






# Strategies for the communication and collaborative online work by university students

## Estrategias para la comunicación y el trabajo colaborativo en red de los estudiantes universitarios

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### ABSTRACT

The impact that Information and Communications Technologies have in the way today's young people communicate and interact is unquestionable. This impact also affects the educational field, which is required to respond to the needs of twenty first century students by training them in acquiring new skills and strategies to deal with a changing and uncertain future. In this study, which involved 2,054 university students from all Spanish Universities, it delved into the knowledge of networking strategies and tools used by these students for the effective development of communication processes and the implementation of strategies for collaboration and communication. It has been developed a non-experimental quantitative methodology and the technique used for collecting information was a questionnaire. The results show that all of them use the Internet to communicate and they have a great use of basic tools to collaborate and interact, but they prefer social networks for being in contact with their peers and establishing relationships. It has been found that students do not have the idea of the Internet as a place to learn. This fact implies new challenges to be solved by Universities, to optimize the possibilities of the networks and institutional platforms as an environment to learn collaboratively.

### RESUMEN

El impacto que las tecnologías de la comunicación tienen en la forma en la que los más jóvenes de hoy en día se comunican y relacionan es incuestionable. Dicho impacto afecta también al campo educativo, al que se le exige que dé respuesta a las necesidades de los estudiantes del siglo XXI, formándoles en la adquisición de habilidades y estrategias para afrontar un futuro cambiante y lleno de incertidumbre. En este estudio, en el que han participado 2.054 estudiantes universitarios de todas las universidades españolas, se profundiza en el conocimiento de las estrategias y herramientas en red empleadas por estos estudiantes para el desarrollo efectivo de los procesos comunicativos y colaborativos. Se ha realizado un diseño de investigación no experimental, de tipo exploratorio basado en el uso del cuestionario como instrumento de recogida de información. Los resultados muestran un mayor uso por parte del alumnado de herramientas básicas de Internet para el trabajo colaborativo mientras que para estar en contacto con sus compañeros y establecer relaciones prefieren las redes sociales. Se ha encontrado que no existe por parte de los estudiantes una concepción de la Red como espacio de aprendizaje, por lo que se plantean nuevos retos a resolver por parte de la institución universitaria de cara a que sus estudiantes optimicen las posibilidades de la Red como lugar en el que aprender colaborativamente.

### KEYWORDS | PALABRAS CLAVE

Digital communication, collaboration, interaction, learning, Internet, students, university, PLE.  
Comunicación digital, colaboración, interacción, aprendizaje, Internet, estudiantes, universidad, PLE.



## 1. Introduction

In recent years the Internet has become, above all, a huge provider of tools that have been developed to enable user participation and communication among those users. Tim O'Reilly defined Web 2.0 as the new paradigm regarding how we use the Internet, in which tools are platforms for users to use and which foster communication (O'Reilly, 2005). When O'Reilly penned this reflection in 2005, the main tools were blogs and wikis, which had transformed how information was published and shared. While this in itself was considered a communication revolution, the social networks boom in 2009-2010 (Observatorio de Redes Sociales, 2011) has further enhanced the idea of the web as a platform in which communication is the fundamental component. The Internet, the network of networks, has always provided communication among its users through tools like email, forums, and chat rooms. These applications have served to broaden and diversify the channels of communication to the extent that today's web, based on communication and mobile technologies, is considered to be Web 3.0 (Kolikant, 2010), which goes beyond the definition of a semantic web.

Whatever definition we choose to adopt, what we believe to be important is that the way we have been communicating and relating to each other over the web in recent years is what has changed our online behavior. The new channels and ways of communication have led to changes in various environments, which means that there are implications for education which need to be valued. If today's environment has changed in this way, the obvious question is what can we, in the world of education, do to enable students to learn to develop the basic skills required for online communication. This is important not only at the professional level, encouraging young people to cope well in a changing environment but also at the personal level since online communication also affects how young people build their own identities (Bernete, 2010).

An additional consideration is that today's university students are known as "digital natives" (Prensky, 2001), because they were born into a technology environment and, therefore, have developed specific skills and attitudes which condition their learning. The "digital native" concept has had a knock-on effect on the world of education, although it has been surpassed in subsequent terms, like "digital resident" coined by White and Le Cornu (2011). Indeed, terms abound as Gisbert and Esteve (2011) show, e.g., "digital learners", "Generation Y" (Lancaster & Stillman, 2002; Jorgensen, 2003; McCrindle, 2006) "Generation C" (Duncan-Howell & Lee, 2007) or "Google Generation" (Rowlands & Nicholas, 2008) all of which underlines how important it is to understand that today's university students represent a generation that was born into a world that had already been transformed by technology where the rules of the game are different, especially when working with information. Hence, the normal development, values, and history of this generation are technology driven. Students do not learn better with ICT because they are digital natives, although they do find it easier to move in these digital environments. Nevertheless, we do need to work with students on basic information management and the development of communication skills.

Prensky (2009) indicates that his description in 2001 is interesting, but that the revolution of webs means that we should really be talking about "digital wisdom" if we are to understand that human beings have to draw on their natural capacities with existing technologies because they increase and enhance the opportunities for communication and collaboration.

Whether or not we call them digital natives, what we have is a generation that uses technologies differently. Various studies have thrown up data of interest:

- 26.25 million Spaniards connect to the Internet regularly; 1.45 million more than in 2013. Of these, 20.6 million connect up every day, i.e., 78% are constantly connected (Fundación Telefónica, 2014).
- Children aged 10 to 17 years mainly use instant messaging (Whatsapp) to communicate, while they use the Internet in general for school tasks and to search for information (Spanish Home Office, 2014).
- Youngsters who frequently use social networks are those who also use other types of tools like blogs and wikis (García-Jiménez, López de Ayala, & Catalina-García, 2013).
- 53.2% of teenagers between 14 and 16 mention new contacts with whom they are in touch mainly online, so this technology is acting as a mechanism for socialization and support of these friendships (Sánchez-Vera, Prendes, & Serrano, 2011).
- Those who make the most use of social networks are also those who are most frequently active online when seeking and sharing contents (García-Jiménez & al., 2013).
- University students have a positive attitude toward social networks (especially Facebook) for educational purposes and for keeping in contact with colleagues (Espuny, González, Lleixá, & Gisbert, 2011).

As we saw earlier, the importance of ICTs in how young people communicate today is beyond question. So

the time is ripe to ask whether the way young people use the web affects their learning, which leads us to the idea of the PLE (Personal Learning Environment). PLE is an issue that has been catching researchers' attention (Chaves, Trujillo & López, 2015). The concept joins two foci of research: student centered learning processes, and how technologies affect or may affect them.

While some authors take a more technological approach to PLEs (Mödrischer & al., 2011), others, like Castañeda and Adell (2013), adopt a more pedagogical stance, in which the PLE is understood not only as a set of tools but also as information processing the connections established with other people and the creation of knowledge itself. Thus, a PLE would comprise three fundamental parts (Castañeda & Adell, 2011):

- Reading tools and strategies through which information is accessed and managed.
- Reflection tools and strate-

gies related to the places where I write and participate.

- Relation tools and strategies related to the environments in which I am in contact with others.

It is the last category that interests us in this paper. Within it, we can include the concept of Personal Learning Network (PLN) to refer to the tools, mechanisms, and activities that we set in motion when communicating with others, when we share resources and when we exchange information (Castañeda & Adell, 2013; Marín & al., 2014). The great advantages of the web are the communication possibilities that it affords. This is important because knowing what tools and strategies university students use means we can devise the strategies to improve their skills as well as provide better online relations concerning their future professional development. PLE theory states that the personal environment that we all have can help us to self-regulate our learning, from setting our goals to a final self-evaluation (Chaves & al., 2015).

This view of the PLE is linked to the idea of a society in constant change that demands updates as well as ongoing, lifelong training to adapt to those changes (Coll & Engel, 2014).

The research we present here stems from the project known as CAPPLE (Competences for Lifelong Learning based on the use of PLEs. Analysis of future professionals and proposals for improvement). The project is funded by the Spanish Ministry for Economy and Competitiveness, and its main aim is to study and learn more about the PLEs of final year students in all subjects at Spanish universities. The starting point is the need to train future professionals in the use of telematic tools and learning strategies so that they are in a better position to create and take advantage of the best opportunities throughout their professional lives (Prendes, 2013).

## 2. Materials and methods

### 2.1. Aims

The aim of this paper is to obtain a deeper knowledge of the online strategies and tools that students use, especially in the area of communication. We seek to answer the question: What type of online strategies and tools do university seniors (final year) use to communicate and collaborate with others? Hence, the objectives to meet are:

**Students do not learn better with ICT because they are digital natives, although they do find it easier to move in these digital environments. Nevertheless, we do need to work with students on basic information management and the development of communication skills. Prensky (2009) indicates that his description in 2001 is interesting, but that the revolution of webs means that we should really be talking about “digital wisdom” if we are to understand that human beings have to draw on their natural capacities with existing technologies because they increase and enhance the opportunities for communication and collaboration.**

- To ascertain and describe how final year university students use telematic tools for online communication and collaboration.
- To analyze students' online preferences and tools when carrying out group projects along with the importance they give to various aspects proper to learning and online collaboration.
- To observe the data and results obtained concerning the sex of the participants and the branch of knowledge to which they belong.

## 2.2. Research design

The research is empirical and seeks to gather information of a descriptive type with no between group comparisons and no manipulation of variables. It is therefore non-experimental, of an exploratory nature, and uses a questionnaire to collect the data (Ato & al., 2013, Pardo, Ruiz, & San Martín, 2015).

The research was carried out in five work phases between 2013-2017 (Prendes, Castañeda, Ovelar, & Carreras, 2014): a theoretical review of PLEs and earlier studies; design and validation of the tool; data collection; data analysis; and, description of the participating students' PLEs.

## 2.3. Sample

The study was comprised of 2054 final year degree students at Spanish universities. Females accounted for 69.67% and males for 30.33%. Since it would have been impossible to access the whole population because volunteer students were targeted, the sampling was non-probabilistic. Although the sample is broad, it is not representative, and no inferences can be made for the population as a whole. The graph below shows the distribution of the participants by area of knowledge.

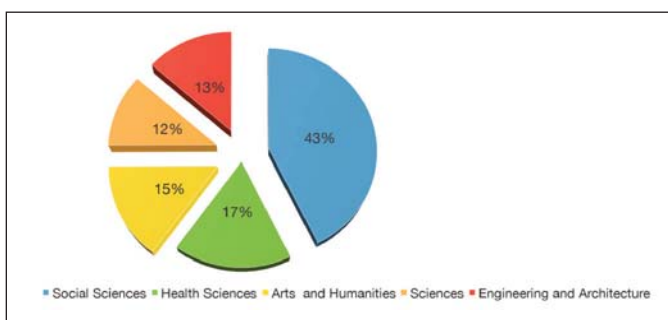


Figure 1. Distribution of participants by area of knowledge.

## 2.4. The tool

A questionnaire that was used, was built on theoretical models of PLEs (Castañeda & Adell, 2011, 2013), self-regulated learning (Anderson, 2002; Martín, García, Torbay, & Rodríguez, 2007; Midgley & al., 2000; Pintrich, Smith, García, & McKeachie, 1991) and communication and ICT competences (Prendes & Gutiérrez, 2013).

The questionnaire was subjected to a three-step validation procedure: expert judgment cognitive interviews and pilot study. Finally, psychometric tests were applied to test for the reliability of the scale, returning a Cronbach alpha of reliability of 0.944.

The questionnaire was comprised of 48 items. It was administered through email. The final version and the complete validation process can be found in Prendes and others (2016). In the following link, we will find the full questionnaire: <https://goo.gl/ta93A8>.

## 3. Analysis and results

### 3.1. Data analysis

Consistent with the research approach, a descriptive analysis was made; and the results of which, regarding the communication and strategy tools and collaborative work used by the students interviewed, are given below (as percentages). Due to the very nature of the variables (they are all categorical), and with the idea of going a step further in the research, associations were made using contingency tables and Pearson's  $\chi^2$  test for the independence of the chi-squared statistic and the contingency coefficient C.

### 3.2. Results

#### 3.2.1. Online communication and use of tools

None of the students interviewed stated that they did not communicate online. The most popular tool for

communication is email (79.12%), followed by social network tools (75.52%). It was determined that the use of social networks is associated with students' interest in learning  $\chi^2(9, 2047)=796.934a, p<0.001, c=0.529$  and with their preference to publish new information they generate on social networks  $\chi^2(9, 2054)=387.805a, p<0.001, c=0.399$ .

Regarding areas of knowledge, students of Health Sciences use email the most (80.95%), while those in Engineering and Architecture use it least (76.47%). Regarding sexes, females (81.01%) state that they use basic tools for communication, which is more than males (75.19%).

If we address the use of social media tools about the various areas of knowledge, we find that students of Social and Legal Sciences top the list (79.47%), while students of Engineering and Architecture are at the bottom (63.32%). By gender, females again make greater use of social network tools for communication (78.48%) than do males (68.53%).

When asked about the value they give to the criticisms and opinions of other users when communicating online, two-thirds (66.85%) of the interviewees claim that they take these into account. No differences were found according to sex or to the area of knowledge to which they belong.

### 3.2.2. Use of tools to favor collaboration and interaction with others

The following results take us a step further into aspects of communication, and they add to our knowledge of students' preferred tools when collaborating and interacting with others (social network tools, emails, chats, video conferences, messaging).

The general data show that students prefer messaging tools (41.19%), followed by email (27.65%) and then social media tools (25.85%). Less than 6% opted for video conferencing. If we break down the data into areas of knowledge, the highest percentages correspond to messaging tools in all cases, with Engineering and Architecture at the top (42.96%) and Health Sciences at the bottom.

One result that stands out is that students of Social and Legal Sciences declare a preference for social network tools,

which they rate second, over email, which occupies second place in all the other areas. Overall, the percentages—both the highest and the lowest—are very similar, and the largest difference was found in the above item (social network tools), with 29.24% in Social and Legal Sciences versus 19.13% for Engineering and Architecture. The opposite occurs for emails with Social and Legal Sciences returning the lowest figure (24.91%) versus the highest in Sciences (32.77%) and Engineering and Architecture (30.69%). By sexes, messaging tools score the highest, with females (42%) slightly ahead of males (39.33%).

It is also seen that females (88.8%) attribute more importance to interaction with others in group work than males (81.2%) and that the difference is significant,  $\chi^2(3, 2054)=22.53, p<.001$ .

Noteworthy are the differences in the use of email and chats, with females choosing as their second option tools that have a social network, followed in third place by email, while for males the order is inverted.

Students were asked about their tool preferences when carrying out group work. The tools included Google Drive, Social Networks, the Virtual Environments of their universities, wikis, and blogs. Graph 2 shows that the responses "almost always" and "always" place Google Drive as the most used tool for group work.

When the data are considered in the light of area of knowledge, Google Drive continues to be the tool most used in all areas, especially in Engineering and Architecture (71.48%) and in Social and Legal Sciences (68.70%). Almost ten percentage points lower come to Arts and Humanities (59.09%) and Social Sciences (59.66%). Social network tools (Twitter, Facebook...) continue to appear in second place in all areas and are used mostly by students of Health Sciences (28.98%) and Arts and Humanities (28.25%). They are least used in Engineering and

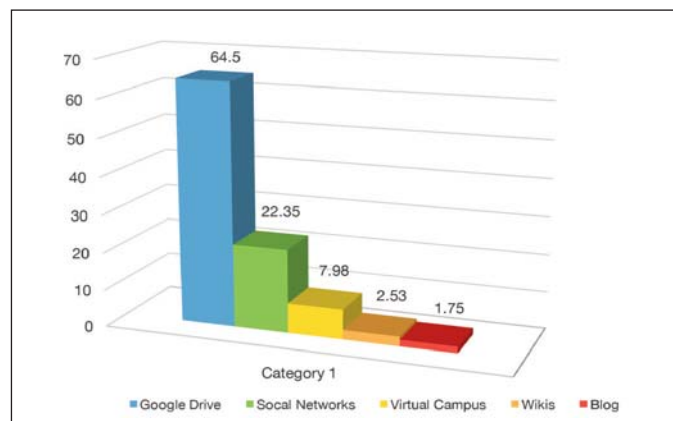


Figure 2. Students' preferred tools for group work.

Architecture, where the percentage is just half that of the areas mentioned above (14.80%). Virtual environments like Moodle or Sakai for project work occupy third place in all the areas of knowledge. Sciences (13.03%) and Engineering and Architecture (10.83%) are the areas where the virtual campus platforms are most preferred, with percentages that are not too distant from those for the social networks (20.08% and 14.63% respectively). In the case of Engineering and Architecture, the difference is just 3.5 percentage points. Blogs occupied the fourth place for Arts and Humanities (4.22%), ahead of wikis, but this was the only area of knowledge in which this occurred. In Health Sciences (0.84%) and Engineering and Architecture (0.84%), blogs receive less support as a tool to use in group projects.

### 3.2.3. Preferences and aspects valued when working in groups

Finally, we asked students about aspects they prioritize when working in teams: “building together”, “interacting with others” and “resource sharing”. The majority of the students considered all three aspects as being priorities (always/almost always or often). “Building together” is always/almost always of importance for 58.08%, and often of importance for 29.99%, giving a total of 88.07%. Sharing resources scored almost the same (87.98%), with always/almost always scoring 48.64%, and often 39.34%. The chance of “interacting with others” was also given priority with always/almost always scoring 53.70%, and often 32.81%, making a total of 86.51%. Regarding sexes, there are some notable differences regarding what is of priority when working in groups. More females responded “always/almost always” over “often” in all three cases than do males. So males’ responses varied less than females’ for these aspects. Another finding of interest is that 90.64% of the females interviewed considered “building together” a priority (64.29% always/almost always and 26.35% often), while for males thought the main priority in working in groups is “resource sharing”, with 85.88% always responding/almost always or often). The differences are significant:  $\chi^2(3, 2054) = 30.07, p < .001$ .

The order of priority students assign to working together varies according to the area of knowledge. Except for Social and Legal Sciences, the aspect most prioritized by students (always/almost always or often) is “resource sharing”. Students

of Social and Legal Sciences valued “building together” highest, with 91.13% always responding/almost always or often.

Table 1 shows the results by area of knowledge for the accumulation of always/almost always and often responses.

	Resource sharing	Interacting with others	Building together
Arts and Humanities	89.61% (1)	85.07% (3)	88.96% (2)
Sciences	86.98% (1)	82.77% (3)	84.45% (2)
Health Sciences	89.49% (1)	87.05% (2)	84.01% (3)
Social and Legal Sciences	87.06% (3)	88.04% (2)	91.13% (1)
Engineering and Architecture	86.28% (1)	84.12% (3)	85.56% (2)

## 4. Discussion and conclusions

From the data in the previous section and considering the research, theory and aims presented in this paper, we are able to draw the conclusions given below about students’ online communication processes as well as their preferred tools when collaborating online with their companions.

Not communicating online is not an option for the students who participated in our research. This matches with the studies carried out by the Fundación Telefónica (2014) which reported that millions of Spaniards today are connected up to the Internet and use this connectivity as a mechanism to socialize and start friendships (Sánchez-Vera & al., 2011).

Concerning Aims 1 and 2 stated at the beginning of the paper, we affirm that both basic Internet tools (email) and social network tools are used by the vast majority of the students interviewed for communication purposes. It is important to note how the use of social media is associated with increased student learning motivation, which offers clues and new possibilities for university institutions and teachers alike.

Going a step further into communication processes, when incorporating collaboration strategies it should be kept in mind that in general students prefer instant messaging tools, according to the data provided by the Spanish Home Office (2014), which show that instant messaging is the tool most used by Spanish adolescents. Besides instant

messaging, our findings show that email and social media tools are also used by the majority of the students interviewed, while the least used tools are video conferencing and chats, in spite of the possibilities that these offer for collaboration. Instant messaging and social network tools are leading to a decline in the use of more traditional telematic tools, like wikis, video conferences or chats (García-Jiménez & al., 2013).

While Web 2.0 brought about a new paradigm of communication (O'Reilly, 2005), the social networks boom meant new channels of communication (Kolikant, 2010). Our study is in line with the above ideas, with the majority of the participants responding that their main channel of communication with companions is via social networks, that they take into consideration the online comments of others and that these networks serve to connect with people with the same learning aims. They, therefore, use the Internet and social networks intensively, as was also reported by Espuny and others (2011).

It can be seen that the web is increasingly becoming a space for learning and for connecting with other people we find interesting, and this helps students to adapt their Personal Learning Environments (Coll & Engel, 2014) and to build their own digital identity Bernete (2010). In a similar vein, it should be noted that students also consider reading other students' blogs as an important factor.

Google Drive is par excellence the preferred tool when students are working on group projects. This tool is followed by social network tools. Notably, the universities' virtual classrooms are not among students' preferred tools when working in groups, even though all the students interviewed are part of these. While there are other tools used less frequently than the virtual classroom (wikis or blogs), the virtual classroom remains some distance behind Google Drive or social networks. Furthermore, the more complex the online possibilities offered and the greater the user involvement required, e.g., link managers, the lower the interest on the part of the students, to the extent that these possibilities are scarcely used.

Although students spend a lot of time connected and online, there are many tools about which they know little or nothing, and they devote more time to those with which they are familiar (White & Le Cornu, 2010).

But beyond the tools used are the motivations of students to collaborate with others. We find the greatest to be the possibility of building together and resource sharing, which are essentially Web 2.0 aspects.

Another aim of this research was to observe the data about gender and area of knowledge. While the responses show a certain homogeneity, some of the differences found between gender are worth noting. For example, females use tools with social networks more. By area of knowledge, we find that students of Social and Legal Sciences use the web for communication most, and those from Engineering and Architecture use it the least. Many Social and Legal Science degrees draw heavily on communication. The communicative and collaborative processes developed in these degrees are fostered by the universities themselves, which, we believe, explains this finding. In the same vein, we find some differences in the usage of tools that foster collaboration and interaction, since students from Social and Legal Sciences again differ from those from Engineering and Architecture, especially in their preferred messaging tools, similar to the findings by sex. It is interesting to note how, again, Social and Legal Sciences students respond differently regarding preferences when working in teams. For these students, the possibility of "building together" comes first, while in the other areas of knowledge, "resource sharing" is the main preference. This leads us to reflect on the different approaches employed within the degree courses themselves for collaborative work.

The students in this survey are online and view social networks positively (Espuny & al., 2011). Now the key is to go a step further and to make use of the spaces in which students are relating and socializing so that these become true learning opportunities.

As elements belonging to a social institution, universities have a lot to contribute in this respect, since the web offers huge opportunities for communication and collaboration that are currently being wasted because of a lack of knowledge as to how to incorporate them into educational processes. There is also a large difference between the digital competence students perceive they have acquired at university and that demanded by the professional world.

The results of our study show that our students are beginning to see the web as a learning space, so the moment is ripe for institutions of higher education to enhance and reaffirm this vision.

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