8	9	10
1	Uso o Facebook para encontrar os meus velhos amigos										
2	Uso o Facebook para fazer novos amigos										
3	Uso o Facebook para comunicar com os meus amigos										
4	Uso o Facebook para partilhar diversas informações e recursos com os meus amigos										
5	Uso o Facebook para encontrar pessoas com interesses e necessidades comuns e para aderir a grupos										
6	Uso o Facebook para manter contacto com a minha Universidade (Turma, Faculdade, Departamento)										
7	Uso o Facebook para me manter a par das últimas notícias sobre a minha escola e os meus colegas										
8	Uso o Facebook para partilhar trabalhos de casa e para realizar projectos académicos com os meus colegas										
9	Uso o Facebook para apoiar o meu trabalho académico (das disciplinas)										
10	Uso o Facebook para me manter a par das últimas notícias do dia-a-dia										
11	Uso o Facebook para ir mantendo a minha agenda actualizada										

ESCALA DE USO ACADÉMICO DA REDE SOCIAL FACEBOOK

Por favor, assinale a sua concordância / discordância com cada uma das seguintes frases.

1="Discordo Completamente" e 10="Concordo Completamente"

		1	2	3	4	5	6	7	8	9	10
1	Fomenta as relações entre os colegas da turma										
2	Fomenta as relações entre o professor e o estudante										
3	Promove o debate na turma										
4	Transmite informação sobre os materiais e recursos necessários para as aulas										
5	Transmite os avisos/novidades da escola, da turma e do trabalho na aula										
6	Serve para distribuir os trabalhos de casa e da aula										
7	Permite formar grupos académicos que partilham os mesmos interesses										
8	Permite partilhar informações sobre as disciplinas ou os trabalhos escolares										
9	Permite organizar os trabalhos em grupo										
10	Permite obter os materiais e as informações necessários para a aprendizagem										
11	Durante a aprendizagem, permite usar os recursos multimédia (vídeo, animação, som, etc.)										

CSE

INSTRUÇÕES: Todos nós somos membros de diferentes grupos ou categorias sociais. Alguns desses grupos ou categorias estão relacionados com o género, a religião, a nacionalidade, a etnia e a classe socioeconómica. Neste questionário, gostaríamos que tivesse em conta a sua pertença a esses grupos ou categorias, e que respondesse às seguintes afirmações com base na forma como se sente em relação a esses grupos e à sua pertença a eles. Não há respostas certas nem erradas para qualquer afirmação: estamos interessados nas suas reacções e opiniões sinceras. Por favor, leia cada uma das frases cuidadosamente, e responda usando a seguintes escala, de 1 a 7:

		Discordo Completamente	Discordo	Discordo um pouco	Neutro	Concordo um pouco	Concordo	Concordo Completamente
1.	Eu sou um membro valioso dos grupos a que pertenço	1	2	3	4	5	6	7
2.	Muitas vezes lamento pertencer aos grupos a que pertenço	1	2	3	4	5	6	7
3.	Em geral, os grupos a que pertenço são valorizados pelos outros	1	2	3	4	5	6	7
4.	Em geral, pertencer aos meus grupos pouco ou nada interfere com a forma como me sinto em relação a mim próprio(a)	1	2	3	4	5	6	7
5.	Sinto que não tenho muito a oferecer aos grupos a que pertenço	1	2	3	4	5	6	7
6.	Em geral, fico satisfeita(o) por pertencer aos grupos a que pertenço	1	2	3	4	5	6	7
7.	A maioria das pessoas considera que os meus grupos sociais são menos eficientes do que outros grupos sociais	1	2	3	4	5	6	7
8.	Os grupos sociais a que pertenço são um reflexo importante daquilo que eu sou	1	2	3	4	5	6	7
9.	Sou um participante que coopera nos grupos sociais a que pertenço	1	2	3	4	5	6	7
10.	Em geral, acho que os grupos sociais a que pertenço não valem a pena	1	2	3	4	5	6	7
11.	Em geral, os outros respeitam os grupos sociais a que pertenço	1	2	3	4	5	6	7
12.	Os grupos sociais a que pertenço não são importantes para a forma como me vejo enquanto pessoa	1	2	3	4	5	6	7
13	Sinto muitas vezes que sou um membro inútil dos meus grupos sociais	1	2	3	4	5	6	7
14.	Sinto-me bem em relação aos grupos sociais a que pertenço	1	2	3	4	5	6	7
15	Em geral, os outros pensam que os grupos sociais de que sou membro não têm qualquer valor	1	2	3	4	5	6	7
16.	Em geral, pertencer a grupos sociais é uma parte importante da imagem que tenho de mim próprio(a)	1	2	3	4	5	6	7

Escala de Satisfação com a Vida

Por favor, assinale a sua concordância / discordância com cada uma das seguintes frases.

1="Discordo Completamente" e 5="Concordo Completamente"

		1	2	3	4	5
1	A minha vida parece-se em quase tudo com o que eu desejaria que ela fosse.					
2	As minhas condições de vida são muito boas.					
3	Estou satisfeito com a minha vida.					
4	Até agora tenho conseguido as coisas importantes da vida que eu desejaria.					
5	Se pudesse recomeçar a minha vida, não mudaria quase nada.					

Escala de Satisfação com a Vida Académica

Por favor, assinale a sua concordância / discordância com cada uma das seguintes frases.

1="Discordo Completamente" e 5="Concordo Completamente"

		1	2	3	4	5
1	A minha vida académica parece-se em quase tudo com o que eu desejaria que ela fosse.					
2	As minhas condições de vida académica são muito boas.					
3	Estou satisfeito com a minha vida académica.					
4	Até agora tenho conseguido as coisas importantes da vida académica que eu desejaria.					
5	Se pudesse recomeçar a minha vida académica, não mudaria quase nada.					

SATISFAÇÃO SOCIAL (ESSS)

A SEGUIR VAI ENCONTRAR VÁRIAS AFIRMAÇÕES, SEGUIDAS DE CINCO LETRAS. MARQUE UM CÍRCULO À VOLTA DA LETRA QUE MELHOR QUALIFICA A SUA FORMA DE PENSAR. POR EXEMPLO, NA PRIMEIRA AFIRMAÇÃO, SE VOCÊ PENSA QUASE SEMPRE QUE POR VEZES SE SENTE SÓ NO MUNDO E SEM APOIO, DEVERÁ ASSINALAR A LETRA **E**, SE ACHA QUE NUNCA PENSA ISSO DEVERÁ MARCAR A LETRA **A**.

	Discordo totalmente	Discordo na maior parte	Não concordo nem discordo	Concordo na maior parte	Concordo totalmente
1-Por vezes sinto-me só no mundo e sem apoio	A	B	C	D	E
2-Não saio com amigos tantas vezes quantas eu gostaria	A	B	C	D	E
3-Os amigos não me procuram tantas vezes quantas eu gostaria	A	B	C	D	E
4-Quando preciso de desabafar com alguém encontro facilmente amigos com quem o fazer	A	B	C	D	E
5-Mesmo nas situações mais embaraçosas, se precisar de apoio de emergência tenho várias pessoas a quem posso recorrer	A	B	C	D	E
6-Às vezes sinto falta de alguém verdadeiramente íntimo que me compreenda e com quem possa desabafar sobre coisas íntimas	A	B	C	D	E
7-Sinto falta de actividades sociais que me satisfaçam	A	B	C	D	E
8-Gostava de participar mais em actividades de organizações (p.ex. clubes desportivos, escuteiros, partidos políticos, etc.)	A	B	C	D	E
9-Estou satisfeito com a forma como me relaciono com a minha família	A	B	C	D	E
10-Estou satisfeito com a quantidade de tempo que passo com a minha família	A	B	C	D	E
11-Estou satisfeito com o que faço em conjunto com a minha família	A	B	C	D	E
12-Estou satisfeito com a quantidade de amigos que tenho	A	B	C	D	E
13-Estou satisfeito com a quantidade de tempo que passo com os meus amigos	A	B	C	D	E
14-Estou satisfeito com as actividades e coisas que faço com o meu grupo de amigos	A	B	C	D	E
15-Estou satisfeito com o tipo de amigos que tenho	A	B	C	D	E

PERCEPÇÃO DE AUTO-CONCEITO

Vamos apresentar um conjunto de frases que permitem aos estudantes universitários e pré-universitários descreverem-se a si próprios. Não há boas nem más respostas, dado que os estudantes diferem bastante entre si. Em primeiro lugar, deve decidir se é a frase do lado esquerdo da folha que o descreve melhor ou se é a do lado direito (veja o exemplo abaixo). Uma vez escolhida a frase que melhor o descreve, deve decidir se você "**é mesmo assim**" ou se é "**mais ou menos assim**" e assinalar com uma cruz o quadrado respectivo. Para cada pergunta só deve colocar uma cruz. Umas vezes vai colocar a cruz no lado direito da folha, outras vezes no lado esquerdo. Nunca deve colocar cruzes simultaneamente do lado direito e esquerdo: só deve assinalar um dos quatro quadrados que estão na mesma linha. Comece a responder a seguir ao exemplo.

EXEMPLO

Sou mesmo assim	Sou mais ou menos assim				Sou mais ou menos assim	Sou mesmo assim
☐	☒	Alguns estudantes gostam de ser como são	**MAS**	Outros estudantes gostariam de ser diferentes	☐	☐

COMECE AGORA A RESPONDER, POR FAVOR

Sou mesmo assim	Sou mais ou menos assim				Sou mais ou menos assim	Sou mesmo assim
☐	☐	Alguns estudantes não estão muito orgulhosos com os trabalhos que fazem	**MAS**	Outros estudantes estão muito orgulhosos com os trabalhos que fazem	☐	☐
☐	☐	Alguns estudantes sentem que dominam as matérias escolares	**MAS**	Outros estudantes sentem que não as dominam	☐	☐
☐	☐	Alguns estudantes sentem-se tão espertos, ou até mais do que outros	**MAS**	Outros estudantes duvidam que sejam tão espertos como os outros	☐	☐
☐	☐	Alguns estudantes acham que são muito bons nos trabalhos que fazem	**MAS**	Outros estudantes duvidam que sejam capazes de fazer os seus trabalhos	☐	☐
☐	☐	Alguns estudantes vão muito bem nos seus estudos	**MAS**	Outros estudantes não vão muito bem nos seus estudos	☐	☐
☐	☐	Alguns estudantes não se sentem muito capazes intelectualmente	**MAS**	Outros estudantes sentem que são muito capazes intelectualmente	☐	☐
☐	☐	Alguns estudantes têm dificuldades em resolver os seus trabalhos casa	**MAS**	Outros estudantes raramente sentem dificuldades com os seus trabalhos de casa	☐	☐
☐	☐	Alguns estudantes acham-se tão inteligentes, ou até mais, do que outros	**MAS**	Outros estudantes duvidam que sejam tão inteligentes como os outros	☐	☐
☐	☐	Alguns estudantes por vezes não se sentem intelectualmente capazes nos seus estudos	**MAS**	Outros estudantes geralmente sentem-se intelectualmente capazes nos seus estudos	☐	☐
☐	☐	Alguns estudantes duvidam que sejam muito inteligentes	**MAS**	Outros estudantes acham-se muito inteligentes	☐	☐

QVA-*r*

QUESTIONÁRIO DE VIVÊNCIAS ACADÉMICAS

(Versão Reduzida)

Leandro S. Almeida, Joaquim Armando Ferreira & Ana Paula Soares

Este questionário pretende conhecer as suas opiniões e sentimentos em relação a diversas situações e vivências académicas. Algumas delas têm a ver com ocorrências dentro da sua Escola/Universidade, outras com ocorrências fora dela. No entanto, todas elas procuram abarcar as suas experiências quotidianas, enquanto estudante do Ensino Superior.

Assegurando-lhe a **confidencialidade das respostas**, solicitamos que preencha o questionário de acordo com o seu percurso e actual momento académico. Agradecemos a honestidade das suas respostas.

De acordo com a sua opinião ou sentimento, pontue a sua resposta numa escala de **1** a **5** pontos conforme indicado:

① Nada em consonância comigo, totalmente em desacordo, nunca se verifica
② Pouco em consonância comigo, bastante em desacordo, poucas vezes se verifica
③ Algumas vezes de acordo e outras em desacordo, algumas vezes verifica-se outras não
④ Bastante em consonância comigo, bastante em acordo, verifica-se bastantes vezes
⑤ Sempre em consonância comigo, totalmente de acordo, verifica-se sempre

Responda a todas as questões. Antes de começar a responder, certifique-se de que compreendeu o que se pretende e a forma de responder.

Não existe um tempo limite, no entanto, procure não dispender demasiado tempo nas suas respostas.

		Nada em consonância Totalmente em desacordo Nunca se verifica	Pouco em consonância comigo Bastante em desacordo Poucas vezes se verifica	Algumas vezes de acordo/desacordo Algumas vezes verifica-se outras não	Bastante em consonância comigo Bastante em acordo Verifica-se bastantes vezes	Sempre em consonância comigo Totalmente de acordo Verifica-se sempre
1.	Faço amigos com facilidade na minha Universidade.....	①	②	③	④	⑤
2.	Acredito que posso concretizar os meus valores (prestígio, estabilidade, solidariedade...) na carreira que escolhi	①	②	③	④	⑤
3.	Mesmo que pudesse não mudaria de Universidade …….....	①	②	③	④	⑤
4.	Apresento oscilações de humor.....	①	②	③	④	⑤
5.	Olhando para trás, consigo identificar as razões que me levaram a escolher este curso.....	①	②	③	④	⑤
6.	Dou comigo acompanhando pouco os outros colegas da turma …….....	①	②	③	④	⑤
7.	Escolhi bem o curso que estou a frequentar.....	①	②	③	④	⑤
8.	Tenho boas competências para a área vocacional que escolhi.....	①	②	③	④	⑤
9.	Sinto-me triste ou abatido/a.....	①	②	③	④	⑤
10.	Faço uma gestão eficaz do meu tempo.....	①	②	③	④	⑤
11.	Sinto-me, ultimamente, desorientado/a e confuso/a.....	①	②	③	④	⑤
12.	Gosto da Universidade que frequento.....	①	②	③	④	⑤
13.	Há situações em que me sinto a perder o controlo.....	①	②	③	④	⑤
14.	Sinto-me envolvido no curso que frequento.....	①	②	③	④	⑤
15.	Conheço bem os serviços existentes na minha Universidade.....	①	②	③	④	⑤
16.	Gostaria de concluir o meu curso na instituição que agora frequento.....	①	②	③	④	⑤
17.	Nos últimos tempos tornei-me mais pessimista.....	①	②	③	④	⑤
18.	O curso em que me encontro foi sobretudo determinado pelas notas de acesso.....	①	②	③	④	⑤
19.	Os meus colegas têm sido importantes no meu crescimento pessoal.....	①	②	③	④	⑤
20.	O meu percurso vocacional está a corresponder às minhas expectativas.....	①	②	③	④	⑤
21.	Sinto cansaço e sonolência durante o dia.....	①	②	③	④	⑤
22.	Julgo que o meu curso me permitirá realizar profissionalmente.....	①	②	③	④	⑤
23.	Sinto confiança em mim próprio/a.....	①	②	③	④	⑤
24.	Sinto que possuo um bom grupo de amigos na Universidade.....	①	②	③	④	⑤
25.	Sinto-me em forma e com um bom ritmo de trabalho.....	①	②	③	④	⑤
26.	Sinto-me mais isolado/a dos outros de algum tempo para cá.....	①	②	③	④	⑤
27.	Tenho desenvolvido amizades satisfatórias com os meus colegas de curso.....	①	②	③	④	⑤
28.	Tenho momentos de angústia.....	①	②	③	④	⑤
29.	Utilizo a Biblioteca da Faculdade/Universidade.....	①	②	③	④	⑤
30.	Torna-se-me difícil encontrar um colega que me ajude num problema pessoal.....	①	②	③	④	⑤

		Nada em consonância Totalmente em desacordo Nunca se verifica	Pouco em consonância comigo Bastante em desacordo Poucas vezes se verifica	Algumas vezes de acordo/desacordo Algumas vezes verifica-se outras não	Bastante em consonância comigo Bastante em acordo Verifica-se bastantes vezes	Sempre em consonância comigo Totalmente de acordo Verifica-se sempre
31.	Não me consigo concentrar numa tarefa durante muito tempo	①	②	③	④	⑤
32.	Elaboro um plano das coisas a realizar diariamente	①	②	③	④	⑤
33.	Tenho relações de amizade próximas com colegas de ambos os sexos	①	②	③	④	⑤
34.	Consigo ter o trabalho escolar sempre em dia	①	②	③	④	⑤
35.	A minha incapacidade para gerir bem o tempo leva-me a ter mau desempenho escolar	①	②	③	④	⑤
36.	Quando conheço novos colegas, não sinto dificuldade em iniciar uma conversa	①	②	③	④	⑤
37.	Escolhi o curso que me parece mais de acordo com as minhas aptidões e capacidades	①	②	③	④	⑤
38.	Sou conhecido/a como uma pessoa amigável e simpática	①	②	③	④	⑤
39.	Penso em muitas coisas que me põem triste	①	②	③	④	⑤
40.	Procuro conviver com os meus colegas fora dos horários das aulas	①	②	③	④	⑤
41.	Sei estabelecer prioridades no que diz respeito à gestão do meu tempo	①	②	③	④	⑤
42.	Tomo a iniciativa de convidar os meus amigos para sair	①	②	③	④	⑤
43.	As minhas relações de amizade são cada vez mais estáveis, duradouras e independentes	①	②	③	④	⑤
44.	Consigo tirar bons apontamentos nas aulas	①	②	③	④	⑤
45.	Sinto-me fisicamente debilitado/a	①	②	③	④	⑤
46.	A instituição de ensino que frequento não me desperta interesse	①	②	③	④	⑤
47.	Sinto que estou a conseguir ser eficaz na minha preparação para os exames	①	②	③	④	⑤
48.	A biblioteca da minha Universidade está bem apetrechada	①	②	③	④	⑤
49.	Procuro sistematizar/organizar a informação dada nas aulas	①	②	③	④	⑤
50.	Simpatizo com a cidade onde se situa a minha Universidade	①	②	③	④	⑤
51.	Sinto-me desiludido/a com o meu curso	①	②	③	④	⑤
52.	Tenho dificuldades em tomar decisões	①	②	③	④	⑤
53.	Tenho boas competências de estudo	①	②	③	④	⑤
54.	Os meus gostos pessoais foram decisivos na escolha do meu curso	①	②	③	④	⑤
55.	Tenho-me sentido ansioso/a	①	②	③	④	⑤
56.	Estou no curso com que sempre sonhei	①	②	③	④	⑤
57.	Sou pontual na chegada às aulas	①	②	③	④	⑤
58.	A minha Universidade tem boas infra-estruturas	①	②	③	④	⑤
59.	Não consigo estabelecer relações íntimas com colegas	①	②	③	④	⑤
60.	Mesmo que pudesse não mudaria de curso	①	②	③	④	⑤

RSES

Segue-se uma lista de afirmações que dizem respeito ao modo como se sente acerca de si próprio(a). À frente de cada uma delas assinale com uma cruz (**X**), na respectiva coluna, a resposta que mais se lhe adequa.

	Discordo fortemente	**Discordo**	**Concordo**	**Concordo fortemente**
1. Globalmente, estou satisfeito(a) comigo próprio(a).	☐	☐	☐	☐
2. Por vezes penso que não sou bom/boa em nada.	☐	☐	☐	☐
3. Sinto que tenho algumas qualidades.	☐	☐	☐	☐
4. Sou capaz de fazer as coisas tão bem como a maioria das pessoas.	☐	☐	☐	☐
5. Sinto que não tenho muito de que me orgulhar.	☐	☐	☐	☐
6. Por vezes sinto-me, de facto, um(a) inútil.	☐	☐	☐	☐
7. Sinto-me uma pessoa de valor, pelo menos tanto quanto a generalidade das pessoas.	☐	☐	☐	☐
8. Gostaria de ter mais respeito por mim próprio(a).	☐	☐	☐	☐
9. Bem vistas as coisas, inclino-me a sentir que sou um(a) falhado(a).	☐	☐	☐	☐
10. Adopto uma atitude positiva para comigo.	☐	☐	☐	☐

Inventário Clínico de Auto-Conceito

INSTRUÇÕES

Todas as pessoas têm uma ideia de como são. A seguir estão expostos diversos atributos, capazes de descreverem como uma pessoa é. Leia cuidadosamente cada questão e responda de forma verdadeira, espontânea e rápida a cada uma delas. Ao dar a sua resposta considere, sobretudo, *a sua maneira de ser habitual* e não o seu estado de espírito de momento. Assinale com uma cruz (x) no quadrado respectivo ☐ aquela que pensa se lhe aplica de forma mais característica.

	Não Concordo	Concordo pouco	Concordo moderadamente	Concordo muito	Concordo muitíssimo
1. Sei que sou uma pessoa simpática	☐	☐	☐	☐	☐
2. Costumo ser franco a exprimir as minhas opiniões	☐	☐	☐	☐	☐
3. Tenho por hábito desistir das minhas tarefas quando encontro dificuldades	☐	☐	☐	☐	☐
4. No contacto com os outros costumo ser um indivíduo falador	☐	☐	☐	☐	☐
5. Costumo ser rápido na execução das tarefas que tenho para realizar	☐	☐	☐	☐	☐
6. Considero-me tolerante para com as outras pessoas	☐	☐	☐	☐	☐
7. Sou capaz de assumir uma responsabilidade até ao fim, mesmo que isso me traga consequências desagradáveis	☐	☐	☐	☐	☐

	Não Concordo	Concordo pouco	Concordo moderadamente	Concordo muito	Concordo muitíssimo
8. De modo geral tenho por hábito enfrentar e resolver os meus problemas	☐	☐	☐	☐	☐
9. Sou uma pessoa usualmente bem aceite pelos outros	☐	☐	☐	☐	☐
10. Quando tenho uma ideia que me parece válida gosto de a pôr em prática	☐	☐	☐	☐	☐
11. Tenho por hábito ser persistente na resolução das minhas dificuldades	☐	☐	☐	☐	☐
12. Não sei porquê a maioria das pessoas embirra comigo	☐	☐	☐	☐	☐
13. Quando me interrogam sobre questões importantes conto sempre a verdade	☐	☐	☐	☐	☐
14. Considero-me competente naquilo que faço	☐	☐	☐	☐	☐
15. Sou uma pessoa que gosta muito de fazer o que lhe apetece	☐	☐	☐	☐	☐
16. A minha maneira de ser leva-me a sentir na vida com um razoável bem-estar	☐	☐	☐	☐	☐
17. Considero-me uma pessoa agradável no contacto com os outros	☐	☐	☐	☐	☐
18. Quando tenho um problema que me aflige não o consigo resolver sem o auxílio dos outros	☐	☐	☐	☐	☐
19. Gosto sempre de me sair bem nas coisas que faço	☐	☐	☐	☐	☐
20. Encontro sempre energia para vencer as minhas dificuldades	☐	☐	☐	☐	☐

¤

Após preencher a escala veja se respondeu a todas as questões. Não deixe nenhuma por responder!

COMO EU SOU

Vai encontrar a seguir um conjunto de afirmações acerca da maneira como você pensa sobre si próprio(a). Á frente de cada afirmação encontra 7 letras (de A a G). Se assinalar a letra A significa que discorda totalmente da afirmação e que ela não corresponde, de maneira nenhuma, ao que você pensa de si: se assinalar a letra G significa que a afirmação corresponde totalmente ao que você pensa sobre si próprio/a. Entre esse dois extremos pode ainda escolher uma de 5 letras consoante estiver mais ou menos em desacordo com a sua maneira de pensar . Assinale uma das letras. Não há respostas certas ou erradas, todas as respostas que der são igualmente correctas. Peço-lhe que pense bem na resposta de modo a que ela expresse correctamente a sua maneira de pensar

	Discordo totalmente ↓	discordo bastante ↓	discordo um pouco ↓	não concordo nem discordo	concordo um pouco ↓	concordo bastante ↓	concordo totalmente ↓
1- Quando faço planos tenho a certeza que sou capaz de realizá-los	A	B	C	D	E	F	G
2- Quando não consigo fazer uma coisa à primeira insisto e continuo a tentar até conseguir	A	B	C	D	E	F	G
3- Tenho dificuldade em fazer novos amigos	A	B	C	D	E	F	G
4- Se uma coisa me parece muito complicada, não tento sequer realizá-la	A	B	C	D	E	F	G
5- Quando estabeleço objectivos que são importantes para mim, raramente os consigo alcançar	A	B	C	D	E	F	G
6- Sou uma pessoa auto-confiante	A	B	C	D	E	F	G
7- Não me sinto capaz de enfrentar muitos dos problemas que se me deparam na vida	A	B	C	D	E	F	G
8- Normalmente desisto das coisas antes de as ter acabado	A	B	C	D	E	F	G
9- Quando estou a tentar aprender alguma coisa nova, se não obtenho logo sucesso, desisto facilmente	A	B	C	D	E	F	G
10- Se encontro alguém interessante com quem tenho dificuldade em estabelecer amizade, rapidamente desisto de tentar fazer amizade com essa pessoa	A	B	C	D	E	F	G
11- Quando estou a tentar tornar-me amigo de alguém que não se mostra interessado, não desisto logo de tentar	A	B	C	D	E	F	G
12- Desisto facilmente das coisas	A	B	C	D	E	F	G
13- As amizades que tenho foram conseguidas através da minha capacidade pessoal para fazer amigos	A	B	C	D	E	F	G
14- Sinto insegurança acerca da minha capacidade para fazer coisas	A	B	C	D	E	F	G
15- Um dos meus problemas, é que não consigo fazer as coisas como devia	A	B	C	D	E	F	G

MUITO OBRIGADO PELA SUA COLABORAÇÃO!

APPENDIX 7 - AF SCALE EXPLORATORY AND CONFIRMATORY FACTOR ANALYSES

This appendix provides information concerning the decision to chose a 4-factor factorial structure for the Portuguese version of the Adoption of Facebook (AF) scale.

The Usluel and Mazman (2009) scale, used as a base for the Portuguese translation, had a total of 21 items, and a five-factor factorial structure.

Table 7.1 presents the varimax rotated component matrix, obtained through "fixing" the number of factors to be extracted to five (the number of factors covered by the original instrument). As the table depicts, the fifth component of the solution (right column on the table) does not present adequate factor loadings, for which this solution was discarded.

Table 7.1. Varimax Component Matrix – 5 "Fix" Factors (even cases, N=278)

Item	Component				
	1	2	3	4	5
U1	,422	,177	,266	**,760**	-,017
U2	,459	,217	,325	**,697**	,037
U3	,215	,302	,322	**,714**	,276
U4	,390	,208	,268	**,552**	,305
EU1	**,827**	,141	,177	,253	,144
EU2	**,885**	,156	,193	,207	,148
EU3	**,882**	,148	,221	,207	,102
EU4	**,836**	,140	,167	,220	,175
SE1	,107	**,852**	,123	,087	,164
SE2	,101	**,851**	,169	,164	,165
SE3	,260	**,786**	,082	,192	,064
SE4	,172	**,827**	,142	,145	,012
FC1	**,655**	,276	,206	,147	,377
FC2	,494	,287	,213	,327	,460
FC3	,393	,206	,129	,122	**,763**
FC4	**,607**	,242	,332	,319	,233
FC5	,594	,144	,414	,282	,062
CI1	,227	,051	**,827**	,147	,013
CI2	,458	,148	**,675**	,237	,169
CI3	,218	,314	**,726**	,354	,134
CI4	,224	,368	**,631**	,386	,251

U-"useful."; EU-"ease of use"; SE-"soc influence"; FC - "facil. conditions"; CI - "community identity"

As depicted in Table 7.2, the solution proposed by using the Kaiser criterion, in which only the factors with eigenvalues greater than one are retained, was not satisfactory either: only three factors were extracted using this method, and furthermore the items measuring usefulness (the first four in the table) loaded ambiguously in more than one component.

The total variance that would be explained by this solution was 71,12%.

Table 7.2. Varimax Component Matrix – Kaiser criterion (even cases, N=278)

	Component		
Item	1	2	3
U1	,450	**,655**	,183
U2	,489	**,668**	,223
U3	,329	**,668**	,363
U4	,492	**,533**	,258
EU1	**,838**	,296	,124
EU2	**,888**	,284	,132
EU3	**,871**	,307	,116
EU4	**,853**	,268	,125
SE1	,146	,147	**,858**
SE2	,145	,229	**,861**
SE3	,276	,177	**,775**
SE4	,168	,200	**,807**
FC1	**,729**	,253	,299
FC2	**,617**	,358	,344
FC3	**,595**	,167	,313
FC4	**,649**	,457	,250
FC5	**,579**	,506	,119
CI1	,172	**,766**	,018
CI2	,456	**,692**	,137
CI3	,225	**,798**	,313
CI4	,275	**,736**	,391

U-“useful.”; EU-“ease of use”; SE-“soc influence”; FC - “facil. conditions”; CI - “community identity”

(Continues, please turn)

The preferred factorial solution is that presented in Table 7.3, obtained by fixing to four the number of factors to be extracted. This solution allowed the identification of four different factors, and the aggregation of "ease of use" and "facilitating conditions" in the same factor was theoretical understandable, since these two dimensions are conceptually and semantically near.

For our sub-sample of evenly numbered participants (N=278), the four factors presented on Table 7.3 were able to explain 75.1% of the overall variance of the scale.

Table 7.3. Varimax Component Matrix – 4 "Fix" Factors (even cases, N=278)

	Component			
Item	1	2	3	4
U1	,376	,162	,262	**,786**
U2	,429	,206	,324	**,718**
U3	,276	,349	,352	**,673**
U4	,454	,248	,294	**,523**
EU1	**,822**	,118	,167	,294
EU2	**,880**	,128	,180	,254
EU3	**,863**	,113	,203	,261
EU4	**,842**	,121	,159	,257
SE1	,153	**,860**	,126	,075
SE2	,146	**,862**	,174	,151
SE3	,263	**,771**	,073	,208
SE4	,164	**,805**	,129	,165
FC1	**,738**	,300	,221	,136
FC2	**,608**	,341	,246	,284
FC3	**,615**	,318	,194	,020
FC4	**,642**	,248	,338	,326
FC5	**,575**	,119	,402	,318
CI1	,215	,035	**,818**	,162
CI2	,481	,147	**,676**	,243
CI3	,240	,322	**,732**	,346
CI4	,283	,397	**,649**	,358

U-"useful."; EU-"ease of use"; SE-"soc influence"; FC - "facil. conditions"; CI - "community identity"

Table 7.4 condensates the information presented in Table 3, and allows a cleaner perception of the final factorial structure proposed for the Portuguese Adoption of Facebook scale.

Table 7.4. Factor structure of the translated Adoption of Facebook scale (even cases, N=278)

Constructs	Item	Item order on the scale	Factor loads
Usefulness	U1	1	,786
	U2	2	,718
	U3	3	,673
	U4	4	,523
Ease of use and	EU1	5	,822
Facilitating conditions	EU2	6	,880
	EU3	7	,863
	EU4	8	,842
	FC1	13	,738
	FC2	14	,608
	FC3	15	,615
	FC4	16	,642
	FC5	17	,575
Social influence	SE1	9	,860
	SE2	10	,862
	SE3	11	,771
	SE4	12	,805
Community identity	CI1	18	,818
	CI2	19	,676
	CI3	20	,732
	CI4	21	,649

Note: Factor loading refer to the varimax-rotated component matrix

Table 7.5 and Figure 7.1 depict the results provided by confirmatory factor analysis (CFA) in relation to the factorial structure presented in Tables 7.3 and 7.4.

As can be perceived by the indicators of goodness of fit (Table 7.5), the four-factor model, in which “ease of use” and “facilitating conditions” are aggregated, present acceptable indicators of fit.

Table 7.5. CFA Goodness of fit indicators (odd cases, N=272)

Fit measure	Good fit	Acceptable fit	Model value
χ^2/df	≤ 2	≤ 3	2,256
RMSEA	≤ 0.05	≤ 0.08	0,068
CFI	≥0.97	≥0.95	0,961
GFI	≥0.95	≥0.90	0,907
AGFI	≥0.90	≥0.85	0,853
IFI	≥0.95	≥0.90	0,961

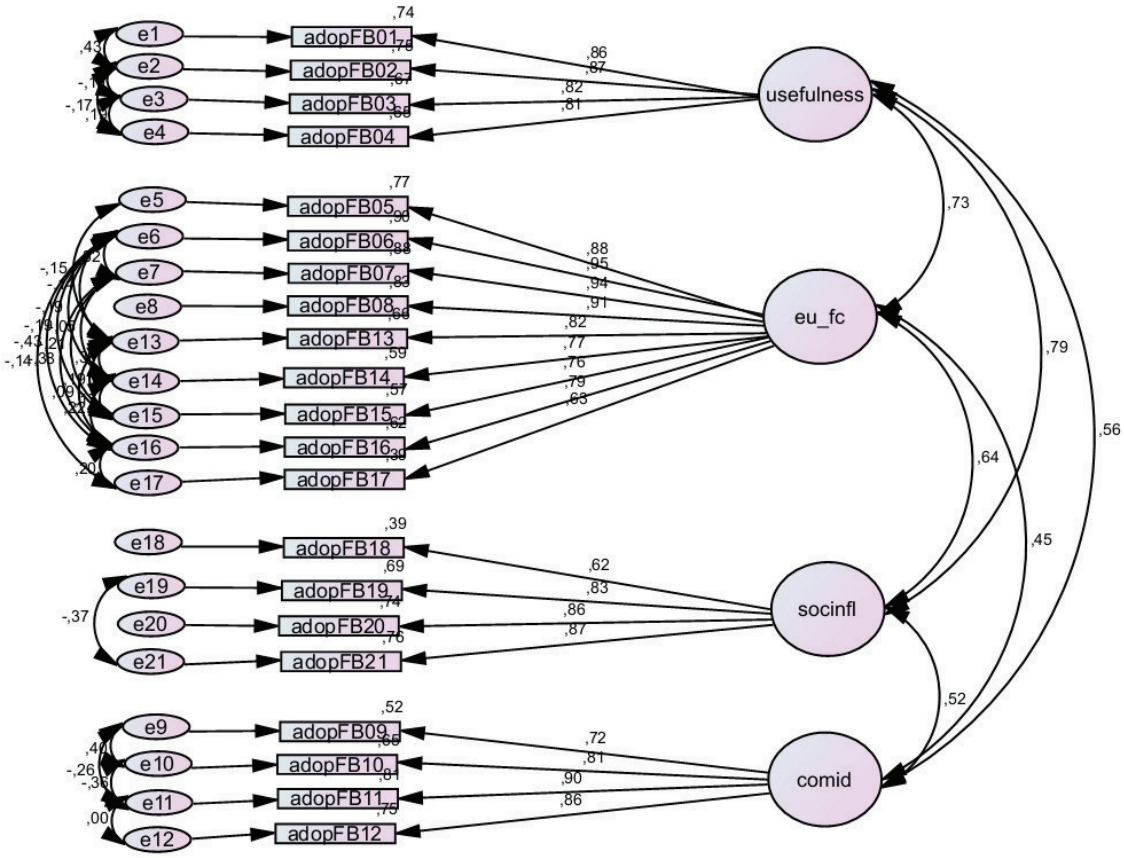

Figure 7.1. CFA for odd-numbered cases in the sample (N=272)

APPENDIX 8 - PFU EXPLORATORY AND CONFIRMATORY FACTOR ANALYSES

In this appendix, the steps leading to the final version of the scale used to assess the purposes of Facebook usage are detailed.

Using the Kaiser criterion, by which only factors whose eigenvalues is greater than one are retained, just two factors emerged from the exploratory factor analysis performed on the data collected with the 11 items of the Portuguese instrument that was translated from the original Purposes of Facebook Usage scale (by Mazman & Usluel, 2010).

Since the original Turkish instrument assessed three different dimensions, a solution with three-factors was investigated, by fixing the number of factors to be extracted in SPSS to three. The solution of this procedure is presented in Table 8.1.
By inspecting Table 8.1, it can be verified that there are several discrepancies between the dimension intended to be measured by each of the translated items and the factors in which they loaded (e.g. distribution of the loading of items SOC01 through SOC07 by components 1 and 3 of the matrix: Table 8.1). This solution was, therefore, discarded.

Table 8.1. Varimax Component Matrix – 3 "Fix" Factors (even cases, N=278)

	Component		
Item	1	2	3
SOC01	,834	,087	,271
SOC02	,356	,175	,845
SOC03	,875	,139	,255
SOC04	,828	,206	,265
SOC05	,283	,325	,825
SOC06	,687	,429	,193
SOC07	,774	,326	,267
WK01	,267	,834	,281
WK02	,188	,905	,200
DAY01	,704	,322	,292
DAY02	,610	,508	,078

SOC-"Social Relations"; WK-"Work-related"; DAY-"Daily activities"

The solution provided by the Kaiser criterion, is depicted in Table 2. Although the factor loadings of four items (SOC05, SOC06, SOC07, DAY02) remained ambiguous, is was possible to isolate the loadings of items SOC01 to SOC04 in one component and those of items WK01 and WK02 in another component.

The item DAY01 loaded in the same factor than items SOC01 to SOC04, when it was expected that it loaded in a separate third factor.

Taking into account these results, the Portuguese instrument that was constructed from the original Turkish version of the Purposes of Facebook Usage scale retained only the items SOC01-SOC04, and the items WK01 and WK02. The selected items are signaled in bold type, and underlined, in Table 8.2.

Therefore, we used an instrument composed of six items (instead of the 11 of the original scale) to assess the purposes of Facebook usage, and we only measured two types of purposes: Facebook usage for social-relations, and Facebook work-related usage.

Table 8.2. Varimax Component Matrix – Kaiser criterion (even cases, N=278)

Original Constructs	Item	Item order on the scale	Component 1	Component 2
Social relations	SOC01	1	**,867**	,162
	SOC02	2	**,545**	,258
	SOC03	3	**,898**	,202
	SOC04	4	**,850**	,269
	SOC05	5	,458	,608
	SOC06	6	,678	,451
	SOC07	7	,789	,482
Work related	WK01	8	,265	**,870**
	WK02	9	,163	**,907**
Daily	DAY01	10	,729	,390
	DAY02	11	,569	,483

Table 8.3 describes the final version of the adapted instrument.

Table 8.3. Final structure of the Purposes of Facebook Usage scale (even cases, N=278)

Constructs	Item	Item order on the scale	Factor loads
Social relations	SOC01	1	,886
	SOC02	2	,610
	SOC03	3	,929
	SOC04	4	,872
Work related	WK01	5	,893
	WK02	6	,934

The total variance explained by the two-factor solution (extracted by Kaiser criterion) for the final, six-item, Portuguese version of the scale was 81.5%.

Table 8.4 and Figure 8.1 depict the results of the confirmatory factor analysis that was performed in the odd-numbered cases of our sample (composed by a total of 550 students).

Table 8.4. CFA Goodness of fit indicators (odd cases, N=272)

Fit measure	Good fit	Acceptable fit	Model value
RMSEA	≤ 0.05	≤ 0.08	0,078
CFI	≥0.97	≥0.95	0,98
GFI	≥0.95	≥0.90	0,966
AGFI	≥0.90	≥0.85	0,911
IFI	≥0.95	≥0.90	0,98

As depicted in Table 8.4, the proposed factorial solution for the Portuguese version of the scale (with six items) presents acceptable indicators of goodness of fit.
Figure 8.1 presents the corresponding SPSS/Amos diagram for the model proposed.

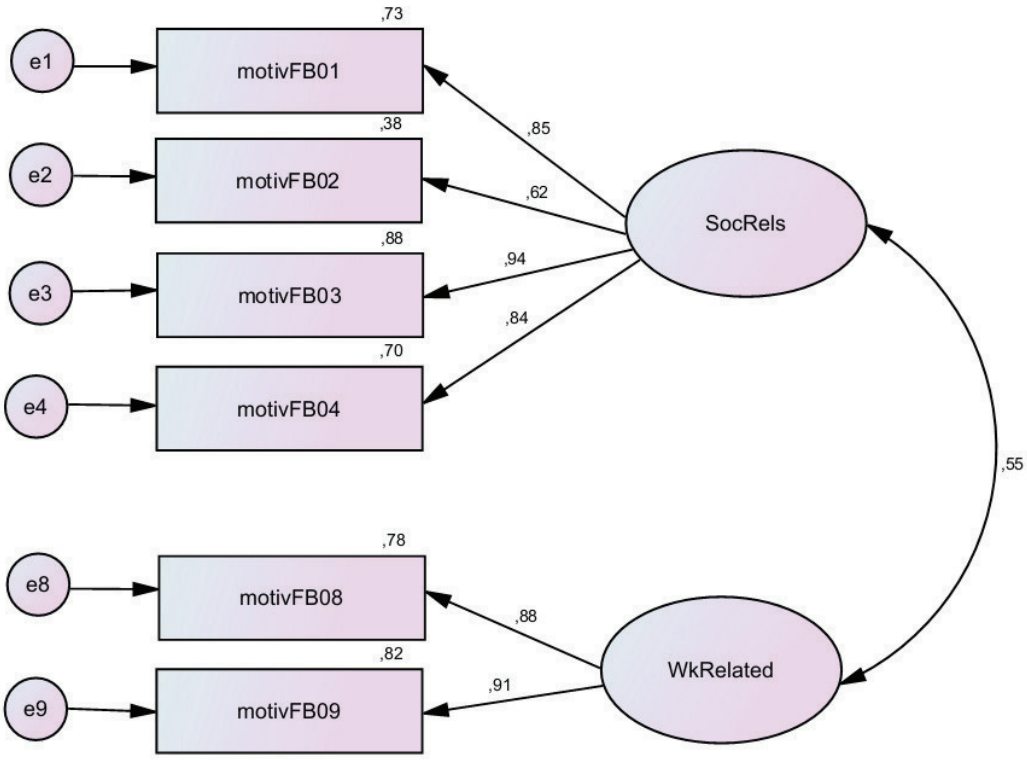

Figure 8.1. CFA for odd-numbered cases in the sample (N=272)

APPENDIX 9 - EUF EXPLORATORY AND CONFIRMATORY FACTOR ANALYSES

This appendix details the factor analyses that were performed in the data collected with the Portuguese version of the Mazman and Usluel (2010)'s Educational Usage of Facebook scale.

The original instrument assessed three different dimensions of Facebook educational usage ("communication", "collaboration", and "resource and material sharing").

However, using the Kaiser criterion, by which only factors whose eigenvalues is greater than one are retained, there was just one factor in our solution, which accounted for 63,5% of the total variance.

Fixing the number of factors to be extracted to three produced the varimax-rotated component matrix depicted in Table 9.1.

Table 9.1. Varimax Component Matrix – 3 "Fix" Factors (even cases, N=278)

Original Construct	Item	Item order on the scale	Compon 1	Compon 2	Compon 3
Communication	COM01	1	,136	,370	,824
	COM02	2	,143	,813	,351
	COM03	3	,418	,734	,240
	COM04	4	,550	,706	,153
	COM05	5	,540	,596	,298
	COM06	6	,570	,625	,045
Collaboration	COL01	7	,509	,095	,726
	COL02	8	,788	,243	,289
	COL03	9	,778	,376	,265
Resource and material	RES01	10	,773	,410	,125
Sharing	RES02	11	,719	,281	,386

By inspecting the factor loadings of each item of the scale, in Table 9.1, we can verify that the items measuring each of the three constructs depicted on the left side of the table are not consistently grouped in the factores that were extracted.

Fixing the number of factors to two, resulted in the varimax-rotated component matrix depicted in Table 9.2. Also for this two-factor solution, there was no consistency between the construct intended to be measured and the components in which each item loaded most strongly.

Table 9.2. Varimax Component Matrix – 2 "Fix" Factors (even cases, N=278)

Original Construct	Item	Item order on the scale	Component 1	Component 2
Communication	COM01	1	,240	,828
	COM02	2	,634	,362
	COM03	3	,779	,317
	COM04	4	,860	,263
	COM05	5	,752	,403
	COM06	6	,830	,163
Collaboration	COL01	7	,306	,821
	COL02	8	,665	,456
	COL03	9	,758	,428
Resource and material	RES01	10	,800	,291
Sharing	RES02	11	,632	,534

In Table 9.3, the component matrix obtained by using the Kaiser criterion is depicted. All factors load strongly in the single component proposed.

Table 9.3. Varimax Component Matrix – Kaiser Criterion (even cases, N=278)

Original Construct	Item	Item order on the scale	Component 1
Communication	COM01	1	,648
	COM02	2	,729
	COM03	3	,827
	COM04	4	,867
	COM05	5	,851
	COM06	6	,788
Collaboration	COL01	7	,699
	COL02	8	,806
	COL03	9	,869
Resource and material	RES01	10	,831
Sharing	RES02	11	,820

These results, obtained with exploratory factor analysis, were confirmed by confirmatory factor analysis, as depicted in Table 9.4 and Figure 9.1.

Table 9.4. CFA Goodness of fit indicators (odd cases, N=272)

Fit measure	Good fit	Acceptable fit	Model value
χ^2/df	≤ 2	≤ 3	1,433
RMSEA	≤ 0.05	≤ 0.08	0,040
CFI	≥0.97	≥0.95	0,996
GFI	≥0.95	≥0.90	0,982
AGFI	≥0.90	≥0.85	0,940
IFI	≥0.95	≥0.90	0,996

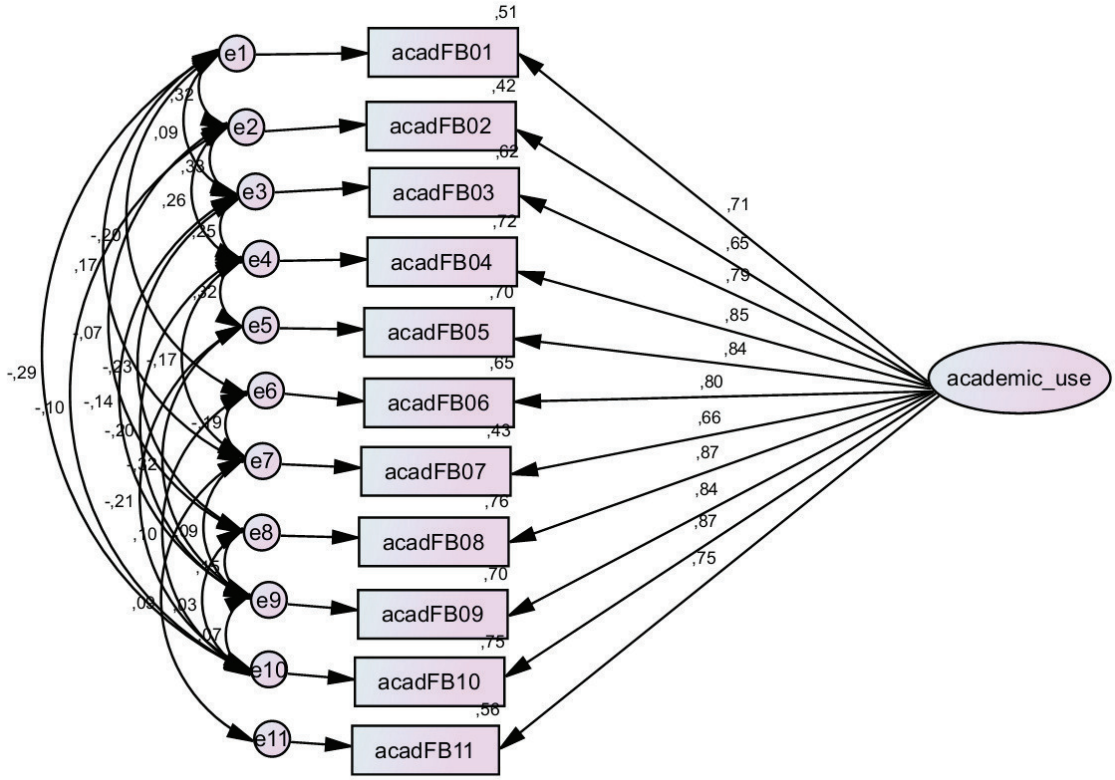

Figure 9.1. CFA for odd-numbered cases in the sample (N=272)

APPENDIX 10 - CSEP EXPLORATORY AND CONFIRMATORY FACTOR ANALYSES

By performing exploratory factor analysis using the Kaiser criterion to extract the factors (i.e. selecting only factors whose eigenvalues was greater than one), the solution depicted in Table 10.1 was obtained. As presented in Table 10.1, it was not possible to identify at least two items assessing the "Collective Self-esteem / Membership" construct, among the four items translated from the original scale.

Also, only two items per construct loaded unambiguously in a separate factor.

Therefore, only the six items underlined and marked with bold type were selected to the measure of collective self-esteem used in the context of this study (CSEp).

Table 10.1. Varimax Component Matrix – Kaiser criterion (even cases, N=318)

		Component			
Original Constructs	**Item**	**1**	**2**	**3**	**4**
Membership	CSE13-r		0,691		
	CSE05-r		0,573	0,430	
	CSE01	0,537			0,583
	CSE09	0,629	0,174		
Private Collective Self-esteem	CSE10-r		0,674		
	CSE02-r		0,404		-0,658
	CSE06	**0,812**			
	CSE14	**0,839**			
Public Collective Self-esteem	**CSE07-r**		**0,734**		
	CSE15-r		**0,797**		
	CSE03	0,478			0,550
	CSE11	0,686			
Importance to Identity	**CSE04-r**			**0,706**	
	CSE12-r			**0,731**	
	CSE16	0,570		0,486	
	CSE08	0,681		0,436	

Note: for clarity purposes only factor loadings above 0,4 are presented.

The results of performing confirmatory factor analysis to assess the validity of the factorial structure proposed for the CSEp are summarized in Table 10.2 and Figure 10.1. In addition to the measures presented in Table 10.2, the simple χ^2 statistic was non-significant (χ^2=[7,N=326]=12,036, p=0,099), what is an additional indicator of the good fit of the model.

Table 10.2. Goodness of fit indicators (odd cases, N=326)

Fit measure	Good fit	Acceptable fit	Model value
χ^2/df	≤ 2	≤ 3	1,719
RMSEA	≤ 0.05	≤ 0.08	0,048
CFI	≥0.97	≥0.95	0,987
GFI	≥0.97	≥0.95	0,988
AGFI	≥0.90	≥0.85	0,964
IFI	≥0.95	≥0.90	0,988

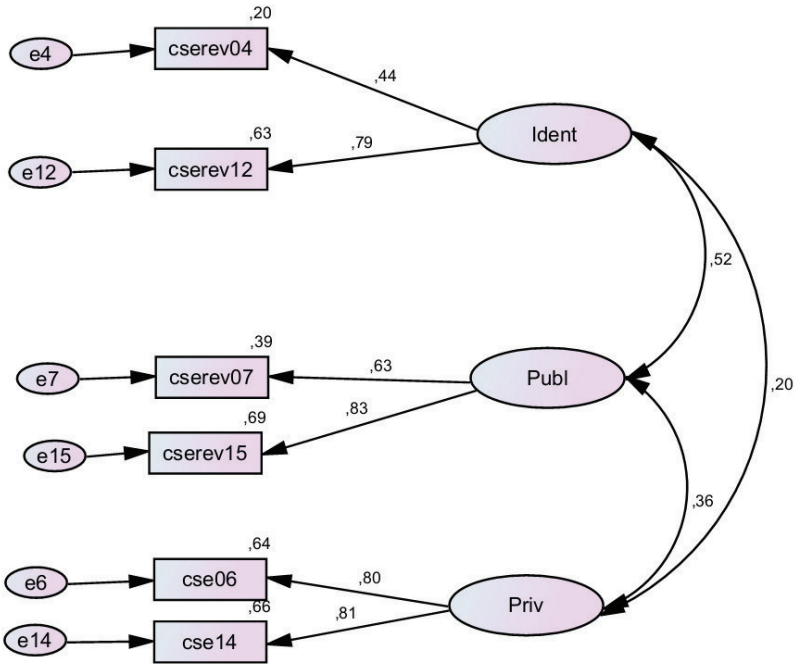

Figure 10.1. CFA for odd-numbered cases in the sample (N=326)

APPENDIX 11 - DERIVATION OF THE SWALS FROM SWLS (NETO, 1999)

In Table 11.1, the original items of the Portuguese version of the Satisfaction with Life Scale (SWLS; Neto, 1999) are presented, in the left column. The column on the right represents the modified item, included in the Satisfaction with Academic Life Scale (SWALS).

Table 11.1. Derivation of the SWALS from the SWLS items

Original Portuguese SWLS item	Modified SWALS item
1- *"A minha vida parece-se em quase tudo com o que eu desejaria que ela fosse."*	1 - *"A minha vida académica parece-se em quase tudo com o que eu desejaria que ela fosse."*
2- *"As minhas condições de vida são muito boas."*	2- *"As minhas condições de vida académica são muito boas."*
3- *"Estou satisfeito com a minha vida.*	3- *"Estou satisfeito com a minha vida académica."*
4- *"Até agora tenho conseguido as coisas importantes da vida que eu desejaria."*	4- *"Até agora tenho conseguido as coisas importantes da vida académica que eu desejaria."*
5- *"Se pudesse recomeçar a minha vida, não mudaria quase nada."*	5- *"Se pudesse recomeçar a minha vida académica, não mudaria quase nada."*

APPENDIX 12 - SELECTION OF PSYCHOLOGICAL VARIABLES (WEB 2.0)

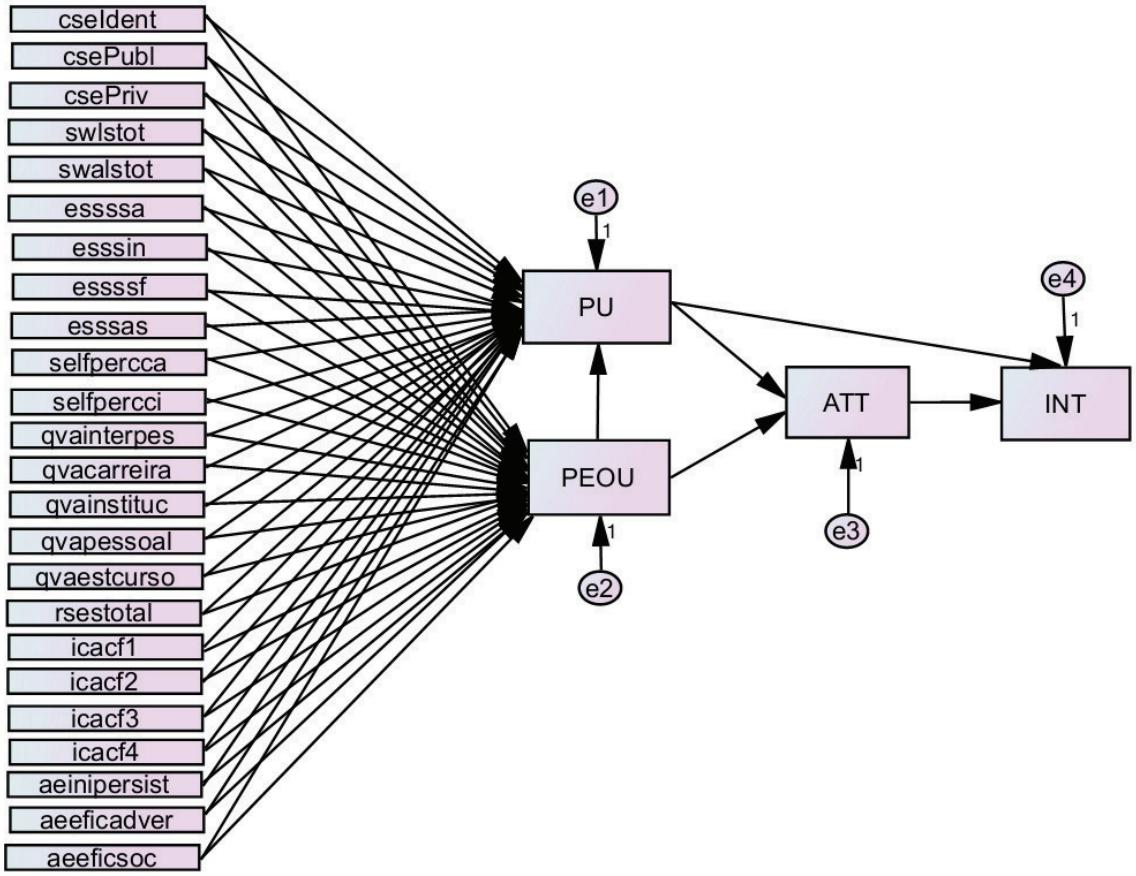

Figure 12.1. Model used to test influence of all assessed psychological variables in Technology Acceptance Model (TAM; Davis, 1989) mediators.

Figure 12.1 depicts all psychological variables connected to "Perceived Usefulness" (PU) and "Perceived Ease of Use" (PEOU), which are TAM (Davis, 1989) proposed mediators of external variables on "Attitudes" (ATT) and "Behavioral Intention" (INT).

The meaning of the acronyms used for the psychological variables (on the picture and on the tables) is described on Table 12.9.

Tables 12.1 to 12.4 depict the regression estimates and total effects for the model represented in Figure 12.1. Tables 12.5 to 12.8 represent the same regressions and total effects when the inter-correlations between the psychological variables (the 24 variables on the left side of Figure 12.1) are taken into consideration.

Table 12.1. Non-standardized regression estimates

	Estimate		Estimates
aeEficAdver->PU	-0,038**	aeEficAdver->PEOU	0,056**
aeEficSoc->PU	0,043**	aeEficSoc->PEOU	0,038*
aeIniPersist->PU	-0,024**	aeIniPersist->PEOU	-0,014
cseIdentMed->PU	0,109**	cseIdentMed->PEOU	0,091
cseMemPubMed->PU	-0,037	cseMemPubMed->PEOU	-0,129*
csePrivMed->PU	-0,048	csePrivMed->PEOU	-0,043
esssAS->PU	0,011	esssAS->PEOU	-0,047*
esssIN->PU	0,007	esssIN->PEOU	0,033
esssSA->PU	-0,017	esssSA->PEOU	-0,019
esssSF->PU	-0,04*	esssSF->PEOU	0,063**
icacF1->PU	0,021	icacF1->PEOU	-0,004
icacF2->PU	0,04**	icacF2->PEOU	-0,094**
icacF3->PU	-0,011	icacF3->PEOU	0,004
icacF4->PU	0,026	icacF4->PEOU	0,182**
qvaCarreira->PU	0,007	qvaCarreira->PEOU	-0,015
qvaEstCurso->PU	0,002	qvaEstCurso->PEOU	-0,006
qvaInstituc->PU	-0,005	qvaInstituc->PEOU	0,011
qvaInterpes->PU	-0,002	qvaInterpes->PEOU	0,018*
qvaPessoal->PU	0,008	qvaPessoal->PEOU	0,007
rsesTotal->PU	-0,008	rsesTotal->PEOU	-0,01
selfpercCA->PU	-0,024	selfpercCA->PEOU	-0,078**
selfpercCI->PU	-0,032	selfpercCI->PEOU	0,075**
swalsTot->PU	0,02	swalsTot->PEOU	0,024
swlsTot->PU	0,013	swlsTot->PEOU	-0,027

Note: please, refer to Table 12.9 for information about the used acronyms

Table 12.2. Selection of variables whose influence on PU or PEOU was significant

	Estimate		Estimates
aeEficAdver->PU	-0,038**	aeEficAdver->PEOU	0,056**
aeEficSoc->PU	0,043**	aeEficSoc->PEOU	0,038*
aeIniPersist->PU	-0,024**	aeIniPersist->PEOU	-0,014
cseIdentMed->PU	0,109**	cseIdentMed->PEOU	0,091
cseMemPubMed->PU	-0,037	cseMemPubMed->PEOU	-0,129*
esssAS->PU	0,011	esssAS->PEOU	-0,047*
esssSF->PU	-0,04*	esssSF->PEOU	0,063**
icacF2->PU	0,04**	icacF2->PEOU	-0,094**
icacF4->PU	0,026	icacF4->PEOU	0,182**
qvaInterpes->PU	-0,002	qvaInterpes->PEOU	0,018*
selfpercCA->PU	-0,024	selfpercCA->PEOU	-0,078**
selfpercCI->PU	-0,032	selfpercCI->PEOU	0,075**

Table 12.3. Standardized total effects on ATT or INT

	QP_ATT_Total	QP_INT
aeEficAdver	0,071	0,037
aeEficSoc	0,121*	0,12**
aeIniPersist	-0,09	-0,093
cseIdentMed	0,1**	0,099**
cseMemPubMed	-0,079*	-0,071*
csePrivMed	-0,04	-0,04
esssAS	-0,053	-0,041
esssIN	0,056	0,049
esssSA	-0,056	-0,054
esssSF	0,039	0,022
icacF1	0,015	0,019
icacF2	-0,101	-0,071
icacF3	-0,004	-0,007
icacF4	0,163**	0,142**
qvaCarreira	-0,038	-0,025
qvaEstCurso	-0,012	-0,008
qvaInstituc	0,016	0,011
qvaInterpes	0,059	0,049
qvaPessoal	0,056	0,056
rsesTotal	-0,033	-0,032
selfpercCA	-0,099	-0,089
selfpercCI	0,06	0,042
swalsTot	0,076	0,073
swlsTot	-0,031	-0,02

Table12.4. Selection of variables whose total effects on ATT or INT were significant

	QP_ATT_Total	QP_INT
aeEficSoc	0,121*	0,12**
cseIdentMed	0,1**	0,099**
cseMemPubMed	-0,079*	-0,071*
icacF4	0,163**	0,142**

Table 12.5. Non-standardized regression estimates (inter-correlations considered)

	Estimate		Estimate
aeEficAdver->PU	-0,038*	aeEficAdver->PEOU	0,056*
aeEficSoc->PU	0,043**	aeEficSoc->PEOU	0,038
aeIniPersist->PU	-0,024	aeIniPersist->PEOU	-0,014
cseIdentMed->PU	0,109**	cseIdentMed->PEOU	0,091
csePrivMed->PU	-0,048	csePrivMed->PEOU	-0,043
csePublMed->PEOU	-0,037	csePublMed->PEOU	-0,129*
esssAS->PU	0,011	esssAS->PEOU	-0,047
esssIN->PU	0,007	esssIN->PEOU	0,033
esssSA->PU	-0,017	esssSA->PEOU	-0,019
esssSF->PU	-0,04*	esssSF->PEOU	0,063*
icacF1->PU	0,021	icacF1->PEOU	-0,004
icacF2->PU	0,04	icacF2->PEOU	-0,094**
icacF3->PU	-0,011	icacF3->PEOU	0,004
icacF4->PU	0,026	icacF4->PEOU	0,182**
qvaCarreira->PU	0,007	qvaCarreira->PEOU	-0,015
qvaEstCurso->PU	0,002	qvaEstCurso->PEOU	-0,006
qvaInstituc->PU	-0,005	qvaInstituc->PEOU	0,011
qvaInterpes->PU	-0,002	qvaInterpes->PEOU	0,018
qvaPessoal->PU	0,008	qvaPessoal->PEOU	0,007
rsesTotal->PU	-0,008	rsesTotal->PEOU	-0,01
selfpercCA->PU	-0,024	selfpercCA->PEOU	-0,078
selfpercCI->PU	-0,032	selfpercCI->PEOU	0,075*
swalsTot->PU	0,02	swalsTot->PEOU	0,024
swlsTot->PU	0,013	swlsTot->PEOU	-0,027

Table 12.6. Selection of variables whose influence on PU or PEOU was significant (inter-correlations considered)

	Estimate		Estimate
aeEficAdver->PU	-0,038*	aeEficAdver->PEOU	0,056*
aeEficSoc->PU	0,043**	aeEficSoc->PEOU	0,038
cseIdentMed->PU	0,109**	cseIdentMed->PEOU	0,091
csePublMed->PEOU	-0,037	csePublMed->PEOU	-0,129*
esssSF->PU	-0,04*	esssSF->PEOU	0,063*
icacF2->PU	0,04	icacF2->PEOU	-0,094**
icacF4->PU	0,026	icacF4->PEOU	0,182**
selfpercCI->PU	-0,032	selfpercCI->PEOU	0,075*

Table 12.7. Standardized total effects on ATT or INT (inter-correlations considered)

	QP_ATT_Total	QP_INT
aeEficAdver	0,071	0,038
aeEficSoc	0,116*	0,114**
aeIniPersist	-0,09	-0,092
cseIdentMed	0,102*	0,1**
csePrivMed	-0,041	-0,04
csePublMed	-0,081*	-0,072*
esssAS	-0,053	-0,041
esssIN	0,054	0,048
esssSA	-0,054	-0,052
esssSF	0,04	0,022
icacF1	0,015	0,019
icacF2	-0,094	-0,065
icacF3	-0,004	-0,007
icacF4	0,163**	0,141**
qvaCarreira	-0,038	-0,025
qvaEstCurso	-0,012	-0,009
qvaInstituc	0,016	0,011
qvaInterpes	0,055	0,045
qvaPessoal	0,056	0,056
rsesTotal	-0,03	-0,029
selfpercCA	-0,096	-0,086
selfpercCI	0,06	0,041
swalsTot	0,077	0,074
swlsTot	-0,031	-0,02

Table 12.8. Selection of variables whose total effects on ATT or INT were significant (inter-correlations considered)

	QP_ATT_Total	QP_INT
aeEficSoc	0,116*	0,114**
cseIdentMed	0,102*	0,1**
csePublMed	-0,081*	-0,072*
icacF4	0,163**	0,141**

Table 12.9. Alphabetically-ordered list of the acronyms used to represent the variables of the study

Acronym	Corresponding Construct	Instrument[1]
aeeficadver	General Self-efficacy – "efficacy on adversity"	AE
aeeficsoc	General Self-efficacy- "social efficacy"	AE
aeinipersist	General Self-efficacy – "initiative and persistence"	AE
ATT	Attitudes / Using Web 2.0 to supplement in-class learning	Web 2.0 Survey
cseIdent	Collective Self-esteem – "identity"	CSEp
csePubl	Collective Self-esteem – "public"	CSEp
csePriv	Collective Self-esteem – "private"	CSEp
esssas	Satisfaction with Social Support – "social activities"	ESSS
esssin	Satisfaction with Social Support – "intimacy"	ESSS
essssa	Satisfaction with Social Support – "satisf. with friends"	ESSS
essssf	Satisfaction with Social Support – "family support"	ESSS
icacf1	Self-concept - "social acceptance/rejection"	ICAC
icacf2	Self-concept - "self-efficacy"	ICAC
icacf3	Self-concept - "psychological maturity"	ICAC
icacf4	Self-concept – "impulsivity/activity"	ICAC
INT	Intention to use Web 2.0 to supplement in-class learning	Web 2.0 Survey
PEOU	Perceived Ease of Use of Web 2.0 Tools	Web 2.0 Survey
PU	Perceived Usefulness of Web 2.0 Tools	Web 2.0 Survey
qvacarreira	Students' Academic Experiences – " career"	QVA-r
qvaestcurso	Students' Academic Experiences – "study"	QVA-r
qvainstituc	Students' Academic Experiences – "institutional"	QVA-r
qvainterpes	Students' Academic Experiences – "interpersonal"	QVA-r
qvapessoal	Students' Academic Experiences – "personal"	QVA-r
rsestotal	Personal Self-esteem	RSES
selfpercca	Self-perception – academic competence	SPP-CS
selfpercci	Self-perception – intellectual competence	SPP-CS
swalstot	Satisfaction with academic life	SWALS
swlstot	Satisfaction with life	SWLS

[1] Note: the names of the instruments mentioned on the right column, and information regarding their respective authors, are presented on Table 12.10

Table 12.10. Instruments used to assess psychological variables

Instrument	Assessed Dimensions
CSEp - Collective Self-esteem Scale –esteem (Based on CSES, Luhtanen & Crocker, 1992)	*Collective* Self-esteem
SWLS – Satisfaction with Life Scale (Neto, 1999)	Satisfaction with Life
SWALS – Satisfaction with Academic Life Scale (Based on the SWLS, Neto, 1999)	Satisfaction with Academic Life
ESSS – Satisfaction with Social Support Scale (Ribeiro, 1999)	Satisfaction with Social Support
SPP-CS – Self-Percep. Profile for College Students (Ribeiro, 1994)	Students' Self-perception
QVAr – Academic Experiences Survey (Almeida, Ferreira & Soares, 2001)	Students' Academic Experiences
RSES – Rosenberg Self-Esteem Scale (Santos, 2008)	*Personal* Self-esteem
ICAC – Self-concept inventory (Serra, 1986)	Self-concept
AE – Auto-Eficácia Geral (Ribeiro, 1995)	General Self-efficacy

APPENDIX 13 - ESTIMATES FOR FIRST TAM-ENHANCED MODEL (WEB 2.0)

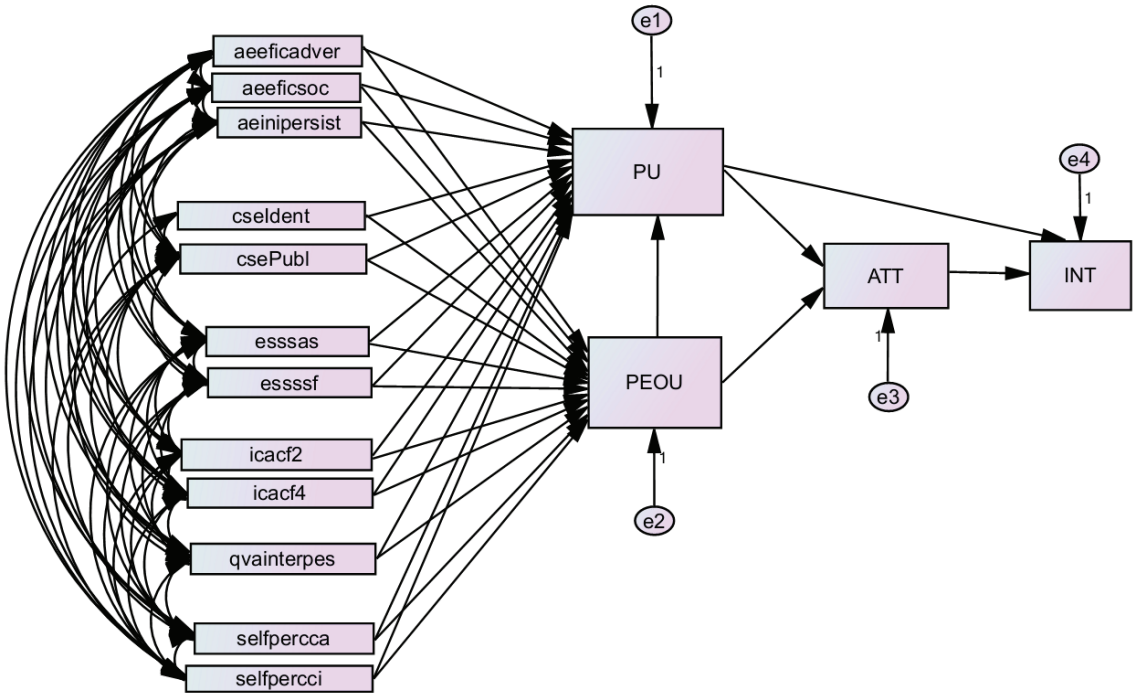

Figure 13.1. Selected psychological variables and their integration in the Technology Acceptance Model (TAM; Davis, 1989) framework

Table 13.1. Goodness of fit indicators for the model represented in Figure 13.1 (N=550)

Fit measure	Good fit	Acceptable fit	Model value
χ^2/df	≤ 2	≤ 3	1,491
RMSEA	≤ 0.05	≤ 0.08	0,03
CFI	≥0.97	≥0.95	0,996
GFI	≥0.95	≥0.90	0,988
AGFI	≥0.90	≥0.85	0,955
IFI	≥0.95	≥0.90	0,996

Mardia's multivariate kurtosis coefficient for the model was 35,376

χ^2 was significant χ^2 (35, N=550) =52,198, p=0,031, but Bollen-Stine bootstrap p, an alternative to the χ^2 test which does not require the multivariate normality assumption was 0,101, thus adding to the goodness of fit indicators presented in Table 13.1.

Estimates calculated through maximum likelihood (ML) estimation, which has been shown to provide robust estimates, even in the presence of severe non-normality (Kline

1998). Additionally, "bias-corrected" (BC) estimates were calculated using the bootstrap procedure in Amos (with 2000 samples), generally revealing perfect or very close match with the ones computed using ML estimation.

Table 13.2. Regression estimates for the model in Figure 13.1

	Estimate	BC Estimate	Std Estimate	BC Std Estimate
aeEficAdver->PEOU	0,051*	0,051	0,18	0,178
aeEficSoc->PEOU	0,04	0,04	0,102	0,102
aeIniPersist->PEOU	-0,015	-0,015	-0,064	-0,062
cseIdent->PEOU	0,081	0,08	0,069	0,068
csePubl->PEOU	-0,136*	-0,133	-0,101	-0,098
esssAS->PEOU	-0,045*	-0,045	-0,089	-0,088
esssSF->PEOU	0,056*	0,055	0,094	0,093
icacF2->PEOU	-0,097**	-0,098	-0,217	-0,218
icacF4->PEOU	0,16**	0,161	0,188	0,19
qvaInterpes->PEOU	0,018	0,018	0,093	0,091
selfpercCA->PEOU	-0,076*	-0,075	-0,114	-0,113
selfpercCI->PEOU	0,083*	0,082	0,137	0,135
PEOU->PU	0,714**	0,715	0,703	0,703
aeEficAdver->PU	-0,041**	-0,042	-0,143	-0,144
aeEficSoc->PU	0,041**	0,042	0,103	0,104
aeIniPersist->PU	-0,015	-0,015	-0,064	-0,063
cseIdent->PU	0,095**	0,094	0,079	0,078
csePubl->PU	-0,045	-0,045	-0,033	-0,033
esssAS->PU	0,015	0,014	0,028	0,027
esssSF->PU	-0,035	-0,035	-0,058	-0,058
icacF2->PU	0,04	0,039	0,088	0,087
icacF4->PU	0,032	0,031	0,037	0,036
qvaInterpes->PU	0,002	0,002	0,009	0,009
selfpercCI->PU	-0,035	-0,034	-0,057	-0,055
selfpercCA->PU	0	0	0	0
PEOU->ATT	0,322**	0,324	0,348	0,35
PU->ATT	0,471**	0,469	0,517	0,514
PU->INT	0,384**	0,382	0,346	0,344
ATT->INT	0,602**	0,604	0,495	0,496

Table 13.3. Covariances estimates for the model in Figure 13.1

	Cov	BC Cov	Corr	BC Corr
cseIdent<->qvaInterpes	1,148**	1,152	0,115	0,116
cseIdent<->csePubl	0,341**	0,341	0,238	0,238
esssSF<->selfpercCA	0,87**	0,873	0,15	0,151
qvaInterpes<->esssSF	5,05**	5,05	0,255	0,255
esssSF<->icacF4	0,436*	0,436	0,096	0,096
esssSF<->icacF2	2,4**	2,411	0,278	0,28
esssSF<->esssAS	2,094**	2,084	0,276	0,275
esssSF<->aeIniPersist	4,457**	4,475	0,274	0,276
esssSF<->aeEficSoc	2,142**	2,145	0,217	0,217
esssSF<->aeEficAdver	3,246**	3,265	0,239	0,241
esssAS<->selfpercCI	1,132**	1,13	0,153	0,153
selfpercCA<->esssAS	0,834**	0,833	0,124	0,124
qvaInterpes<->esssAS	5,875**	5,888	0,255	0,256
icacF4<->esssAS	0,461*	0,453	0,087	0,086
icacF2<->esssAS	1,993**	1,984	0,199	0,198
esssAS<->aeIniPersist	5,293**	5,29	0,28	0,28
esssAS<->aeEficSoc	2,467**	2,472	0,215	0,216
esssAS<->aeEficAdver	2,726**	2,72	0,173	0,173
selfpercCA<->selfpercCI	3,499**	3,494	0,619	0,618
qvaInterpes<->selfpercCI	5,121**	5,104	0,266	0,265
icacF4<->selfpercCI	1,005**	1,003	0,227	0,226
icacF2<->selfpercCI	3,174**	3,159	0,378	0,376
csePubl<->selfpercCI	0,336**	0,333	0,121	0,12
aeIniPersist<->selfpercCI	6,545**	6,543	0,414	0,414
aeEficSoc<->selfpercCI	2,144**	2,143	0,223	0,223
aeEficAdver<->selfpercCI	3,573**	3,547	0,27	0,268
qvaInterpes<->selfpercCA	5,196**	5,205	0,295	0,296
selfpercCA<->icacF4	0,763**	0,763	0,188	0,189
selfpercCA<->icacF2	3,915**	3,907	0,51	0,51
csePubl<->selfpercCA	0,428**	0,423	0,169	0,167
selfpercCA<->aeIniPersist	7,79**	7,792	0,539	0,54
selfpercCA<->aeEficSoc	2,115**	2,134	0,241	0,243

Table 13.4. Covariances estimates for the model in Figure 13.1 (Continued)

	Cov	BC Cov	Corr	BC Corr
selfpercCA<->aeEficAdver	5,337**	5,33	0,442	0,442
qvaInterpes<->icacF4	5,051**	5,05	0,366	0,366
qvaInterpes<->icacF2	11,989**	11,978	0,458	0,458
qvaInterpes<->csePubl	1,589**	1,581	0,184	0,184
qvaInterpes<->aeIniPersist	26,028**	26,04	0,529	0,529
qvaInterpes<->aeEficSoc	17,981**	18,001	0,602	0,602
qvaInterpes<->aeEficAdver	18,713**	18,654	0,454	0,453
icacF4<->icacF2	2,513**	2,507	0,418	0,417
csePubl<->icacF4	0,287**	0,288	0,145	0,145
icacF4<->aeIniPersist	3,889**	3,89	0,344	0,344
icacF4<->aeEficSoc	1,94**	1,951	0,282	0,284
icacF4<->aeEficAdver	2,941**	2,942	0,311	0,311
csePubl<->icacF2	1,046**	1,041	0,278	0,277
icacF2<->aeIniPersist	15,223**	15,227	0,709	0,71
icacF2<->aeEficSoc	4,824**	4,836	0,37	0,371
icacF2<->aeEficAdver	12,905**	12,916	0,719	0,72
csePubl<->esssSF	0,197*	0,202	0,069	0,071
csePubl<->aeIniPersist	2,135**	2,121	0,301	0,3
csePubl<->aeEficSoc	0,84**	0,839	0,195	0,195
csePubl<->aeEficAdver	2,023**	2,01	0,341	0,339
aeIniPersist<->aeEficSoc	12,628**	12,654	0,515	0,516
aeIniPersist<->aeEficAdver	26,851**	26,788	0,794	0,793
aeEficSoc<->aeEficAdver	9,65**	9,646	0,47	0,47

Table 13.5. Alphabetically-ordered list of the acronyms used to represent the variables of the study

Acronym	Corresponding Construct	Instrument[1]
aeeficadver	General Self-efficacy – "efficacy on adversity"	AE
aeeficsoc	General Self-efficacy- "social efficacy"	AE
aeinipersist	General Self-efficacy – "initiative and persistence"	AE
ATT	Attitudes / Using Web 2.0 to supplement in-class learning	Web 2.0 Survey
cseIdent	Collective Self-esteem – "identity"	CSEp
csePubl	Collective Self-esteem – "public"	CSEp
csePriv	Collective Self-esteem – "private"	CSEp
esssas	Satisfaction with Social Support – "social activities"	ESSS
esssin	Satisfaction with Social Support – "intimacy"	ESSS
essssa	Satisfaction with Social Support – "satisf. with friends"	ESSS
essssf	Satisfaction with Social Support – "family support"	ESSS
icacf1	Self-concept - "social acceptance/rejection"	ICAC
icacf2	Self-concept - "self-efficacy"	ICAC
icacf3	Self-concept - "psychological maturity"	ICAC
icacf4	Self-concept – "impulsivity/activity"	ICAC
INT	Intention to use Web 2.0 to supplement in-class learning	Web 2.0 Survey
PEOU	Perceived Ease of Use of Web 2.0 Tools	Web 2.0 Survey
PU	Perceived Usefulness of Web 2.0 Tools	Web 2.0 Survey
qvacarreira	Students' Academic Experiences – " career"	QVA-r
qvaestcurso	Students' Academic Experiences – "study"	QVA-r
qvainstituc	Students' Academic Experiences – "institutional"	QVA-r
qvainterpes	Students' Academic Experiences – "interpersonal"	QVA-r
qvapessoal	Students' Academic Experiences – "personal"	QVA-r
rsestotal	Personal Self-esteem	RSES
selfpercca	Self-perception – academic competence	SPP-CS
selfpercci	Self-perception – intellectual competence	SPP-CS
swalstot	Satisfaction with academic life	SWALS
swlstot	Satisfaction with life	SWLS

[1] Note: the names of the instruments mentioned on the right column, and information regarding their respective authors, are presented on Table 13.6.

Table 13.6. Instruments used to assess psychological variables

Instrument	Assessed Dimensions
CSEp - Collective Self-esteem Scale –esteem (Based on CSES, Luhtanen & Crocker, 1992)	*Collective* Self-esteem
SWLS – Satisfaction with Life Scale (Neto, 1999)	Satisfaction with Life
SWALS – Satisfaction with Academic Life Scale (Based on the SWLS, Neto, 1999)	Satisfaction with Academic Life
ESSS – Satisfaction with Social Support Scale (Ribeiro, 1999)	Satisfaction with Social Support
SPP-CS – Self-Percep. Profile for College Students (Ribeiro, 1994)	Students' Self-perception
QVAr – Academic Experiences Survey (Almeida, Ferreira & Soares, 2001)	Students' Academic Experiences
RSES – Rosenberg Self-Esteem Scale (Santos, 2008)	*Personal* Self-esteem
ICAC – Self-concept inventory (Serra, 1986)	Self-concept
AE – Auto-Eficácia Geral (Ribeiro, 1995)	General Self-efficacy

APPENDIX 14 - ESTIMATES FOR SECOND TAM-ENHANCED MODEL (WEB 2.0)

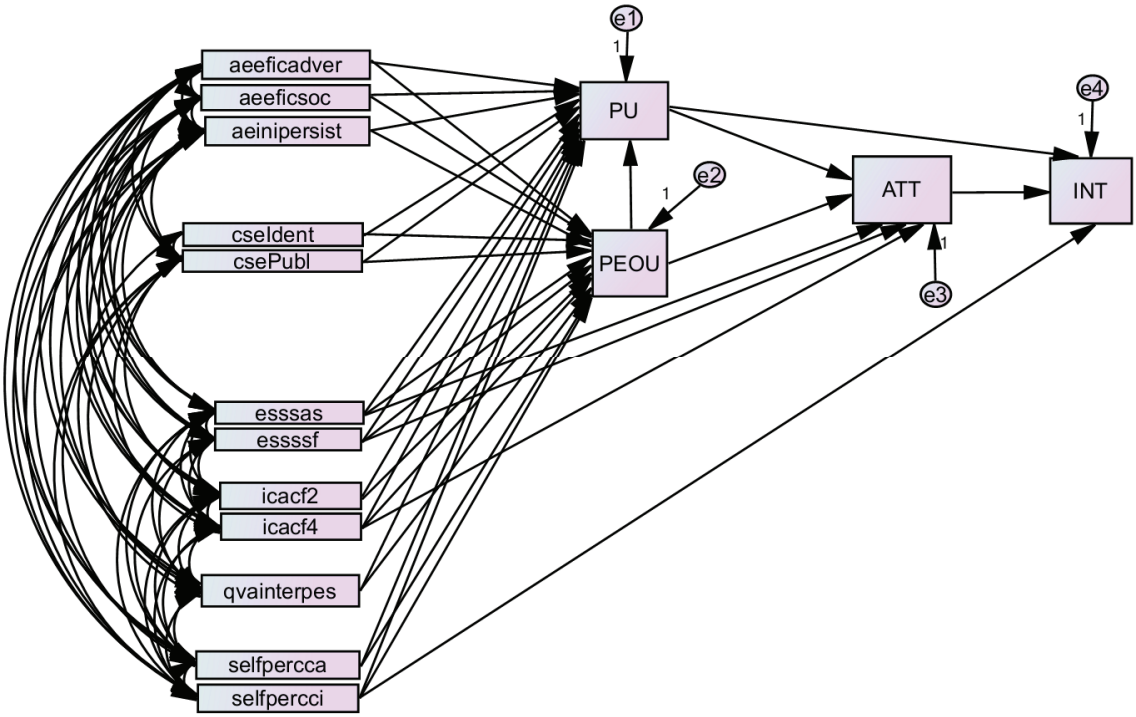

Figure 14.1. Integration of psychological variables in TAM (Davis, 1989)

Table 14.1. Goodness of fit indicators for the model represented on Figure 14.1

Fit measure	Good fit	Acceptable fit	Model value
χ^2/df	≤ 2	≤ 3	1,106
RMSEA	< 0.05	< 0.08	0,014
CFI	≥0.97	≥0.95	0,999
GFI	≥0.95	≥0.90	0,992
AGFI	≥0.90	≥0.85	0,966
IFI	≥0.95	≥0.90	0,999

Mardia's multivariate kurtosis coefficient for the model was 35,376

χ^2 was non-significant χ^2 (33, N=550) =36,491, p=0,310

Bollen-Stine bootstrap p=0,471

Estimates were calculated using the maximum likelihood (ML) method and "bias-corrected" (BC) using Amos bootstrap with 2000 samples.

Table 14.2. Regression Estimates for the model in Figure 14.1

	Estimate	BC Estimate	Std Estimate	BC Std Estimate
aeEficAdver->PEOU	0,051*	0,051	0,179	0,177
aeEficSoc->PEOU	0,04	0,04	0,101	0,102
cseIdent->PEOU	0,081	0,08	0,069	0,068
aeIniPersist->PEOU	-0,015	-0,015	-0,064	-0,062
csePubl->PEOU	-0,136*	-0,133	-0,101	-0,098
esssAS->PEOU	-0,045*	-0,045	-0,089	-0,088
esssSF->PEOU	0,056*	0,055	0,094	0,093
icacF2->PEOU	-0,097**	-0,098	-0,216	-0,216
icacF4->PEOU	0,16**	0,161	0,188	0,189
qvaInterpes->PEOU	0,018	0,018	0,093	0,091
selfpercCA->PEOU	-0,076*	-0,075	-0,113	-0,113
selfpercCI->PEOU	0,083*	0,082	0,137	0,135
PEOU->PU	0,714**	0,715	0,703	0,703
aeEficAdver->PU	-0,041**	-0,042	-0,142	-0,143
aeEficSoc->PU	0,041**	0,042	0,103	0,104
aeIniPersist->PU	-0,015	-0,015	-0,064	-0,063
cseIdent->PU	0,095**	0,094	0,079	0,078
csePubl->PU	-0,045	-0,045	-0,033	-0,033
esssAS->PU	0,015	0,014	0,028	0,027
esssSF->PU	-0,035	-0,035	-0,058	-0,058
icacF2->PU	0,04	0,039	0,088	0,086
icacF4->PU	0,032	0,031	0,037	0,036
qvaInterpes->PU	0,002	0,002	0,009	0,009
selfpercCA->PU	0	0	0	0
selfpercCI->PU	-0,035	-0,034	-0,057	-0,055
PU->ATT	0,465**	0,462	0,51	0,507
PEOU->ATT	0,317**	0,319	0,343	0,344
icacF4->ATT	0,053**	0,053	0,067	0,067
esssSF->ATT	-0,025	-0,025	-0,045	-0,045
esssAS->ATT	-0,02	-0,02	-0,042	-0,042
ATT->INT	0,605**	0,606	0,497	0,498
PU->INT	0,383**	0,381	0,345	0,343
selfpercCI->INT	-0,046*	-0,046	-0,067	-0,068

Table 14.3. Covariance Estimates for the model in Figure 14.1

	Cov	BC Cov	Corr	BC Corr
cseIdent<->qvaInterpes	1,148**	1,152	0,116	0,116
cseIdent<->csePubl	0,341**	0,341	0,238	0,238
esssSF<->selfpercCA	0,701**	0,699	0,121	0,121
qvaInterpes<->esssSF	4,726**	4,717	0,239	0,239
esssSF<->icacF4	0,363*	0,359	0,08	0,079
esssSF<->icacF2	2,157**	2,158	0,251	0,252
esssSF<->esssAS	2,094**	2,082	0,276	0,274
esssSF<->aeIniPersist	3,958**	3,954	0,245	0,245
esssSF<->aeEficSoc	1,962**	1,957	0,199	0,199
esssSF<->aeEficAdver	2,842**	2,85	0,21	0,211
esssAS<->selfpercCI	1,07**	1,069	0,145	0,145
selfpercCA<->esssAS	0,8**	0,799	0,119	0,119
qvaInterpes<->esssAS	5,823**	5,836	0,254	0,255
icacF4<->esssAS	0,452*	0,443	0,086	0,084
icacF2<->esssAS	1,964**	1,954	0,197	0,197
esssAS<->aeIniPersist	5,23**	5,226	0,279	0,279
esssAS<->aeEficSoc	2,446**	2,45	0,214	0,215
esssAS<->aeEficAdver	2,694**	2,689	0,172	0,172
selfpercCA<->selfpercCI	3,478**	3,472	0,616	0,616
qvaInterpes<->selfpercCI	4,965**	4,944	0,258	0,257
icacF4<->selfpercCI	0,994**	0,992	0,224	0,224
icacF2<->selfpercCI	3,105**	3,09	0,372	0,37
csePubl<->selfpercCI	0,346**	0,343	0,124	0,124
aeIniPersist<->selfpercCI	6,424**	6,422	0,408	0,409
aeEficSoc<->selfpercCI	2,082**	2,08	0,217	0,217
aeEficAdver<->selfpercCI	3,488**	3,461	0,265	0,263
qvaInterpes<->selfpercCA	5,056**	5,06	0,289	0,289
selfpercCA<->icacF4	0,747**	0,748	0,186	0,186
selfpercCA<->icacF2	3,841**	3,832	0,505	0,505
csePubl<->selfpercCA	0,412**	0,407	0,163	0,162
selfpercCA<->aeIniPersist	7,653**	7,653	0,535	0,535
selfpercCA<->aeEficSoc	2,053**	2,07	0,236	0,237
selfpercCA<->aeEficAdver	5,234**	5,224	0,437	0,437
qvaInterpes<->icacF4	4,991**	4,987	0,364	0,363
qvaInterpes<->icacF2	11,742**	11,724	0,453	0,453

Table 14.3. Covariance Estimates for the model in Figure 14.1 (continued)

	Cov	BC Cov	Corr	BC Corr
qvaInterpes<->csePubl	1,481**	1,47	0,172	0,171
qvaInterpes<->aeIniPersist	25,554**	25,553	0,524	0,525
qvaInterpes<->aeEficSoc	17,788**	17,802	0,599	0,6
qvaInterpes<->aeEficAdver	18,346**	18,28	0,449	0,448
icacF4<->icacF2	2,48**	2,473	0,416	0,414
csePubl<->icacF4	0,279**	0,28	0,141	0,141
icacF4<->aeIniPersist	3,829**	3,828	0,341	0,341
icacF4<->aeEficSoc	1,913**	1,923	0,28	0,281
icacF4<->aeEficAdver	2,894**	2,894	0,308	0,308
csePubl<->icacF2	0,992**	0,984	0,265	0,264
icacF2<->aeIniPersist	14,953**	14,949	0,706	0,706
icacF2<->aeEficSoc	4,71**	4,717	0,365	0,365
icacF2<->aeEficAdver	12,693**	12,698	0,715	0,716
csePubl<->aeIniPersist	2,048**	2,032	0,29	0,289
csePubl<->aeEficSoc	0,796**	0,795	0,185	0,186
csePubl<->aeEficAdver	1,952**	1,936	0,331	0,329
aeIniPersist<->aeEficSoc	12,412**	12,432	0,511	0,512
aeIniPersist<->aeEficAdver	26,463**	26,39	0,792	0,791
aeEficSoc<->aeEficAdver	9,482**	9,474	0,466	0,466

Table 14.4. Alphabetically-ordered list of the acronyms used to represent the variables of the study

Acronym	Corresponding Construct	Instrument[1]
aeeficadver	General Self-efficacy – "efficacy on adversity"	AE
aeeficsoc	General Self-efficacy- "social efficacy"	AE
aeinipersist	General Self-efficacy – "initiative and persistence"	AE
ATT	Attitudes / Using Web 2.0 to supplement in-class learning	Web 2.0 Survey
cseIdent	Collective Self-esteem – "identity"	CSEp
csePubl	Collective Self-esteem – "public"	CSEp
csePriv	Collective Self-esteem – "private"	CSEp
esssas	Satisfaction with Social Support – "social activities"	ESSS
esssin	Satisfaction with Social Support – "intimacy"	ESSS
essssa	Satisfaction with Social Support – "satisf. with friends"	ESSS
essssf	Satisfaction with Social Support – "family support"	ESSS
icacf1	Self-concept - "social acceptance/rejection"	ICAC
icacf2	Self-concept - "self-efficacy"	ICAC
icacf3	Self-concept - "psychological maturity"	ICAC
icacf4	Self-concept – "impulsivity/activity"	ICAC
INT	Intention to use Web 2.0 to supplement in-class learning	Web 2.0 Survey
PEOU	Perceived Ease of Use of Web 2.0 Tools	Web 2.0 Survey
PU	Perceived Usefulness of Web 2.0 Tools	Web 2.0 Survey
qvacarreira	Students' Academic Experiences – " career"	QVA-r
qvaestcurso	Students' Academic Experiences – "study"	QVA-r
qvainstituc	Students' Academic Experiences – "institutional"	QVA-r
qvainterpes	Students' Academic Experiences – "interpersonal"	QVA-r
qvapessoal	Students' Academic Experiences – "personal"	QVA-r
rsestotal	Personal Self-esteem	RSES
selfpercca	Self-perception – academic competence	SPP-CS
selfpercci	Self-perception – intellectual competence	SPP-CS
swalstot	Satisfaction with academic life	SWALS
swlstot	Satisfaction with life	SWLS

[1] Note: the names of the instruments mentioned on the right column, and information regarding their respective authors, are presented on Table 14.5.

Table 14.5. Instruments used to assess psychological variables

Instrument	Assessed Dimensions
CSEp - Collective Self-esteem Scale –esteem (Based on CSES, Luhtanen & Crocker, 1992)	*Collective* Self-esteem
SWLS – Satisfaction with Life Scale (Neto, 1999)	Satisfaction with Life
SWALS – Satisfaction with Academic Life Scale (Based on the SWLS, Neto, 1999)	Satisfaction with Academic Life
ESSS – Satisfaction with Social Support Scale (Ribeiro, 1999)	Satisfaction with Social Support
SPP-CS – Self-Percep. Profile for College Students (Ribeiro, 1994)	Students' Self-perception
QVAr – Academic Experiences Survey (Almeida, Ferreira & Soares, 2001)	Students' Academic Experiences
RSES – Rosenberg Self-Esteem Scale (Santos, 2008)	*Personal* Self-esteem
ICAC – Self-concept inventory (Serra, 1986)	Self-concept
AE – Auto-Eficácia Geral (Ribeiro, 1995)	General Self-efficacy

APPENDIX 15 - INTERMEDIATE INTEGRATIVE MODEL (WEB 2.0)

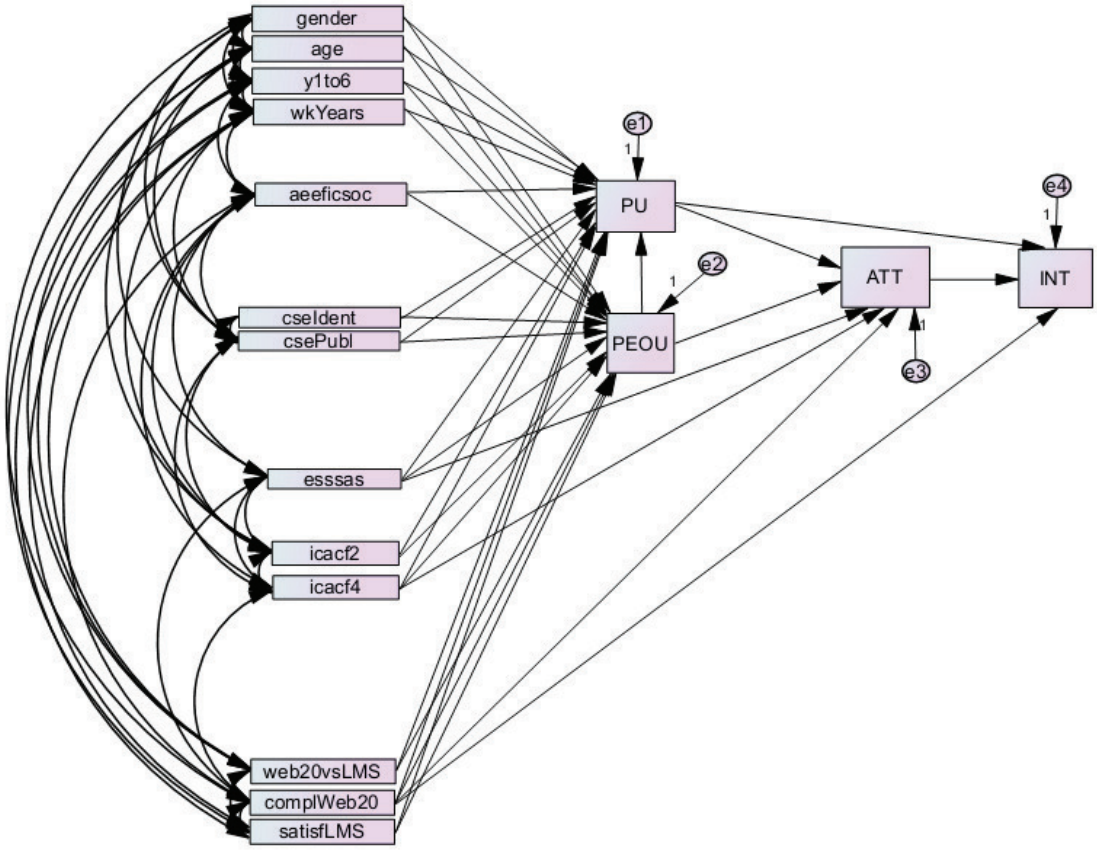

Figure 15.1 Intermediate integrative model
(Demographic, professional and LMS-related variables)

Table 15.1. Goodness of fit indicators of model represented on Figure 15.1. (N=550)

Fit measure	Good fit	Acceptable fit	Model value
χ^2/df	≤ 2	≤ 3	0,903
RMSEA	≤ 0.05	≤ 0.08	0,000
CFI	≥0.97	≥0.95	1
GFI	≥0.95	≥0.90	0,988
AGFI	≥0.90	≥0.85	0,971
IFI	≥0.95	≥0.90	1

The Mardia's multivariate kurtosis coefficient for the model was 83,898, with variables "age", and "wkYears" contributing more to the multivariate non-normality of the data. The χ^2 test indicated good fit: χ^2 (65, N=550) =58,674, p=0,697.

Most importantly, given the existence of severe multivariate non-normality in the data, the Bollen-Stine bootstrap p was 0,825.

Estimates were calculated using the maximum likelihood (ML) method and "bias-corrected" (BC) using Amos bootstrap with 2000 samples.

Table 15.2 Standardized total effects

Variable [a]	PEOU Estimate	PU Estimate	**ATT Estimate**	**INT Estimate**
aeEficSoc	0,151**	0,127**	**0,11****	**0,094****
age	0,147	-0,068	**0,015**	**-0,015**
complWeb20	0,352**	0,412**	**0,412****	**0,41****
cseIdentMed	0,073	0,137**	**0,09****	**0,087****
csePublMed	-0,06	-0,099*	**-0,067***	**-0,064***
esssAS	-0,028	-0,007	**-0,058**	**-0,03**
gender	-0,1*	-0,137**	**-0,098****	**-0,091****
icacF2	-0,084	-0,105*	**-0,077***	**-0,071***
icacF4	0,133**	0,103*	**0,147****	**0,103****
satisfLMS	0,013	-0,006	**0,001**	**-0,002**
web20vsLMS	0,06	0,052	**0,044**	**0,038**
wkYears	-0,165*	0,079	**-0,015**	**0,018**
y1to6	-0,064	-0,052	**-0,046**	**-0,038**

Notes: [a]Please, refer to Table 15.4 for information on what each variable's acronym represents
* p<0,05. ** p<0,01

Table 15.3. Explained variance for endogenous variables in model of Figure 15.1

Endogenous Variable	Variance Explained (%)
PEOU (Perceived ease of use)	22
PU (Perceived usefulness)	57
ATT (Attitudes)	66
INT (Intention)	63

Table 15.4. Meaning of variables acronyms

Variable [a]	Assessed Dimension
aeEficSoc	Social self-efficacy (as measured by AE)
age	Age
ATT	Attitudes towards using Web 2.0 to suppl. Learning (TAM)
complWeb20	Wish that institutions LMS was complemented with Web 2.0
cseIdentMed	Importance to identity collective self-esteem (as measured by CSEp)
csePublMed	Public collective self-esteem (as measured by CSEp)
esssAS	Satisfaction with social support (as measured by ESSS)
gender	Gender (male/female)
icacF2	Self-efficacy (as measured by ICAC)
icacF4	Activity-impulsivity (as measured by ICAC)
INT	Intentions towards using Web 2.0 to suppl. Learning (TAM)
PEOU	Perceived Ease of Use (TAM) / Web 2.0 suppl. learning
PU	Perceived Usefulness (TAM) / Web 2.0 suppl. Learning
satisfLMS	Satisfaction with institutions' LMS
web20vsLMS	Institution's LMS "equal or better" than any Web 2.0 tool
wkYears	Years of professional experience
y1to6	Year of Enrolment (from 1st BSc year students to MSc finalists)

Table 15.5. Regression estimates

	Estimate	BC Estimate	Std Estimate	BC Std Estimate
aeEficSoc->PEOU	0,059**	0,059	0,151	0,151
cseIdentMed->PEOU	0,086	0,086	0,073	0,073
csePublMed->PEOU	-0,082	-0,081	-0,06	-0,059
esssAS->PEOU	-0,014	-0,015	-0,028	-0,029
icacF2->PEOU	-0,038	-0,038	-0,084	-0,085
icacF4->PEOU	0,113**	0,114	0,133	0,133
wkYears->PEOU	-0,047*	-0,046	-0,165	-0,161
y1to6->PEOU	-0,098	-0,099	-0,064	-0,064
age->PEOU	0,037	0,036	0,147	0,144
gender->PEOU	-0,323*	-0,317	-0,1	-0,098
web20vsLMS->PEOU	0,06	0,06	0,06	0,059
complWeb20->PEOU	0,315**	0,314	0,352	0,351
satisfLMS->PEOU	0,013	0,01	0,013	0,011
PEOU->PU	0,616**	0,616	0,607	0,608
aeEficSoc->PU	0,014	0,015	0,035	0,037
cseIdentMed->PU	0,111**	0,11	0,093	0,092
csePublMed->PU	-0,086*	-0,086	-0,062	-0,062
esssAS->PU	0,005	0,005	0,01	0,01
icacF2->PU	-0,025	-0,025	-0,054	-0,056
icacF4->PU	0,019	0,019	0,022	0,022
wkYears->PU	0,051**	0,049	0,179	0,17
y1to6->PU	-0,021	-0,023	-0,013	-0,015
age->PU	-0,04**	-0,038	-0,157	-0,148
gender->PU	-0,25**	-0,248	-0,076	-0,076
web20vsLMS->PU	0,016	0,017	0,016	0,016
complWeb20->PU	0,18**	0,179	0,199	0,197
satisfLMS->PU	-0,014	-0,012	-0,014	-0,013
PU->ATT	0,437**	0,436	0,48	0,478
PEOU->ATT	0,299**	0,301	0,324	0,325
esssAS->ATT	-0,022	-0,022	-0,046	-0,046
complWeb20->ATT	0,083**	0,082	0,1	0,099
icacF4->ATT	0,043*	0,043	0,055	0,055
ATT->INT	0,576**	0,578	0,473	0,474
PU->INT	0,362**	0,36	0,325	0,324
complWeb20->INT	0,082**	0,082	0,082	0,081

Table 15.6. Covariances estimates

	Cov	BC Cov	Corr	BC Corr
cseIdentMed<->csePublMed	0,327**	0,329	0,229	0,231
esssAS<->icacF4	0,451*	0,442	0,085	0,084
esssAS<->icacF2	2,059**	2,06	0,205	0,205
esssAS<->aeEficSoc	2,509**	2,512	0,219	0,219
icacF4<->icacF2	2,493**	2,487	0,416	0,414
csePublMed<->icacF4	0,285**	0,285	0,144	0,144
icacF4<->aeEficSoc	1,916**	1,926	0,279	0,281
csePublMed<->icacF2	1,017**	1,011	0,271	0,27
icacF2<->aeEficSoc	4,8**	4,815	0,369	0,37
csePublMed<->aeEficSoc	0,844**	0,839	0,197	0,196
age<->gender	-0,278*	-0,277	-0,099	-0,099
y1to6<->gender	0,047*	0,047	0,102	0,102
wkYears<->gender	-0,252*	-0,252	-0,101	-0,1
csePublMed<->gender	0,054**	0,053	0,104	0,103
esssAS<->gender	-0,189**	-0,19	-0,136	-0,137
gender<->complWeb20	-0,053	-0,054	-0,067	-0,068
y1to6<->age	1,248**	1,251	0,212	0,214
wkYears<->age	27,349**	27,339	0,854	0,853
csePublMed<->age	0,773**	0,774	0,116	0,117
icacF2<->age	2,115**	2,106	0,105	0,104
age<->web20vsLMS	-0,997**	-0,999	-0,111	-0,112
age<->satisfLMS	-1,611**	-1,617	-0,171	-0,173
wkYears<->y1to6	0,455*	0,461	0,087	0,087
aeEficSoc<->y1to6	-0,454**	-0,452	-0,12	-0,119
y1to6<->web20vsLMS	-0,143*	-0,145	-0,097	-0,098
y1to6<->satisfLMS	-0,356**	-0,357	-0,23	-0,232
aeEficSoc<->wkYears	1,338**	1,327	0,065	0,065
csePublMed<->wkYears	0,893**	0,888	0,15	0,15
icacF2<->wkYears	2,094**	2,081	0,116	0,116
wkYears<->web20vsLMS	-0,679*	-0,676	-0,085	-0,085
wkYears<->satisfLMS	-0,917**	-0,923	-0,109	-0,111
web20vsLMS<->satisfLMS	1,574**	1,566	0,667	0,665
complWeb20<->satisfLMS	-0,368**	-0,37	-0,138	-0,139
aeEficSoc<->complWeb20	0,542*	0,548	0,083	0,084
esssAS<->complWeb20	-0,419*	-0,418	-0,083	-0,083
icacF4<->complWeb20	0,485**	0,487	0,161	0,162

Table 15.7. Instruments used to assess psychological variables, used in both studies: A1 and A2

Instrument	Assessed Construct
CSEp - Collective Self-esteem Scale –esteem (Based on CSES, Luhtanen & Crocker, 1992)	*Collective* Self-esteem
SWLS – Satisfaction with Life Scale (Neto, 1999)	Satisfaction with Life
SWALS – Satisfaction with Academic Life Scale (Based on the SWLS, Neto, 1999)	Satisfaction with Academic Life
ESSS – Satisfaction with Social Support Scale (Ribeiro, 1999)	Satisfaction with Social Support
SPP-CS – Self-Percep. Profile for College Students (Ribeiro, 1994)	Students' Self-perception
QVAr – Academic Experiences Survey (Almeida, Ferreira & Soares, 2001)	Students' Academic Experiences
RSES – Rosenberg Self-Esteem Scale (Santos, 2008)	*Personal* Self-esteem
ICAC – Self-concept inventory (Serra, 1986)	Self-concept
AE – Auto-Eficácia Geral (Ribeiro, 1995)	General Self-efficacy

APPENDIX 16 - FINAL INTEGRATIVE MODEL (WEB 2.0)

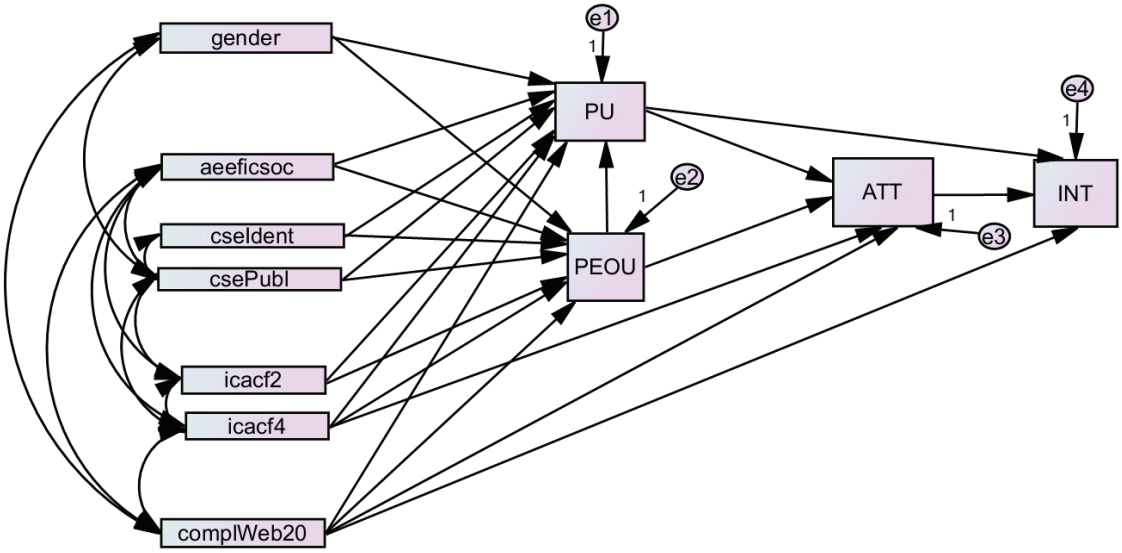

Figure 16.1. Final integrative model

For the final integrative model depicted in Figure 8.22, the basic χ^2 statistic provided a good indicator of its fit: χ^2 (22, N=550) =23,455, p=0,377.

The Mardia's multivariate kurtosis coefficient was 18,039, thus being important to supplement the results of the $\chi^2$with a non-parametric measure of goodness of fit. For this purpose, the Bollen-Stine bootstrap p was computed, and a p value of 0,528 confirmed the goodness of fit of the model.

Other fit indicators concerning the model depicted in Figure 16.1 are shown in Table 16.1. According to those indicators, the model presents a very good fit for the data obtained from our sample.

Table 16.1. Fit indicators of the final integrative mode, represented on Figure 16.1

Fit measure	Good fit	Acceptable fit	Model value
χ^2/df	≤2	≤ 3	1,066
RMSEA	≤ 0.05	≤ 0.08	0,011
CFI	≥0.97	≥0.95	0,999
GFI	≥0.95	≥0.90	0,992
AGFI	≥0.90	≥0.85	0,977
IFI	≥0.95	≥0.90	0,999

Estimates were calculated using the maximum likelihood (ML) method and "bias-corrected" (BC) using Amos bootstrap with 2000 samples.

Table 16.2. Standardized total effects on attitudes (ATT) and intentions (INT)

Variable [a]	ATT Estimate	INT Estimate
gender	-0,097**	-0,091**
aeEficSoc	0,114**	0,099**
cseIdent	0,089**	0,087**
csePubl	-0,07**	-0,065**
icacF2	-0,083*	-0,075*
icacF4	0,144**	0,102**
complWeb20	0,417**	0,413**

Notes: [a]Please, refer to Table 16.9 for information on what each variable's acronym represents. * p<0,05. ** p<0,01

Table 16.3. Explained variance for endogenous variables in model of Figure 16.1

Endogenous Variable	Variance Explained (%)
PEOU (Perceived ease of use)	21
PU (Perceived usefulness)	56
ATT (Attitudes)	65
INT (Intention)	63

Table 16.4. Regression Estimates for the Predictors of PEOU

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
gender	-0,303*	-0,298	**-0,094***	-0,092
aeEficSoc	0,057**	0,057	**0,146****	0,145
cseIdent	0,085	0,084	**0,072**	0,071
csePubl	-0,095	-0,093	**-0,07**	-0,068
icacF2	-0,042*	-0,043	**-0,094***	-0,096
icacF4	0,118**	0,119	**0,139****	0,14
complWeb20	0,314**	0,314	**0,351****	0,352

* p<0,05. ** p<0,01

Table 16.5. Regression Estimates for the Predictors of PU

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
gender	-0,271**	-0,269	**-0,083****	-0,082
aeEficSoc	0,021	0,021	**0,052**	0,053
cseIdent	0,113**	0,112	**0,094****	0,094
csePubl	-0,079	-0,079	**-0,057**	-0,057
icacF2	-0,024	-0,025	**-0,054**	-0,055
icacF4	0,017	0,016	**0,02**	0,019
complWeb20	0,185**	0,183	**0,204****	0,202
PEOU	0,608**	0,61	**0,599****	0,6

* p<0,05. ** p<0,01

Table 16.6. Regression Estimates for the Predictors of Attitudes

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
icacF4	0,039	0,039	**0,05**	0,05
complWeb20	0,087**	0,086	**0,105****	0,104
PU	0,436**	0,434	**0,478****	0,476
PEOU	0,301**	0,302	**0,325****	0,326

* p<0,05. ** p<0,01

Table 16.7. Regression Estimates for the Predictors of Intentions

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
complWeb20	0,082**	0,082	**0,081****	0,081
PU	0,362**	0,36	**0,326****	0,324
ATT	0,576**	0,578	**0,473****	0,474
complWeb20	0,082**	0,082	**0,081****	0,081

* p<0,05. ** p<0,01

Table 16.8. Covariance and correlation matrices.

	Cov	BC Cov Mean	**Corr**	BC Corr Mean
cseIdent<-->csePubl	0,326**	0,326	**0,228****	0,229
icacF2<-->icacF4	2,514**	2,506	**0,417****	0,415
csePubl<-->icacF4	0,298**	0,297	**0,151****	0,15
icacF4<-->aeEficSoc	1,947**	1,955	**0,283****	0,284
csePubl<-->icacF2	1,067**	1,062	**0,283****	0,283
icacF2<-->aeEficSoc	4,882**	4,891	**0,373****	0,373
csePubl<-->aeEficSoc	0,88**	0,879	**0,205****	0,205
csePubl<-->gender	0,053*	0,052	**0,102***	0,101
gender<-->complWeb20	-0,065*	-0,065	**-0,082***	-0,083
aeEficSoc<-->complWeb20	0,546*	0,544	**0,084***	0,083
icacF4<-->complWeb20	0,46**	0,461	**0,153****	0,154

* p<0,05. ** p<0,01

Table 16.9. Meaning of variables acronyms (Model in Figure 16.1)

Variable [a]	**Assessed Dimension**
aeEficSoc	Social self-efficacy (as measured by AE)
ATT	Attitudes towards using Web 2.0 to suppl. Learning (TAM)
complWeb20	Wish that institutions LMS was complemented with Web 2.0
cseIdentMed	Importance to identity collective self-esteem (as measured by CSEp)
csePublMed	Public collective self-esteem (as measured by CSEp)
gender	Gender (male/female)
icacF2	Self-efficacy (as measured by ICAC)
icacF4	Activity-impulsivity (as measured by ICAC)
INT	Intentions towards using Web 2.0 to suppl. Learning (TAM)
PEOU	Perceived Ease of Use (TAM) / Web 2.0 suppl. learning
PU	Perceived Usefulness (TAM) / Web 2.0 suppl. Learning

Table 16.10. Instruments used to assess psychological variables

Instrument	Assessed Construct
CSEp - Collective Self-esteem Scale –esteem (Based on CSES, Luhtanen & Crocker, 1992)	*Collective* Self-esteem
SWLS – Satisfaction with Life Scale (Neto, 1999)	Satisfaction with Life
SWALS – Satisfaction with Academic Life Scale (Based on the SWLS, Neto, 1999)	Satisfaction with Academic Life
ESSS – Satisfaction with Social Support Scale (Ribeiro, 1999)	Satisfaction with Social Support
SPP-CS – Self-Percep. Profile for College Students (Ribeiro, 1994)	Students' Self-perception
QVAr – Academic Experiences Survey (Almeida, Ferreira & Soares, 2001)	Students' Academic Experiences
RSES – Rosenberg Self-Esteem Scale (Santos, 2008)	*Personal* Self-esteem
ICAC – Self-concept inventory (Serra, 1986)	Self-concept
AE – Auto-Eficácia Geral (Ribeiro, 1995)	General Self-efficacy

APPENDIX 17 - CORE MODEL (FACEBOOK)

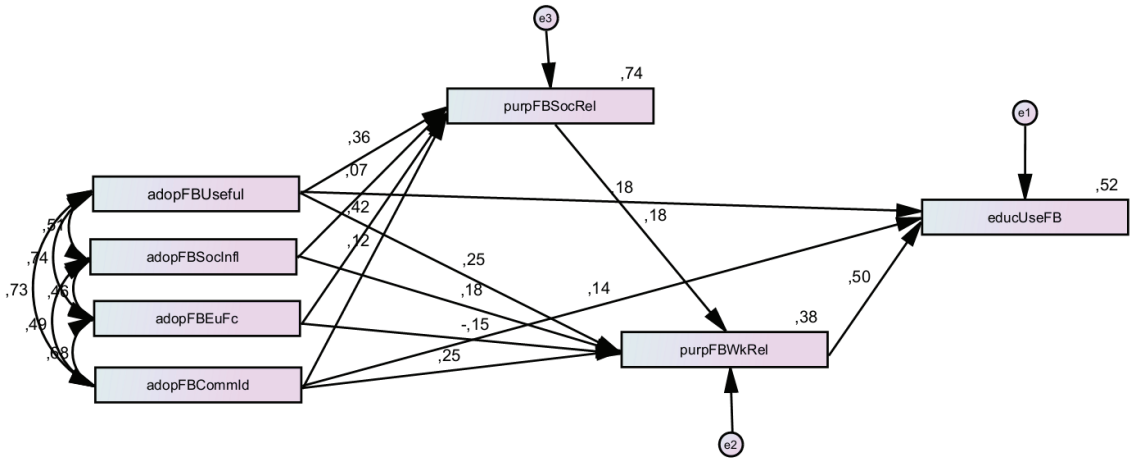

Figure 17.1. Core educational usage of Facebook model

Tables 17.1 to 17.4 provide further details regarding the regression and covariance estimates presented on Figure 17.1. The estimates displayed on Figure 17.1 correspond to the column labeled "Standardized Regression" (the column marked with **bold** type).

In the context of the model presented in Figure 17.1, the four predictors of the variable assessing the use of Facebook for the purpose of creating or maintaining social relations ("purpFBSocRel") explained 74% of the variance observed for that variable.

The five predictors of the variable measuring the use of Facebook for work-related purposes ("purpFBWkRel") explained 38% of the variance observed for that variable.

The three predictors of educational use of Facebook ("educUseFB") explained 52% of the total variance observed for that variable.

Table 17.1. Predictors of " purpFBSocRel"

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
adopFBUseful	0,378**	0,378	**0,362****	0,361
adopFBSocInfl	0,086**	0,086	**0,072****	0,072
adopFBCommId	0,129**	0,128	**0,123****	0,122
adopFBEuFc	0,456**	0,457	**0,416****	0,417

Note: ** p<0,01

Table 17.2. Predictors of "purpFBWkRel"

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
adopFBCommId	0,233**	0,231	**0,246****	0,244
adopFBEuFc	-0,145*	-0,145	**-0,147***	-0,146
adopFBUseful	0,231**	0,232	**0,245****	0,245
adopFBSocInfl	0,192**	0,191	**0,179****	0,178
purpFBSocRel	0,163**	0,164	**0,181****	0,182

Note: ** p<0,01; * p<0,05

Table 17.3. Predictors of "educUseFB"

	Estimate	BC Estimate	**Std Estimate**	BC Std Estimate
purpFBWkRel	0,436**	0,435	**0,5****	0,499
adopFBUseful	0,152**	0,153	**0,185****	0,186
adopFBCommId	0,115**	0,114	**0,139****	0,138

Note: ** p<0,01

Table 17.4. Covariances among exogenous variables in the model

	Cov	BC Cov Mean	**Corr**	BC Corr Mean
adopFBCommId<->adopFBEuFc	5,004**	4,998	0,677**	0,677
adopFBSocInfl<->adopFBCommId	3,355**	3,351	0,494**	0,495
adopFBUseful<->adopFBCommId	5,653**	5,648	0,73**	0,73
adopFBSocInfl<->adopFBEuFc	3,006**	3,005	0,462**	0,462
adopFBUseful<->adopFBEuFc	5,495**	5,489	0,741**	0,74
adopFBUseful<->adopFBSocInfl	3,469**	3,467	0,509**	0,509

Note: ** p<0,01

APPENDIX 18 - PSYCHOLOGICAL VARIABLES SELECTION (FACEBOOK)

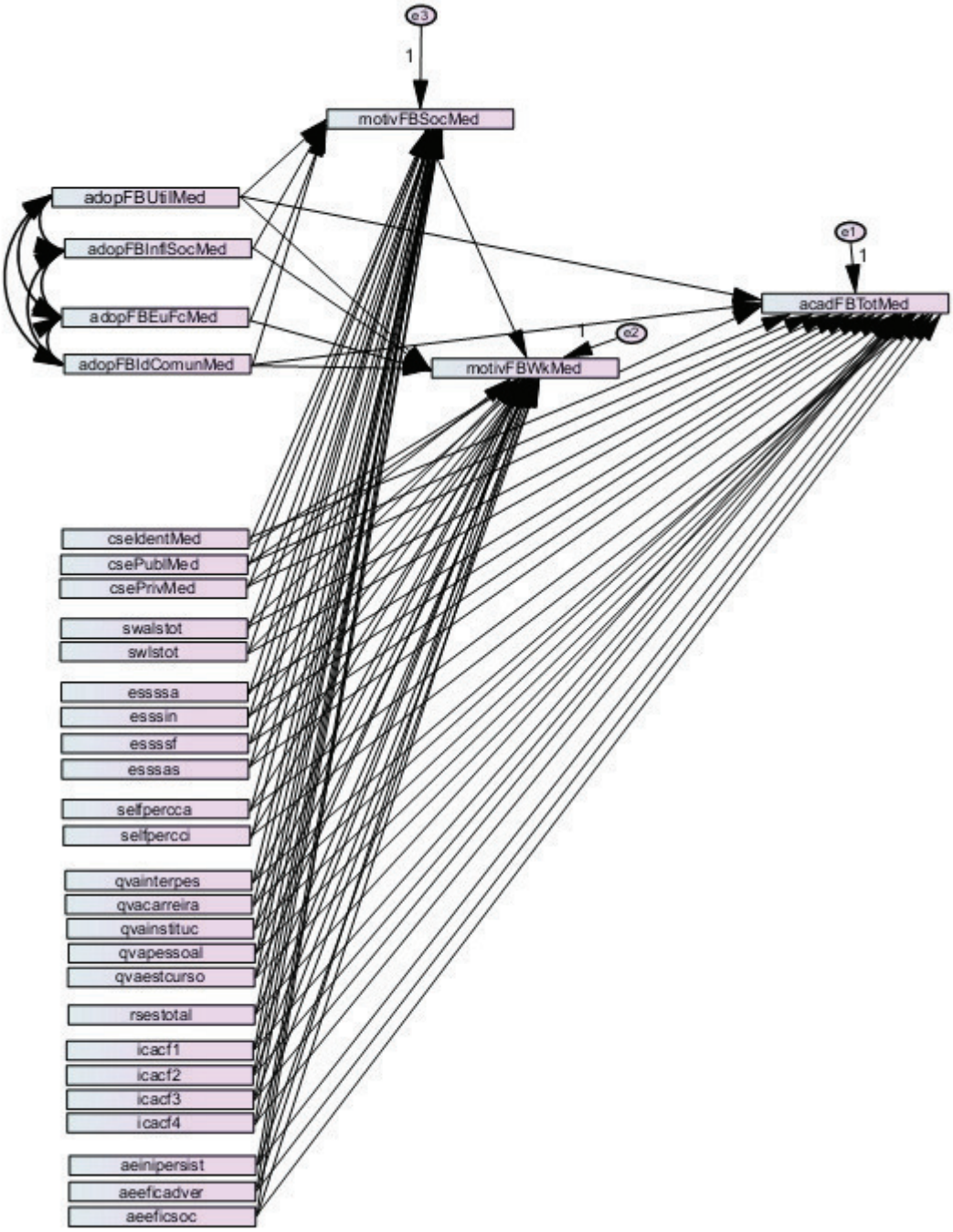

Figure 18.1. Model used to select relevant psychological variables (educational use of Facebook)

Table 18.1. Predictors of the variable "motivFBSocMed"

Variable	Regression Estimate
adopFBUtilMed	**0,38****
adopFBInflSocMed	**0,074***
adopFBIdComunMed	**0,116****
adopFBEuFcMed	**0,467****
cseIdentMed	0,017
csePublMed	0,091
csePrivMed	-0,035
swalsTot	0
swlsTot	0,024
esssSA	**0,041***
esssIN	0,021
esssSF	-0,017
esssAS	**-0,067****
selfpercCA	-0,005
selfpercCI	-0,046
icacF2	-0,01
qvaInterpes	0
qvaCarreira	0
qvaInstituc	0
qvaPessoal	-0,011
qvaEstCurso	-0,009
rsesTotal	**-0,026***
icacF1	0,013
icacF3	-0,007
icacF4	-0,034
aeIniPersist	**0,026****
aeEficAdver	-0,015
aeEficSoc	0,006

** p<0.01, * p<0,05

Table 18.2 Synthesis of significant predictors of the variable "motivFBSocMed"

Variable	Regression Estimate
adopFBUtilMed	0,38**
adopFBInflSocMed	0,074*
adopFBIdComunMed	0,116**
adopFBEuFcMed	0,467**
esssSA	0,041*
esssAS	-0,067**
rsesTotal	-0,026*
aeIniPersist	0,026**

** p<0.01, * p<0,05

Table 18.3. Predictors of the variable "motivFBWkMed"

Variable	Regression Estimate
adopFBIdComunMed	**0,22****
adopFBEuFcMed	**-0,128***
adopFBUtilMed	**0,227****
adopFBInflSocMed	**0,189****
motivFBSocMed	**0,165****
cseIdentMed	0,111
csePublMed	-0,008
csePrivMed	-0,094
swalsTot	-0,014
swlsTot	**0,046***
esssSA	-0,012
esssIN	0,01
esssSF	0,032
esssAS	0,003
selfpercCA	-0,004
selfpercCI	0,005
icacF2	0,021
qvaInterpes	0,008
qvaCarreira	-0,009
qvaInstituc	0,01
qvaPessoal	0,007
qvaEstCurso	0,018
rsesTotal	0,032
icacF1	0,022
icacF3	0,035
icacF4	**-0,154****
aeIniPersist	-0,022
aeEficAdver	**-0,034***
aeEficSoc	0,016

** p<0.01, * p<0,05

Table 18.4 Synthesis of significant predictors of the variable "motivFBWkMed"

Variable	Regression Estimate
adopFBIdComunMed	0,22**
adopFBEuFcMed	-0,128*
adopFBUtilMed	0,227**
adopFBInflSocMed	0,189**
motivFBSocMed	0,165**
swlsTot	0,046*
icacF4	-0,154**
aeEficAdver	-0,034*

** p<0.01, * p<0,05

Table 18.5. Predictors of the variable "acadFBTotMed"

Variable	Estimate
adopFBUtilMed	**0,15****
adopFBIdComunMed	**0,091***
cseIdentMed	**0,145****
csePublMed	**-0,168****
csePrivMed	0,029
swalsTot	0,028
swlsTot	-0,031
esssSA	0,029
esssIN	-0,029
esssSF	-0,013
esssAS	-0,032
selfpercCA	-0,009
selfpercCI	0,035
icacF2	**0,052****
qvaInterpes	0,001
qvaCarreira	0,002
qvaInstituc	**0,027***
qvaPessoal	0,007
qvaEstCurso	0
rsesTotal	0,001
icacF1	0,014
icacF3	0
icacF4	0,073
aeIniPersist	**-0,027***
aeEficAdver	-0,008
aeEficSoc	0,014

** p<0.01, * p<0,05

Table 18.6 Synthesis of significant predictors of the variable"acadFBTotMed"

Variable	Estimate
adopFBUtilMed	0,15**
adopFBIdComunMed	0,091*
cseIdentMed	0,145**
csePublMed	-0,168**
icacF2	0,052**
qvaInstituc	0,027*
aeIniPersist	-0,027*

** p<0.01, * p<0,05

Table 18.7 Synthesis of significant predictors of the three endogenous variables in the model

	Estimate
adopFBUtilMed->motivFBSocMed	0,38**
adopFBInflSocMed->motivFBSocMed	0,074*
adopFBIdComunMed->motivFBSocMed	0,116**
adopFBEuFcMed->motivFBSocMed	0,467**
esssSA->motivFBSocMed	0,041*
esssAS->motivFBSocMed	-0,067**
rsesTotal->motivFBSocMed	-0,026*
aeIniPersist->motivFBSocMed	0,026**
adopFBIdComunMed->motivFBWkMed	0,22**
adopFBEuFcMed->motivFBWkMed	-0,128*
adopFBUtilMed->motivFBWkMed	0,227**
adopFBInflSocMed->motivFBWkMed	0,189**
motivFBSocMed->motivFBWkMed	0,165**
swlsTot->motivFBWkMed	0,046*
icacF4->motivFBWkMed	-0,154**
aeEficAdver->motivFBWkMed	-0,034*
adopFBUtilMed->acadFBTotMed	0,15**
adopFBIdComunMed->acadFBTotMed	0,091*
cseIdentMed->acadFBTotMed	0,145**
csePublMed->acadFBTotMed	-0,168**
icacF2->acadFBTotMed	0,052**
qvaInstituc->acadFBTotMed	0,027*
aeIniPersist->acadFBTotMed	-0,027*

Note: this table synthesizes the results depicted in Tables 18.2, 18.4, and 18.6

APPENDIX 19 - COMPLETE COVARIANCE MATRIX (FACEBOOK)

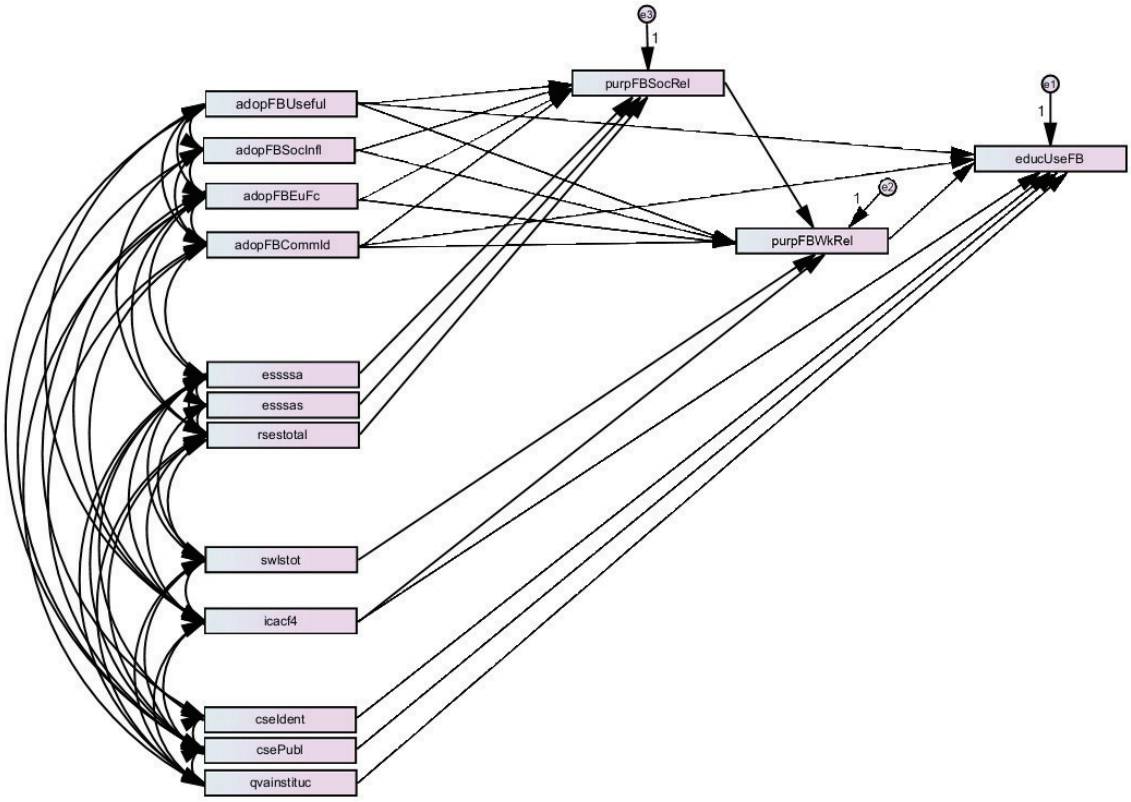

Figure 19.1. Final model for the educational usage of Facebook.

The correlations (i.e. standardized covariances) among the exogenous variables in the model are represented as double-headed arrows in the left-most side of the diagram. Table 19.1 details the strength of those correlations.

(Continued on the next page, please turn)

Table 19.1. Covariances and correlations for model represented in Figure 19.1.

	Cov	BC Cov Mean	Corr	BC Corr Mean
adopFBUseful<->adopFBCommId	5,536**	5,53	0,726**	0,726
adopFBUseful<->adopFBEuFc	5,364**	5,356	0,733**	0,733
adopFBUseful<->adopFBSocInfl	3,312**	3,31	0,494**	0,494
adopFBSocInfl<->adopFBCommId	3,156**	3,152	0,473**	0,473
adopFBSocInfl<->adopFBEuFc	2,841**	2,838	0,443**	0,443
adopFBCommId<->adopFBEuFc	4,903**	4,894	0,673**	0,672
adopFBEuFc<->esssSA	0,715**	0,712	0,072**	0,072
cseIdent<->esssSA	0,337*	0,336	0,07*	0,07
csePubl<->esssSA	0,636**	0,637	0,152**	0,153
esssSA<->esssAS	6,021**	6,019	0,54**	0,54
adopFBUseful<->icacF4	0,64**	0,637	0,13**	0,13
adopFBCommId<->icacF4	0,58**	0,579	0,119**	0,119
adopFBEuFc<->icacF4	0,987**	0,985	0,211**	0,211
csePubl<->icacF4	0,326**	0,326	0,165**	0,165
icacF4<->esssSA	0,897**	0,901	0,135**	0,136
adopFBEuFc<->qvaInstituc	0,966**	0,967	0,073**	0,073
csePubl<->qvaInstituc	0,683**	0,672	0,122**	0,121
qvaInstituc<->esssSA	3,574**	3,59	0,189**	0,191
qvaInstituc<->icacF4	1,279**	1,272	0,144**	0,143
adopFBSocInfl<->rsesTotal	-1,348**	-1,352	-0,121**	-0,122
adopFBEuFc<->rsesTotal	0,935**	0,926	0,077**	0,077
csePubl<->rsesTotal	1,049**	1,048	0,205**	0,206
esssAS<->rsesTotal	3,614**	3,613	0,266**	0,266
esssSA<->rsesTotal	6,393**	6,395	0,372**	0,371
icacF4<->rsesTotal	2,859**	2,861	0,352**	0,353
qvaInstituc<->rsesTotal	6,661**	6,639	0,29**	0,289
esssSA<->swlsTot	5,801**	5,801	0,415**	0,415
esssAS<->swlsTot	2,337**	2,323	0,211**	0,211
icacF4<->swlsTot	1,377**	1,381	0,209**	0,21
csePubl<->swlsTot	0,436**	0,433	0,105**	0,105
qvaInstituc<->swlsTot	3,781**	3,782	0,202**	0,203
adopFBUseful<->csePubl	-0,368**	-0,364	-0,119**	-0,118
adopFBSocInfl<->csePubl	-0,598**	-0,594	-0,221**	-0,22
adopFBCommId<->csePubl	-0,355**	-0,351	-0,116**	-0,114
csePubl<->cseIdent	0,335**	0,334	0,234**	0,234
rsesTotal<->swlsTot	6,594**	6,582	0,387**	0,386
adopFBCommId<->esssSA	0,785**	0,778	0,076**	0,075
adopFBEuFc<->cseIdent	-0,203*	-0,206	-0,06*	-0,061

APPENDIX 20 - NON-SIGNIFICANT EFFECTS OF DEMOGRAPHIC VARIABLES (FACEBOOK)

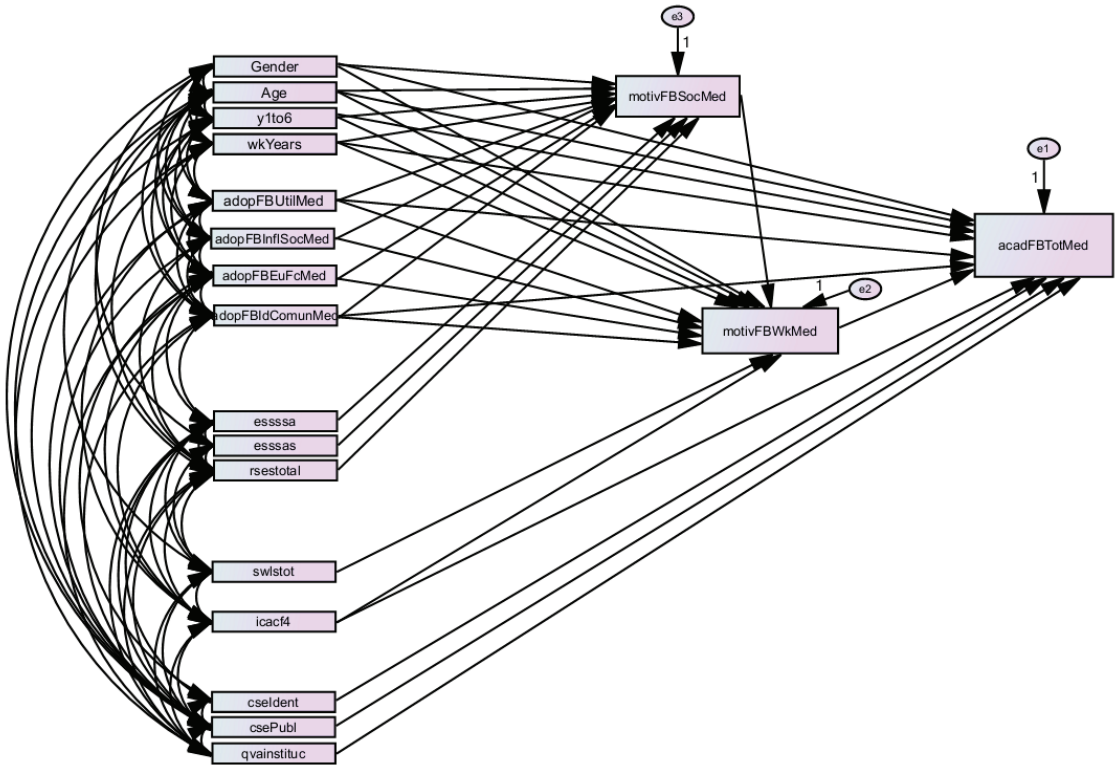

Figure 20.1. Model used to test effect of demographic variables in educational usage of Facebook

As depicted in Table 20.1, the effects of the number of working years ("wkYears"), year of enrollment ("y1to6"), age, and gender were all non-significant, in each of the three endogenous variables in the model: a) usage of Facebook for social-relational purposes ("motivFBSocMed"), b) usage of Facebook for work-related purposes ("motivFBWkMed"), and c) educational usage of Facebook ("acadFBTotMed").

Table 20.1. Non-standardized regression estimates of variables in the model on Figure 20.1

Endogenous Variable	Predictor	Estimate	P
motivFBSocMed	adopFBUtilMed	0,385	***
	adopFBInflSocMed	0,076	0,014
	adopFBIdComunMed	0,11	0,002
	adopFBEuFcMed	0,457	***
	WkYears	-0,002	0,943
	y1to6	-0,088	0,188
	Age	-0,007	0,73
	Gender	0,187	0,175
	esssAS	-0,061	0,016
	esssSA	0,048	0,022
	rsesTotal	-0,032	0,034
motivFBWkMed	adopFBEuFcMed	-0,138	0,019
	motivFBSocMed	0,145	0,015
	swlsTot	0,059	0,014
	icacF4	-0,109	0,036
	WkYears	-0,01	0,748
	y1to6	-0,183	0,051
	Age	-0,008	0,792
	Gender	-0,125	0,516
	adopFBIdComunMed	0,227	***
	adopFBUtilMed	0,235	***
	adopFBInflSocMed	0,193	***
acadFBTotMed	icacF4	0,1	0,01
	motivFBWkMed	0,431	***
	adopFBIdComunMed	0,101	0,005
	adopFBUtilMed	0,148	***
	WkYears	-0,035	0,149
	y1to6	0,05	0,488
	Age	0,034	0,126
	Gender	-0,141	0,329
	qvaInstituc	0,042	0,002
	csePublMed	-0,153	0,017
	cseIdentMed	0,159	0,003

APPENDIX 21 - CORRELATIONS AMONG ALL PSYCHOGICAL VARIABLES

Table 21.1. Correlations among the assessed psychological variables

	cseIdent	csePubl	csePriv	swlstot	swalstot
cseIdent	1,00	0,23**	0,315**	0,01	0,03
csePubl	0,23**	1,00	0,315**	0,133**	0,095*
csePriv	0,315**	0,315**	1,00	0,167**	0,205**
swlstot	0,01	0,133**	0,167**	1,00	0,512**
swalstot	0,03	0,095*	0,205**	0,512**	1,00
essssa	0,089*	0,183**	0,236**	0,44**	0,302**
esssin	0,06	0,231**	0,245**	0,433**	0,252**
essssf	0,01	0,087*	0,112**	0,31**	0,223**
esssas	0,02	0,06	0,07	0,245**	0,208**
essstotal	0,06	0,191**	0,226**	0,475**	0,326**
selfpercca	0,04	0,186**	0,125**	0,291**	0,474**
selfpercci	0,03	0,138**	0,093*	0,197**	0,244**
qvainterpes	0,121**	0,199**	0,353**	0,283**	0,341**
qvacarreira	-0,01	0,217**	0,265**	0,268**	0,449**
qvainstituc	0,02	0,123**	0,232**	0,234**	0,35**
qvapessoal	0,03	0,211**	0,13**	0,392**	0,375**
qvaestcurso	0,06	0,084*	0,125**	0,212**	0,356**
rsestotal	0,02	0,226**	0,145**	0,42**	0,381**
icacf1	0,09*	0,166**	0,233**	0,342**	0,245**
icacf2	-0,02	0,283**	0,247**	0,344**	0,37**
icacf3	0,02	0,179**	0,184**	0,187**	0,141**
icacf4	0,01	0,153**	0,189**	0,262**	0,179**
icacglobal	0,03	0,286**	0,29**	0,379**	0,333**
aeinipersist	0,02	0,321**	0,238**	0,375**	0,379**
aeeficadver	-0,03	0,343**	0,247**	0,27**	0,316**
aeeficsoc	0,00	0,207**	0,23**	0,223**	0,176**
aetotal	0,00	0,345**	0,275**	0,347**	0,354**

** p<0.01, * p<0.05

Table 21.2. Correlations among the assessed psychological variables (continued)

	essssa	esssin	essssf	esssas	essstotal
cseIdent	0,089*	0,06	0,01	0,02	0,06
csePubl	0,183**	0,231**	0,087*	0,06	0,191**
csePriv	0,236**	0,245**	0,112**	0,07	0,226**
swlstot	0,44**	0,433**	0,31**	0,245**	0,475**
swalstot	0,302**	0,252**	0,223**	0,208**	0,326**
essssa	1,00	0,588**	0,426**	0,56**	0,875**
esssin	0,588**	1,00	0,316**	0,442**	0,784**
essssf	0,426**	0,316**	1,00	0,28**	0,623**
esssas	0,56**	0,442**	0,28**	1,00	0,748**
essstotal	0,875**	0,784**	0,623**	0,748**	1,00
selfpercca	0,187**	0,191**	0,153**	0,134**	0,219**
selfpercci	0,152**	0,234**	0,04	0,16**	0,198**
qvainterpes	0,491**	0,472**	0,258**	0,266**	0,501**
qvacarreira	0,215**	0,215**	0,234**	0,183**	0,274**
qvainstituc	0,258**	0,254**	0,237**	0,115**	0,285**
qvapessoal	0,433**	0,537**	0,296**	0,417**	0,556**
qvaestcurso	0,212**	0,143**	0,228**	0,06	0,209**
rsestotal	0,405**	0,436**	0,261**	0,333**	0,476**
icacf1	0,417**	0,377**	0,245**	0,227**	0,425**
icacf2	0,364**	0,34**	0,282**	0,215**	0,398**
icacf3	0,24**	0,216**	0,169**	0,109*	0,245**
icacf4	0,193**	0,181**	0,098*	0,096*	0,192**
icacglobal	0,426**	0,398**	0,285**	0,23**	0,447**
aeinipersist	0,419**	0,427**	0,279**	0,297**	0,472**
aeeficadver	0,337**	0,273**	0,244**	0,193**	0,347**
aeeficsoc	0,395**	0,384**	0,22**	0,227**	0,412**
aetotal	0,443**	0,418**	0,29**	0,281**	0,477**

** p<0.01, * p<0.05

Table 21.3. Correlations among the assessed psychological variables (continued)

	selfpercca	selfpercci	qvainterpes	qvacarreira	qvainstituc
cseIdent	0,04	0,03	0,121**	-0,01	0,02
csePubl	0,186**	0,138**	0,199**	0,217**	0,123**
csePriv	0,125**	0,093*	0,353**	0,265**	0,232**
swlstot	0,291**	0,197**	0,283**	0,268**	0,234**
swalstot	0,474**	0,244**	0,341**	0,449**	0,35**
essssa	0,187**	0,152**	0,491**	0,215**	0,258**
esssin	0,191**	0,234**	0,472**	0,215**	0,254**
essssf	0,153**	0,04	0,258**	0,234**	0,237**
esssas	0,134**	0,16**	0,266**	0,183**	0,115**
essstotal	0,219**	0,198**	0,501**	0,274**	0,285**
selfpercca	1,00	0,62**	0,303**	0,288**	0,17**
selfpercci	0,62**	1,00	0,272**	0,148**	0,115**
qvainterpes	0,303**	0,272**	1,00	0,397**	0,468**
qvacarreira	0,288**	0,148**	0,397**	1,00	0,503**
qvainstituc	0,17**	0,115**	0,468**	0,503**	1,00
qvapessoal	0,409**	0,387**	0,464**	0,315**	0,251**
qvaestcurso	0,309**	0,095*	0,37**	0,392**	0,449**
rsestotal	0,522**	0,526**	0,48**	0,373**	0,322**
icacf1	0,284**	0,306**	0,612**	0,278**	0,296**
icacf2	0,512**	0,38**	0,459**	0,398**	0,323**
icacf3	0,198**	0,124**	0,365**	0,274**	0,253**
icacf4	0,19**	0,228**	0,369**	0,23**	0,162**
icacglobal	0,438**	0,371**	0,613**	0,405**	0,356**
aeinipersist	0,541**	0,416**	0,534**	0,444**	0,315**
aeeficadver	0,444**	0,273**	0,454**	0,429**	0,303**
aeeficsoc	0,244**	0,226**	0,603**	0,238**	0,279**
aetotal	0,499**	0,368**	0,603**	0,446**	0,347**

** p<0.01, * p<0.05

Table 21.4. Correlations among the assessed psychological variables (continued)

	qvapessoal	qvaestcurso	rsestotal	icacf1	icacf2
cseIdent	0,03	0,06	0,02	0,09*	-0,02
csePubl	0,211**	0,084*	0,226**	0,166**	0,283**
csePriv	0,13**	0,125**	0,145**	0,233**	0,247**
swlstot	0,392**	0,212**	0,42**	0,342**	0,344**
swalstot	0,375**	0,356**	0,381**	0,245**	0,37**
essssa	0,433**	0,212**	0,405**	0,417**	0,364**
esssin	0,537**	0,143**	0,436**	0,377**	0,34**
essssf	0,296**	0,228**	0,261**	0,245**	0,282**
esssas	0,417**	0,06	0,333**	0,227**	0,215**
essstotal	0,556**	0,209**	0,476**	0,425**	0,398**
selfpercca	0,409**	0,309**	0,522**	0,284**	0,512**
selfpercci	0,387**	0,095*	0,526**	0,306**	0,38**
qvainterpes	0,464**	0,37**	0,48**	0,612**	0,459**
qvacarreira	0,315**	0,392**	0,373**	0,278**	0,398**
qvainstituc	0,251**	0,449**	0,322**	0,296**	0,323**
qvapessoal	1,00	0,169**	0,625**	0,305**	0,481**
qvaestcurso	0,169**	1,00	0,351**	0,288**	0,482**
rsestotal	0,625**	0,351**	1,00	0,533**	0,631**
icacf1	0,305**	0,288**	0,533**	1,00	0,485**
icacf2	0,481**	0,482**	0,631**	0,485**	1,00
icacf3	0,138**	0,292**	0,309**	0,455**	0,501**
icacf4	0,14**	0,188**	0,37**	0,574**	0,42**
icacglobal	0,407**	0,439**	0,643**	0,813**	0,825**
aeinipersist	0,624**	0,402**	0,732**	0,474**	0,712**
aeeficadver	0,476**	0,403**	0,544**	0,357**	0,721**
aeeficsoc	0,388**	0,197**	0,407**	0,552**	0,374**
aetotal	0,592**	0,404**	0,675**	0,522**	0,726**

** p<0.01, * p<0.05

Table 21.5. Correlations among the assessed psychological variables (continued)

	icacf3	icacf4	icacglobal	aeinipersist	aeeficadver
cseIdent	0,02	0,01	0,03	0,02	-0,03
csePubl	0,179**	0,153**	0,286**	0,321**	0,343**
csePriv	0,184**	0,189**	0,29**	0,238**	0,247**
swlstot	0,187**	0,262**	0,379**	0,375**	0,27**
swalstot	0,141**	0,179**	0,333**	0,379**	0,316**
essssa	0,24**	0,193**	0,426**	0,419**	0,337**
esssin	0,216**	0,181**	0,398**	0,427**	0,273**
essssf	0,169**	0,098*	0,285**	0,279**	0,244**
esssas	0,109*	0,096*	0,23**	0,297**	0,193**
essstotal	0,245**	0,192**	0,447**	0,472**	0,347**
selfpercca	0,198**	0,19**	0,438**	0,541**	0,444**
selfpercci	0,124**	0,228**	0,371**	0,416**	0,273**
qvainterpes	0,365**	0,369**	0,613**	0,534**	0,454**
qvacarreira	0,274**	0,23**	0,405**	0,444**	0,429**
qvainstituc	0,253**	0,162**	0,356**	0,315**	0,303**
qvapessoal	0,138**	0,14**	0,407**	0,624**	0,476**
qvaestcurso	0,292**	0,188**	0,439**	0,402**	0,403**
rsestotal	0,309**	0,37**	0,643**	0,732**	0,544**
icacf1	0,455**	0,574**	0,813**	0,474**	0,357**
icacf2	0,501**	0,42**	0,825**	0,712**	0,721**
icacf3	1,00	0,41**	0,73**	0,316**	0,33**
icacf4	0,41**	1,00	0,693**	0,346**	0,313**
icacglobal	0,73**	0,693**	1,00	0,658**	0,609**
aeinipersist	0,316**	0,346**	0,658**	1,00	0,796**
aeeficadver	0,33**	0,313**	0,609**	0,796**	1,00
aeeficsoc	0,237**	0,284**	0,5**	0,518**	0,474**
aetotal	0,346**	0,367**	0,693**	0,933**	0,904**

** p<0.01, * p<0.05

Table 21.6. Correlations among the assessed psychological variables (continued)

	aeeficsoc	aetotal
cseIdent	0,00	0,00
csePubl	0,207**	0,345**
csePriv	0,23**	0,275**
swlstot	0,223**	0,347**
swalstot	0,176**	0,354**
essssa	0,395**	0,443**
esssin	0,384**	0,418**
essssf	0,22**	0,29**
esssas	0,227**	0,281**
essstotal	0,412**	0,477**
selfpercca	0,244**	0,499**
selfpercci	0,226**	0,368**
qvainterpes	0,603**	0,603**
qvacarreira	0,238**	0,446**
qvainstituc	0,279**	0,347**
qvapessoal	0,388**	0,592**
qvaestcurso	0,197**	0,404**
rsestotal	0,407**	0,675**
icacf1	0,552**	0,522**
icacf2	0,374**	0,726**
icacf3	0,237**	0,346**
icacf4	0,284**	0,367**
icacglobal	0,5**	0,693**
aeinipersist	0,518**	0,933**
aeeficadver	0,474**	0,904**
aeeficsoc	1,00	0,716**
aetotal	0,716**	1,00

** p<0.01, * p<0.05