






# The Ubiquitous Possibilities of the Laptop: Spanish University Students' Perceptions

## Posibilidades ubicuas del ordenador portátil: percepción de estudiantes universitarios españoles

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### ABSTRACT

University classrooms have been taken over by a new type of student, the «plurimodalicts». This society is characterized by the different ways its students relate to ICTs. This article analyses where, how and for what a sample of 451 students from five Spanish public universities use their laptop computers. The study uses an incidental non-random cluster sample design. Data collection was conducted via questionnaire based on a five-point Likert scale. The questionnaire was divided into three sections: computer use; location and frequency of use of the device; and laptop functions and applications. The study concludes that «plurimodalicts» use their laptops to produce academic work, as well as for exchanging class notes and searching for information. The distance or direct learning methodology and the respondent's gender also determine laptop use for academic tasks, which is greater at distance learning institutions and is more prevalent among women than men. These devices are mainly used at home and, in the case of the younger respondents, also in university libraries. The laptop functions vary according to age group, and the device is mostly used for gaming and as a study tool by the youngest students.

### RESUMEN

Las aulas universitarias están ocupadas por un nuevo modelo de sociedad estudiantil denominada «plurimodalictic». Esta sociedad se caracteriza por el conjunto de relaciones que establecen los universitarios con las tecnologías de la información y comunicación (TIC). Este artículo analiza los usos, lugares de utilización y funciones que otorgan 451 estudiantes de cinco universidades públicas españolas al ordenador portátil. El muestreo utilizado para el estudio parte de un diseño muestral incidental no aleatorio y por conglomerados. La recogida de información se ha realizado a través de un cuestionario con respuestas en escala Likert de cinco puntos. Éste se ha estructurado en tres secciones, una para usos del ordenador, otra para lugares y frecuencia de uso del dispositivo y la última para funciones y aplicaciones del ordenador portátil. Las conclusiones obtenidas permiten afirmar que el uso mayoritario del ordenador portátil entre la «plurimodalictic» es académico. Se usa para elaborar trabajos, intercambiar apuntes o buscar información. La metodología de la universidad de procedencia y el género del entrevistado determina el uso académico de los ordenadores portátiles siendo mayor en las universidades no presenciales y entre las mujeres que entre los hombres. El lugar donde mayoritariamente se utilizan estos dispositivos es en los domicilios particulares seguido, entre los entrevistados más jóvenes, por las bibliotecas universitarias. Las funciones otorgadas al ordenador portátil varían con la edad siendo mayoritariamente lúdica e instrumental entre los más jóvenes.

### KEYWORDS | PALABRAS CLAVE

University students, laptop, learning styles, ubiquitous, digital divide, media skill, digital literacy, prosumers. Estudiantes universitarios, portátil, estilos de aprendizaje, ubicuo, brecha digital, competencia mediática, alfabetización digital, prosumidores.



## 1. Introduction

Universities still have pseudo-analogical students who use ICTs in a way that follows the logic, structure and usage of educational resources that existed prior to content digitization. They continue to work according to forms of teaching and learning that accompanied the arrival of Web 1.0, a static network providing one-way transmission of information and knowledge (Santos, Etxeberria, Lorenzo, & Prats, 2012). These students can create their own study models (Tabuenca, Verpoorten, Ternier, Westera, & Specht, 2013) and professional development models (Tabuenca, Verpoorten, Ternier, Westera, & Specht, 2012) in a way that is unaffected by the influence of media.

Pseudo-analogical students, in the main, have been unwilling, unable or simply have not known how to become multimodal literate (González, 2013; Bautista, 2007), multimedia literate (Esteve, Esteve, & Gisbert, 2012), digital literate (Gisbert, 2013; Area, Gutiérrez, & Vidal, 2012; Travieso & Planella, 2008) or media literate (García-Ruiz, Ramírez-García & Rodríguez-Rosell, 2014; Area, 2012; Aguaded, 2012), acquiring skills that would enable them to take an active part in the knowledge society as prosumers (Aguaded & Sánchez, 2013; Villalustre, 2013; Khan, 2012) instead of remaining mere consumers.

Pseudo-analogical students are also joined in the lecture hall by digital immigrants (Wang, Myers, & Sundaram, 2013; Prensky, 2011; Prensky, 2001) and Net visitors (Tabuenca, Ternier, & Specht, 2013). These two groups are passive or non-participatory users of media. Their voluntary telematic inactivity classes them as neither in danger of digital exclusion nor pushes them to the edge of any digital divide (Marciales, 2012; Monclús & Sabán, 2012). They are in fact veteran learners.

Other groups in the lecture hall include the new learners (Gurung & Rutledge, 2014; Thompson, 2013), the new millennium learners (Trinder, Guiller, Margaryan, Littlejohn & Nicol, 2008), the «Instant message generation» (Bautista, Escofet, Forés, López, & Marimon, 2013; Gisbert & Esteve, 2011) the «Net Generation» (Jones, Ramanau, Cross, & Healing, 2010; Tapscott, 1999), digital natives (Wang, Myers, & Sundaram, 2013; Fueyo, 2011; Prensky, 2011), digital literates (González, 2012), technological literates (Ortega, 2009), the student residents (Hernández, Ramírez-Martínell, & Cassany, 2014) prosumers (García-Ruiz, Ramírez-García & Rodríguez-Rosell, 2014) and media prosumers (Ferrés, Aguaded, & García-Matilla, 2012), among others.

This student universe consisting of so many different technological profiles is the base of our investigation. The statistical study of the data collected revealed that the students' relation to ICTs was plural in nature, so, in our modest attempt to contribute to the knowledge on this subject, we have defined this relationship as «plurimodalict», based on the words plural, modalities and ICTs.

We apply the term «plurimodalict» to all university students who are media citizens, media literates (Sánchez & Aguaded, 2013; Aguaded & Sánchez, 2013; Aguaded, 2012), media humanists (Pérez & Varis, 2012), audiovisual literates and all other possible types of media user previously mentioned here, and who will later appear in the scientific literature.

The main feature of the «plurimodalict» society is the various ways in which university students use media for learning and communication, separately or synchronically. It is by its nature a multifactor polyhedron society reflecting students' unpredictable stance towards technology, in that it is by no means certain that students use digital tools in their teaching-learning processes although they might use particular technologies in their daily lives. This confusion arises because they do not always want to use the technological tools they manage in their daily lives as learning tools (García, Gros, & Escofet, 2012).

Such behaviour has made this research difficult, for example, when attempting to determine what type of mobile device they normally use. This volatility is influenced by the data package for each device, the student sample selected, the socioeconomic and academic status of the student, place of residence and the academic subject studied.

To find out which mobile digital device is most used by the «plurimodalicts» we consulted official statistics, which offered results that were generic. An extrapolation of figures from the 2014 edition of the annual report from 2013 by the Ministry of Energy and Industry (Urueña, 2014) reveals that the electronic device with Internet access most used by the «plurimodalicts» for academic work is the laptop computer.

## 2. The laptop computer

Since 2012, it has been the mobile phone that has competed for our attention as the most frequently used device among ICT users (Mihailidis, 2014; Tabuenca, Ternier, & Specht, 2013; Yang, Lu, Gupta, Cao, & Zhang, 2012). These devices can be either smartphones or non-smartphones. Hence researchers need to clarify whether a smartphone is an electronic device

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for oral communication between two speakers that can also execute apps and connect to the Internet (Ruiz-Olmo & Belmonte-Jiménez, 2014) or whether it is a portable computer that can be used as a phone.

By the third quarter of 2013 in Spain, the smartphone had become the most frequently used device among ICT users, although its main specific use remained undefined. That being so, this research team concluded that the laptop computer rather than the smartphone was the device used most by students when doing academic tasks. This is justified by the fact that 87.1% of the population have Internet access at home, and 62.5% of homes have a laptop, while only 53.7%, or half the population have smartphones.

Internet is accessed at home via smartphone by 74.3% of the population, by laptop in 68.4% of cases and by the desktop PC at 66.6% (Urueña, 2014).

The smartphone is for single person use while the laptop and desktop computers can have many users. This multiplicity of users of compu-

tters and the greater ergonomic comfort of using a laptop as opposed to a smartphone, with their bigger screens and better resolution, mean that laptops are still the most widely used mobile electronic device. Their only drawback compared to the other digital mobile devices is the quality of the software they support.

Assuming the numerical superiority of the laptop over the smartphone, this article will characterize the uses, functions and the places where laptops are used in Spain by the «plurimodalicts».

### 3. Methodology

This article addresses the subject of laptop usage in a sample of 451 students from five public universities in Spain: Complutense, Vigo, Oviedo, Granada and the UNED. The research took place at public universities as the study was financed with state funds. The objectives were: to identify the uses of the laptop by «plurimodalicts»; to identify the actions that «plurimodalicts» perform on these devices and to show where these activities take place. To achieve these objectives, we used an incidental non-random cluster sample design. The choice of clusters as a representative sample of the universal population was random,

but not the final units. This does not mean the sample is less representative, and it enables us to draw general conclusions from the reference results but not an estimate of the errors on the population parameters. Data were gathered by questionnaire, with a five-point Likert scale to measure responses. The questionnaire was structured in three parts, with laptop use corresponding to 10 items, location and frequency of use 9 items and functions and applications 9 items.

The internal consistency of each scale was measured using the Cronbach Alpha Coefficient. The results

Universities still have pseudo-analogical students who use ICTs in a way that follows the logic, structure and usage of educational resources that existed prior to content digitization. They continue to work according to forms of teaching and learning that accompanied the arrival of Web 1.0, a static network providing one-way transmission of information and knowledge.

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for the reliability of each scale were: Cronbach Alpha for the dimension of laptop uses, 0.73; for location and frequency of use, 0.72; for functions and applications, 0.77; the Cronbach Alpha for the instrument overall was 0.81. The scores show the consistency of the questionnaire. The reliability measure for each scale is shown in section 4 of this article.

The sample consisted of 23.7% men and 76.3% women, and the proportions were similar in the five universities studied. The gender imbalance is due to the fact that the respondents studied subjects that are more popular among women than men. In terms of age range, 24.4% were between 18 and 20, 33% between 21 and 23, 10% between 24 and 27, 5.7% between 28 and 31 and 26.9% over 31. The age range corresponds to the level of education on which the participants are studying, with 24.2% studying for a bachelor's degree, 70.5% as undergraduates, 0.3% for a doctorate, 4.7% for a Master and 0.3% had already graduated. In terms of which university, 5% were from the Complutense University of Madrid, 40% from Oviedo, 10.9% attended the University of Vigo, 18.2% from Granada and 25.8% studied distance learning courses at the UNED.

## 4. Results and discussion

### 4.1. Scale: The uses of the laptop

Table 1 shows the results from each item on the first scale. Laptop use among those sampled consists mainly of information search (76.5%), for collaborative tasks (70.1%) and learning (70%). The device was used least for tasks involving innovation (41%) and expression (47.2%). The results vary according to gender, age and university.

In terms of gender, women use their laptops to search for information in 78.9% of cases, and men 69.8%. For age range, 97.2% of those between 18 and 20 consider info searches to be the most important use to which they put their laptops while only 28.9% of those over 31 do so. In terms of university, the figures are Complutense (94.4%), Oviedo (89.2%), Vigo (95.6%) and Granada (93.5%), where classes are face-to-face, as opposed to distance learning at the UNED where the figure is 1.4%.

The second most widely applied use of the laptop by students is in collaboration tasks, 70.1%. By gender there is no significant difference: 68.6% for women and 75.5% for men ( $C=0.063$ ,  $Sig.=0.202$ ). Neither is there a significant difference for age. Students aged 18 to 20 valued this use at 62.3%, those between 24 and 27 at 78.6% and those 31 and over at 71.9% ( $C=0.113$ ,  $Sig.=0.266$ ). In terms of university, the differences are significant: ( $C=0.258$ ,  $Sig.=0.000$ ) with scores of 60.2% for Oviedo, 77.6% for Vigo and 90.1% for UNED students.

Using the laptop for learning (70%) reveals no significant statistical differences ( $C=0.037$ ,  $Sig.=0.454$ ). This usage type would appear to be more important for women (71.4%) than for men (67.4%). Younger students (18-31) appreciate this usage more (88.9% and 70.1%) than their older colleagues (45.6%). The same occurs at those universities where students attend class: Complutense (65.7%), Oviedo (77.6%), Vigo (82.2%) and Granada (79.2%) compared to UNED (44.4%).

The explanatory factor analysis gives a KMO test score of 0.80 and 771 for the Bartlett sphericity test. There is a significance level of 0.000, which indicates that the dimension reduction model is adequate.

The explained variation of the first three factors with self-values higher than 1 is 62%, meaning that the three-dimensional model can be used satisfactorily. Factor saturations of the variables show that the first factor influences entertainment. They saturate entertainment (0.755), information (0.794) and communication (0.641), while the second factor influences

**Table 1. Frequency of use of laptop computers**

Laptop computer uses	Respondent percentages	
	Yes (%)	No (%)
Entertainment	65.4	34.6
Expression	47.2	52.8
Motivation	47.8	52.2
Information	76.5	23.5
Learning	70	30
Collaboration	70.1	29.9
Communication	63.5	36.5
Illustration	53.4	46.6
Innovation	41	59

motivation: motivation (0.739), innovation (0.772).

The third influences learning; saturation of learning (0.796), collaboration (0.611) and illustration (0.575).

Using the saturation coefficients, we calculated the factor scores for the sample subjects in order to obtain the variance analyses and define differences within the gender, age and university variables. The results indicate that the first factor (use of laptop for entertainment) is more important for the youngest respondents (18-20 year olds) ( $F=51.45$ ,  $Sig.=0.000$ ) than for the older learners (31 and over) and the distance learners (UNED) ( $F=146.5$ ,  $Sig.=0.000$ ). The second factor (motivation) varies according to the university where the participants study ( $F=3.83$ ,  $Sig.=0.005$ ). The students with the highest scores are those from the UNED, with Oviedo scoring lowest.

The use of the laptop for academic work shows significant differences for age ( $F=7.02$ ,  $Sig.=0.000$ ). This is valued less highly by those older than 31. The universities that score highest and lowest in this category are Complutense and UNED, respectively.

### 4.2. Scale: The activities performed

The data indicate that laptop use for academic tasks (producing work, study, exchanging class notes, searching for academic information) is very frequent or frequent, ranging from 88.7% (producing work) to 55.2% (exchanging class notes), which allows us to state that although learning patterns generated by Web 1.0 and 2.0 are hardly dynamic (Francisco, 2011), the Spanish «plurimodalict» uses the laptop mainly for learning.

The results for gender reveal that 92.5% of women use the laptop for producing academic work as opposed to 77% of men. In terms of age, the statistics are not significantly different ( $C=0.194$ ,  $Sig.=0.422$ ); the 18-20 age group use the device more (92.5%) than those 31 and over (85.3%). The scores by university are also high, with 100% of «plurimoda-

licts» in Granada and 84.9% in Oviedo using the laptop for academic tasks. The data show that the laptop is often used for other reasons that are not directly aca-

ademic but which can perhaps be considered educational, such as e-mail communication (87.7%), social networking (71.6%) and entertainment (62.1%). However, the use of laptops for online chats is low (36.9%), possibly because students prefer to use their smartphones for chatting (Quicios, Sevillano, & Ortega, 2013).

Analysing laptop usage for e-mailing, we observe that this activity is greater among women (90.5%) than men (79%), and is very frequent across all the age ranges. Students aged 28 to 31 use the laptop for e-mailing in 95.9% of cases, and those between 18 and 20 score 81.1%. In terms of the universities, the scores range from 93.3% at UNED and 80.5% for Complutense.

The third activity corresponding to laptop use for information purposes is the search for educational information (85.2%). Women use their laptops frequently to find information (89.5%), and men less so (70.2%). The 18-20 year-old students score 91.3% against 70.8% for those aged 24-27. In terms of the five universities, direct or distance learning influences laptop use for information sourcing, with 91.4% of UNED students citing this usage as opposed to 76.4% from Oviedo.

The exploratory factor analysis yielded a KMO score of 0.80, 626.36 for the Bartlett sphericity test and a significance level of 0.000. We then used a dimension reduction model to generate a model containing four factors that explain the 68% variance. The principal components method with Variamax rotation was used to extract those factors.

The saturations of the variables in each of the four factors extracted and rotated indicate that the first factor is related to the use of the laptop computer for carrying out academic activities. Saturations occur in the production of works (0.783), study (0.745), e-mailing (0.537) and searching for academic information (0.726). The second factor is related to facilitating the

**Table 2: Frequency of use of laptop computer for each activity**

Activities performed with laptop	Response percentages				
	N (%)	HE (%)	OC (%)	OF (%)	A (%)
Producing academic work	1.2	1.7	1.5	20.1	68.6
Study	6.2	9.1	25.2	29.5	30
Search for non-academic information	1.2	5.5	15.1	38.8	39.5
Chats	22.4	20.6	20.1	18.6	18.3
Social networks	8.6	7.9	11.9	23.7	47.9
Exchanging class notes	6.4	11.2	27.1	30.8	24.4
E-mail	1.7	2.9	7.7	21.4	66.3
Search for academic information	1.9	3.4	9.5	32.6	52.6
Doing group tasks (Skype)	18.2	24.7	24.2	16.5	16.5
Entertainment	4.2	10	23.7	30.7	31.4

N = Never; HE = Hardly Ever; OC = Occasionally; OF = Often; A = Always

learning process via contact with colleagues. Saturations affect the exchange of class notes (0.595) and performing group tasks via Skype (0.877). The third factor relates to use of the laptop as a social communication tool. Saturations influence chats (0.861) and social networks (0.777). The fourth factor refers to the laptop as an entertainment tool, with saturations of the search for non-academic information (0.752) and entertainment (0.842).

An ANOVA test was run to check for significant differences between the scores for the subjects in each extracted and rotated factor, and the gender, age and university variables.

In use of the laptop for academic activities the variance analysis of factor scores show that women use the laptop for this task more than men ( $F=22.54$ , Sig.=0.000), a result which coincides with the findings of other researchers (García, Gros, & Escofet, 2012) and shows that our research consolidates and categorizes a methodology and a trend.

This article is also valuable as it reinforces the formulation of a new theory by conceptualizing a new type of student society, the «plurimodalict» society, characterized by the relation that students establish with ICTs. The study on which this article is based indicates that age is not a significant variable in the use of the laptop for performing academic activities. So, age is not important as a constituent characteristic of the «plurimodalict».

On the other hand, distance or direct learning as a teaching methodology influences the frequency of use of the laptop for academic activities ( $F=12$ , Sig.=0.000). Students in the classroom do not have the same technological necessities as distance learners. This hypothesis is validated by the data. Post-hoc comparisons reveal statistically significant differences in the scores for this factor in students at the UNED and those from Oviedo and Granada.

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#### 4.3. Scale: Location of laptop use

Table 3 presents the response percentages for each item on the third scale.

Students hardly ever use their laptops at university, except in the library, and neither do they use them much outside or when commuting. The most usual places for laptop use are at home (70.1%) or at work (23.2%).

A factor analysis of the items on the scale together with the disaggregation of the scores for gender reveal that 93% of women mostly use their laptops at home, while men score 86%. Disaggregated scores for age show that those over 28 (95%) do the same as opposed to 86% of those under 28. For universities, 95% of UNED students use their laptops indoors against an 86% average for the «plurimodalicts» at the four other universities.

The scores for the KMO and Bartlett sphericity tests are 0.73 and 499, respectively, with a significance level of 0.000. A factor analysis of the items on the scale showed that the first four factors explain 70% of the total variance, making the variables on the scale sufficiently representative. The first factor is heavily loaded in relation to the use of the laptop at university; they saturate university cafeteria (0.698), corridors (0.871) and classrooms (0.621). The second factor indicates laptop use at work or in the library, saturating the former (0.815) and the latter (0.700). The third factor refers to laptop use outdoors or on transport, with saturation of leisure areas (0.623), outdoors (0.872) and transport (0.698). The fourth location for laptop use is at home (0.909).

The ANOVA tests for each factor show that the subjects aged 18 to 28 use their laptops at university (cafeteria, corridors, classrooms) more frequently than their elders ( $F=7.41$ ,  $Sig.=0.000$ ).

UNED and Granada students use theirs at home more than students from the three other universities ( $F=3.66$ ,  $Sig.=0.006$ ). Students at Complutense, Vigo and Oviedo use their laptops more at university ( $F=15.56$ ,  $Sig.=0.000$ ).

#### 5. Conclusions

This article deals with a highly contemporary theme, as the extent of the national and international literature on the subject testifies. It is a fertile study area at the moment and our article offers a novel perspective. In

the last five years, there has been a lot of research into computer and smartphone use by students but not so much on the content of that usage.

In line with other research on the subject, the results presented in this article scientifically strengthen a principal of global theory on the phenomenon studied (Ruiz-Olmo & Belmonte-Jiménez, 2014; Urueña, 2014; García, Gros, & Escofet, 2012). This article consolidates and categorizes a methodology and a trend, and also contributes to the formulation of a new theory, which is that university students constitute a new type of society that we call «plurimodalicts», a term we have coined from the words plural, modalities and ICTs.

The «plurimodalicts» are an emerging model of university student. This is formed of students who connect to the ever-changing polyhedron ICTs and use a communication device in a number of different ways depending on where they are at the time, the data package and type of relation they have with ICTs.

The verified global results indicate that this society uses the laptop mainly for academic work. In the sample, 88% stated that they use it for producing works, and 55% for exchanging class notes or searching for information. Other uses include communication via e-mail (88%) and social networking (71%). Factor analyses and ANOVA tests revealed that it is women who mainly use the laptop for academic activities.

Further variance analyses showed that the students aged 18 to 28 use their laptops in the university library more than their older counterparts (32%). The locations most widely frequented in terms of laptop use across all age ranges were the home (91%) followed by the workplace (43,8%). The results also show that other spaces such as gardens, transport and the outdoors in general are emerging as student study places thanks to the laptop's portability.

The variable corresponding to university mem-

**Table 3. Frequency of laptop use in each location**

Location of laptop use	Response percentages				
	N (%)	HE (%)	OC (%)	OF (%)	A (%)
University cafe	62.2	17.9	11.1	4.6	4.1
Corridors	67.4	14.4	11.3	5.2	1.7
Classrooms	45.6	15.9	18.9	12.4	7.3
Leisure areas	52.9	20.5	13.7	6.3	6.6
At home	2.7	1	5	21.1	70.1
At work	31.8	8.2	16.2	20.6	23.2
Outdoors	77.5	13.5	4.1	2.2	2.7
Library	30.1	14.5	23	17.9	14.5
Commuting	79.3	12.0	4.7	2.8	1.1

N = Never; HE = Hardly Ever; OC = Occasionally; OF = Often; A = Always

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bership indirectly confirms the validity of our sample and the data collected. Distance learners at the UNED use their laptops at home more than students at the other four classroom-based universities.

Regarding laptop use for non-academic purposes, neither age, gender or university membership were significant in the factor analysis for laptop use for contact with colleagues or as a social communication or leisure tool, although the younger students tend to make more use of theirs for gaming than the older learners.

The factor analyses identified some dimensions related to laptop uses and functions which future works could define as specific user profiles of the «plurimodalict» phenomenon. This study shows that university teaching staff need to design didactic content and activities that fit the «plurimodalict» learning style and the different ways in which «plurimodalicts» use their laptops.

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