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Analysis of the use of mobile devices in Spanish university classrooms

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Abstract

Introduction: The level of training in media literacy of Spanish faculty members and the use of mobile devices by students for learning purposes were investigated. **Method:** We analyze the questionnaires completed by 100 professors from different Spanish universities, aged 39-64 years, with items focused on teaching innovation using mobile devices and media competence in their classes. **Results:** It has been established that the main barriers to innovation using ICTs in classes are due to the faculty themselves and a lack of investment by universities. **Discussion:** In view of the findings, it is clear that an insufficient technological training of the faculty compromises curricular innovation using mobile devices. **Conclusions:** Despite the misgivings of some professors and the lack of investment by higher education institutions, there are also success stories of innovative teaching, which must be multiplied to meet the demands of students and society at large.

Keywords

Media literacy, mobile devices, teaching innovation, university, faculty.

Contents

Opportunities and barriers for teaching innovation with mobile technologies. 3.3 Analyzing the implications of mobile devices. 3.4 Level of media literacy of students. 3.5 Level of teacher training in mobile technologies. 4. Conclusions. 5. References.

1. Introduction

In modern societies, characterized by continuous and rapid change, new technologies have become a key element in everyday life: politics, culture, education and interpersonal relationships are increasingly dependent on multiple screens. Digital technology has become omnipresent and almost omnipotent. It is the so-called Information Age paradigm, which Manuel Castells (1995, p. 12) described as one in which new technologies do not determine what happens in society but change the ground rules so that citizens need to learn about and adapt to new realities or will be subject to the control of countries or individuals with control of the access to knowledge and power.

But not all screens are equally popular, especially among the youth, who value smartphones above all other devices, including laptops, tablets and smart TVs, largely due to the phenomenon of media convergence. Henry Jenkins (2008) argues that content flows through multiple media platforms triggering a migratory behavior in the audience in search of the desired product. In other words, given the diversity of technological devices for the consumption of audiovisual texts, content tends to be unified and thanks to such unification, users can enjoy for instance the same TV show, any time any place, through a range of devices while the experience is only conditioned by the size of the screen.

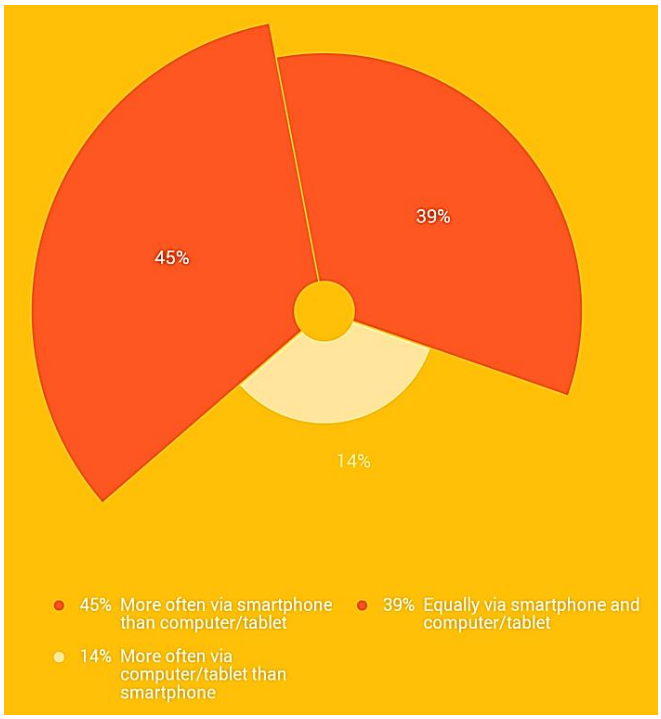

Figure 1: *Devices most often used to come online*. Spain. Source: *The Connected Consumer Survey*.

Besides media consumption, the possibility of bidirectional communication using private messaging platfoms such as *WhatsApp*, *Line*, *Telegram* or social networks, regardless of location, make smartphones more attractive than the rest of devices, which are in varying degrees tied to a location for the consumption of text, video or audio. Users prize connectivity above everything. Morales (2012, p. 93) points out how connectivity needs have evolved from email and functional applications such as GPS to interaction in a variety of networks established on the basis of personal, work or common interests, and to newer forms of interaction such as payment gateways.

According to the *Google Consumer Barometer Report*, in 2017 a majority of Spanish users chose smartphones as their favorite form of access to the Internet. A sample of 1000 individuals over 16 years of age was considered representative of the total population (online and offline). The questions in the survey were related to surfing habits, choices in the use of web sites or apps. Nearly a half of the respondents (45%) expressed their preference for smartphones as compared to laptops or tablets, while 39% claimed to enjoy equally surfing the Internet on smartphones, laptops and tablets, and only 14% chose laptops and tablets above smartphones.

The report included a large number of countries as different in their sociocultural practices as the United Kingdom and China. Among British users of digital technologies, the preference for smartphones above other devices was ranked at 32% while 75% of the Chinese chose cell phones as their favorite device, well above other countries.

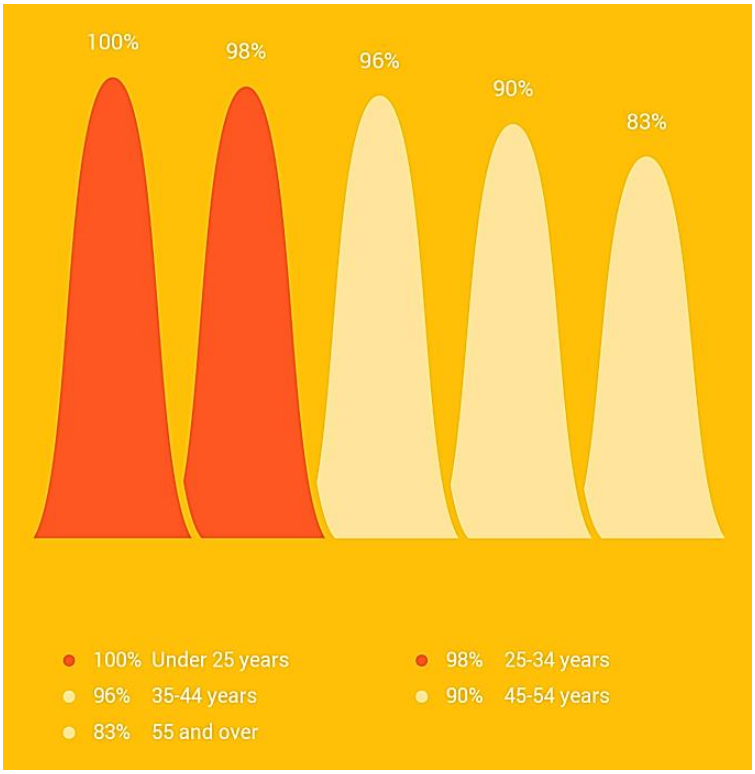

Figure 2: *Daily Internet Use*. Spain. Source: *The Connected Consumer Survey*.

Regarding the frequency of use of the Internet, 100% of respondents under 25 years claim to surf the Internet daily, followed by 98% between 25 and 34 years, and 96% between 35 and 44 years. Above 44 years there is a higher decrease in Internet consumption. Nevertheless, Spanish under-25s are slightly above their British counterparts in Internet consumption (96%) and at a considerable distance from daily Internet users in the same age group in China (88%).

These results confirm smartphones as the favorite means of access to the Internet for young and adult Spaniards while the highest Internet consumption is found among adolescents and youths, that is, the generations of digital natives (Prensky, 2001).

Against this backdrop, all educational centers, whether schools, high schools or colleges, feel the pressure to integrate ICTs in their teaching practice more substantially than ever. But the process is being by no means uniform. Most high schools do not allow cell phones in the classroom but critical voices have been raised against the ban and in favor of taking advantage of new habits in information gathering and cultural consumption among the youth (Gutiérrez & Tyner, 2012, p. 32).

Since digital technologies have been integrated in social practices, there is a growing need to teach how to deal with digital media and the overwhelming amount of information we are exposed to daily, now that it is becoming increasingly difficult to discriminate between useful and false content circulating through multiple channels. Nevertheless, the Internet can prove to be a powerful teaching tool if educators approach its use critically and make students aware that content is not always information. Ayuste, Gros & Valvidieso (2012, p. 22) caution against the way in which politics, citizen participation, the media, consumerism, cultural industries, entertainment, interpersonal and sexual behavior become blurred in the Internet, which enables not only the flows of information but also of power.

It is true that digital technologies pose risks but they also have huge potential. There are many educational applications which turn learning into a playful experience, such as *Kahoot!* which allows the user to create quizzes in minutes on the basis of classic question and answer games. The player giving the most right answers in the shortest time wins. *Duolingo* is another very popular application for learning languages using the smartphone. This app helps learning foreign languages playing games that allow the user to reach higher levels of vocabulary and sentence construction. Its popularity seems to derive from a simple but effective form of motivation, the so-called "streak counts", notifications that remind the learner the number of days of continued practice earning points.

There are other learning apps with an academic orientation, notably TED talks. TED began as a conference on Technology, Entertainment and Design over thirty years ago but today covers almost every topic and a TED talk app has been designed for smartphones with over two thousand lectures subtitled in more than one hundred languages and the possibility of downloading the video or audio so that they are available offline. The length of all the talks, 18 minutes, seems to work very well balancing seriousness and attention, and the experience of speakers and variety of topics make them inspiring learning tools to be used in classes to create lessons and motivate discussions.

Other applications designed without an educational purpose can also meet classroom needs notwithstanding. Martínez-Rodrigo & Raya-González (2013, p. 1563) argue that the nature and potential of social networks tune in with the paradigm shift in education from unidirectionality to bidirectionality, which allows for learner-centered approaches, gives students a more active role, and promotes competence acquisition within and outside the classroom, all of them principles upheld by the European Higher Education Area.

Social networks offer opportunities for getting in contact with users from around the world and accessing varied multimedia content with the possibility of interacting in real time by means of a synthetic language. However, a significant part of the users with whom we maintain contact are acquaintances in our immediate surroundings, and so social networks are changing how we relate to others and how we share content. In particular, for youngsters these virtual spaces contribute markedly to leisure and entertainment (Martínez-Rodrigo & Sánchez-Martín, 2015, p. 90).

But the function of social networks should not be confined to shared spaces for private life experiences, content related to personal interests, or views; for example, if well-managed, they can provide a free exhibition space for users. Thus they are especially interesting for students in areas related to creativity and content generation such as Bachelor programs in arts and audiovisual communication.

The implementation of digital technologies in education can be focused on individual needs or group interaction but in either case motivation to gain knowledge is enhanced by introducing mobile devices in the process. One approach which can benefit especially from mobile technology is collaborative learning. This method engages students to participate actively and develop competences such as the capacity to debate in formal manner. Calzadilla (2002, p. 5) explains how collaborative learning allows individuals to obtain feedback on their own learning styles and apply metacognitive strategies to improve performance. Cooperative learning also increases motivation by strengthening the sense of belonging and self-esteem through the identification of common goals and responsibilities.

The potential of mobile technologies can be exploited by combining collaborative work and ICTs since the latter provide channels of communication which guarantee open and interactive spaces for learning which are rich in informational stimuli, motivating and focused on competence development (García-Valcárcel, Basilotta, López, 2014, p. 67).

While encouraging progress has been made in the instrumental use of digital technologies, there has not been a parallel effort to promote education oriented to critical, aesthetic and ethical reflection (Tucho *et al.,* 2015). Media competence requires an adequate understanding and use of media, communication channels and technology. Ferrés and Piscitelli (2012, p. 79) define it in terms of knowledge, skills and attitudes displayed in six dimensions by individuals who receive messages (field of participation), who interact with them (field of analysis) and who produce them (field of expression). The six dimensions correspond to language, technology, processes of production and dissemination, processes of reception and interaction, ideology and values, and aesthetics (Ferrés, Aguaded & García, 2012, p. 25). Ferrés and Piscitelly (2012, p. 81) justify the inclusion of “emotion” as a seventh

dimension because of the way in which critical thinking is exposed to the impact of emotions. These authors argue that media competence requires a critical capacity towards one's own critical thinking. Because of the dominance of the emotional over the rational mind, it is appropriate to refer to the human being as a "rationalizing rather than a rational animal", using the famous quote by science fiction author Robert Heinlein (1953).

These dimensions are broken down into indicators which show the capacity to both understand critically the messages conveyed by the media in terms of form and content, and generate messages to establish communication by means of the technology tools available.

Now, more than ever, media competence becomes central to face the changes in communication processes derived from transmedia narratives, which are booming and increasingly present in our multi-screen society.

In mobile environments it is impossible to think of a one-way communication process, or on only one –or a few– discourse model(s), as it is to ignore the importance of the prosumer. Concepts should be adapted or else the expected results will hardly be achieved when content is addressed to connected citizens, whether it is film, advertising, journalism, literature or politics (Campalans & Renó, 2012, p. 1).

In transmedia narratives, especially in popular fiction, stories told across platforms become complementary so that prosumers need to access all of them to get the full details and participate actively in the creation of contents. As Grandío (2016, p. 95) explains, transmedia narratives are built on different expressive codes taken from visual, auditory or written media. For a comprehensive understanding of transmedia realms, the receiver needs to grasp the complementarity of media texts and hence the importance to promote the capacity for multimodal expression in students.

Transmedia narratives have produced new media texts such as the interactive documentary, in which the old linear storytelling is transformed into a non-linear one, expanded and with a liquid structure. Users are free to explore aspects of their interest accessing extra content or following alternative paths to the main narrative thread (Vázquez-Herrero et al., 2017). This requires considerable skill at interpreting and integrating content so that the experience is enriching.

So far, we have considered the components of media competence, how necessary it has become to adapt to current social demands and the acquisition of media skills by increasingly younger users. Now we should turn to teachers and faculty, who should translate media competence into motivating teaching strategies.

The use of ICTs and the media as teaching resources and tools for learning the contents of the curriculum, usually in the hands of educators, is often the first step at integrating digital technologies in education centers (Gutiérrez &Tyner, 2012, p. 32-33). Nevertheless, in many cases teaching staff without proper training in media literacy are responsible for teaching students how to be media literate citizens (Gabelas, 2007, p. 71).

When we refer to the role of teaching staff as educators we include teachers in primary and secondary education and university faculty, since the rapid change in the media and the codes used is constant and calls for continuous training. Cabrero & Guerra (2011, p. 91) consider it essential in our media society to include media skills as part of teacher training since the media have become a customary resource in the students' process of socialization and learning. The use and processing of information, and the analysis and production of messages will be determined by the methodological approach adopted in the early stages of education.

Several studies have been made to establish whether the training of future educators and communication professionals includes media education as a subject or course content because one of the main reasons why it is scarcely present in primary and secondary education seems to be found in the curricula in higher education, which lacks such training and is most often immediately previous to professional practice, causing the said deficiencies.

On the other hand, as Masanet y Ferrés (2013, p. 89) explain, such deficiencies in the curricula arise from a lack of knowledge or commitment among academic authorities towards media education. Findings show the inability of administrators to distinguish between subjects directly or indirectly related to media education. This leads to a gridlock since subjects focused on ICTs are considered directly related to media education and as a result authorities conclude that the subjects offered are sufficient while only one dimension of media competence is taught.

Experts have warned against the risks of media illiteracy, so now it is the mandate of the educational community to demand training proposals and the inclusion of media education subjects in the curriculum rather than dealing with its contents as transversal competences, as is currently the case in the last years of primary and in secondary education (López & Aguaded, 2015, p. 194).

In view of the apparent lack of media education in higher education in general and in teacher training in particular, we established the following goals for our study:

-To know which are the most used devices in university teaching and learning and how they are being employed.

-To reveal some aspects and opportunities which characterize teaching innovation by means of mobile devices and the barriers that need to be overcome to deliver their full potential.

-To find out whether university faculty analyze in their classes the social, political economic and environmental implications of mobile devices in our society.

-To analyze the perception of university faculty of the level of media literacy of undergraduates.

-To establish the level of training of faculty in the use of mobile devices for teaching, methodological and technical purposes.

2. Method

A questionnaire with 10 items was completed by 100 professors from Spanish universities. The ages of respondents range between 39 and 64 years. The questions focused on the goals detailed above: use of mobile devices in class, opportunities and constraints, whether the course contents included the use of digital technologies, perceptions of the level of media competence of students and level of training of the faculty in media skills. The space for answers was not limited.

The information obtained from the answers provided was analyzed quantitatively and qualitatively depending on the type of question.

3. Analysis and results

The information collected was analyzed in relation to the topics established in the goals. First, data were grouped into categories related to the type of device employed. Secondly the analysis focused on the opportunities and barriers in the use of digital technologies. Next, the media competence of students was considered. Finally, the level of training of the faculty was examined.

3.1. Mobile devices used in class

Findings indicate that the most commonly used technical device is the laptop, followed by smartphones and tablet computers or Ipads (Figure 3). It should be noted that devices are not used exclusively. A student may employ more than one device, each of them with a specific use.

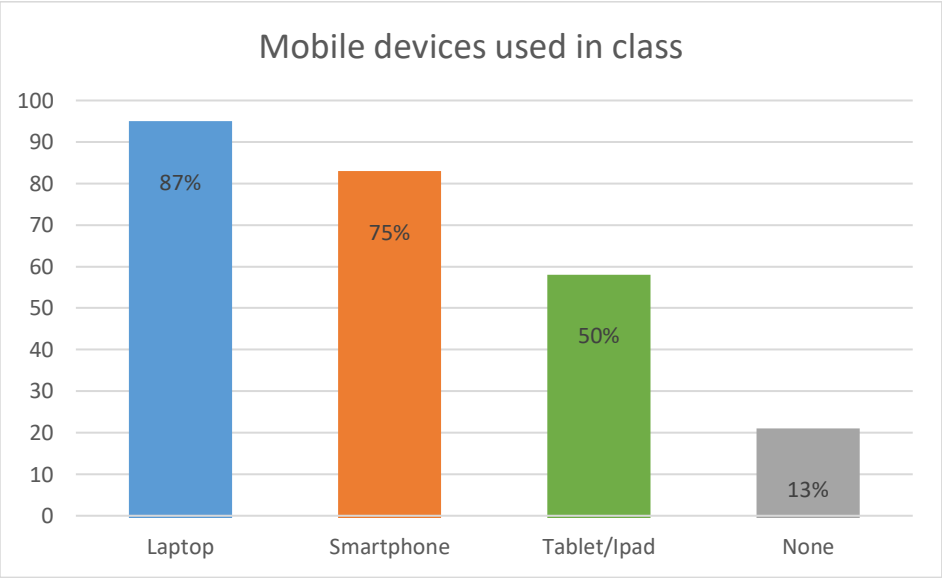

Figure 3: Mobile devices used in class.
Source: prepared by the authors.

As can be seen in Figure 3, most professors (87%) confirm that the laptop is the preferred device among undergraduates. It is used specifically to take notes, follow a PowerPoint presentation showed by the professor, and in certain studies such as Audiovisual Communication, to run some professional software for video and sound editing which has technical requirements above those offered by other devices. Laptops are especially useful in subjects which combine on-site and virtual teaching since they are the tool for up to half of the class time.

Smartphones (75%) came in second as the most used devices. They are generally used for browsing on the Internet. In modern languages degrees they have replaced dictionaries and provide a fast tool for looking up meanings during classes. They also allow access to learning platfoms, designed by universities for course management, and resources such as university libraries to check availability of books or access and download e-books. Some professors attribute a motivating character to smartphones in the learning process. JBC describes the main advantage of smartphones as an increase in the students' attention and concentration, curiously the opposite view to professors who see them as sources of distraction.

Regarding tablet computers, their employment was confirmed in 50% of the cases as the least used mobile device in general. Its main use is taking class notes and run application software which requires performance above that of smartphones. It is a hybrid between laptops and smartphones. They do not reach the performance of laptops –except some upmarket models– and although both tablets and smartphones are portable, only the latter is really considered mobile.

If we consider the academic use of mobile devices outside the classroom, students employ them to gather information about the subjects, to prepare essays and exams, to communicate with professors via email and with peers via WhatsApp, a central tool to organize collaborative projects.

As to the user experience with mobile technologies, 37% of the teaching staff deem smartphones the least useful of the devices considered. JAJ claims that the use of smartphones is more limited because most application interface designs require larger screens and better performance. A fourth of the faculty have observed a decrease in the use of laptops and an increase of tablets and smartphones in class. Some respondents consider that the use of cell phones is limited to degrees such as Journalism due to the professional orientation of graduates.

In short, at present the most commonly used device in university classes is the laptop, followed by smartphones and tablets. Each device determines a particular experience, whether taking class notes, online information searching, or communication with faculty members outside the classroom. Different fields of study are associated with specific uses, as is the case of software in technical degrees.

3.2. Opportunities and barriers for teaching innovation with mobile technologies

There is a general feeling among respondents that mobile devices offer new opportunities for teaching innovation beyond searching for information online and using office software. Mobile technologies

create new modes and models of research in all fields of study allowing real cross-functional knowledge sharing. From the wide range of possibilities offered by mobile technologies, MVL highlights:

-Allowing students and teachers to be syncronized with one another content-wise during the learning process.

-Taking the teaching experience to spaces outside the classroom, creating new environments for learning.

-Increasing the integration of teaching and a professional reality which has already adapted to the digital revolution.

-Managing efficiently the changing media communicative formats, ever adapting to updated portable media devices.

The possibilities for teaching innovation are only beginning to be explored. For instance, the synchronization between teacher and students can be further developed into the so-called "second-screen" learning, with the professor as the "first screen". Students can access or create personalized content while the instructor guides and facilitates the core of the lesson.

Overall, the use of mobile devices in education is the natural consequence of adapting learning to the current social reality. MAM explains that the potential of these technologies for content management goes beyond the web and extends the concept of "any time, any place, for anyone" to "any time, any place, for anything". In the university environment, innovation consists in maximizing collaborative learning, which includes the faculty members.

However, respondents also share concerns about losing sight of teaching goals because of the pressure to "innovate for innovation's sake". In principle mobile technologies should be used to solve learning problems. In some professors' opinion, their use should be complementary to areas of teaching which develop unidirectionally from teacher to student and do not require technological mediation.

Another important fear about using mobile devices in class is the distraction factor for students, especially when the class contents are not considered interesting. M points out that new technologies should be made relevant for competence and knowledge acquisition. Otherwise students will use the digital devices for activities unrelated to class such as text messaging or playing games.

The main barriers for innovation, respondents explain, are to be found in the faculty's own reservations regarding innovation experiences due to three factors:

1. Time constraints to deal with all the contents of the course syllabus, made worse by the recent changes in the academic calendar.

2. Little training in media competence and skills (this is discussed in some detail below).

3. Resistance to introduce changes in established teaching procedures.

A second difficulty originates because of budget cuts in higher education, which limit the investment in software and hardware. Faculty mention cases when they have to use their personal devices for classes. According to JAJ, there should be a discussion about the total replacement of office PCs by laptops. Most university departments regularly allocate funds for publications, translations and conference participation but financing digital technology is not generalized and is a must at least in technological disciplines. Many professors are reluctant to use their personal devices because of the wear and tear that faculty end up paying for. Public universities tend to use free software to save money but this policy compromises the quality of teaching in fields of study which require professional software.

Summing up, university faculty see in mobile technologies opportunities for innovation and for bringing teaching closer to current social reality, which undoubtedly benefits the learning process. But there is also a number of barriers to be removed: the faculty's poor media skills, packed teaching schedules and lack of institutional investment.

3.3. Analyzing the implications of mobile devices

Questionnaire respondents were asked whether they devote part of their classes to analyzing the social, political, economic and environmental implications of the use of mobile technologies for our society. These issues are relevant to education since they affect all fields of study and citizens should be aware of the consequences of the use of devices which have become ubiquitous in daily life.

It was found that 63% of faculty members discuss the implications of the use of mobile technologies in class. However, differences were observed when these issues are dealt with (or avoided) as shown in Figure 4.

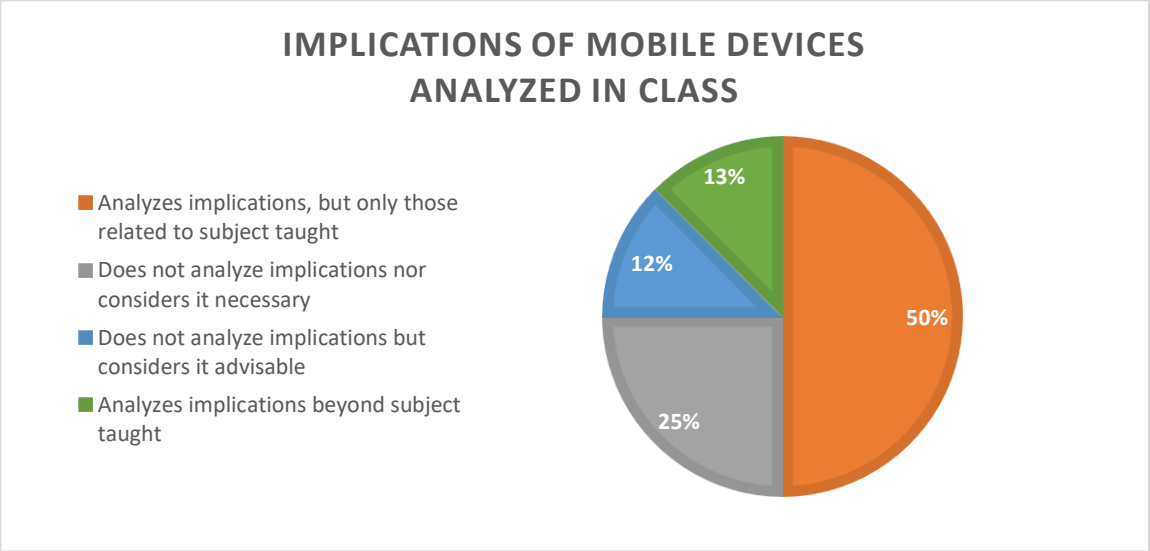

Figure 4: Implications of mobile devices analyzed in class. Source: prepared by the authors.

We can start by considering the reasons given for not analyzing the implications of mobile technologies in the classroom. From the group who consider it unnecessary (25%), little more than half believe such discussion is beyond the scope of their course and should be dealt with in a subject of its own given its importance and complexity. Little less than half think this type of content was already part of the students' secondary education and should not be studied again. Finally, 12% of respondents had never contemplated including such analysis in their course contents although they consider it valuable and may incorporate it in coming years.

Regarding the 63% who analyze the implications of mobile technologies in class, a majority (80%) admit that they only focus on issues with a direct connection to the course contents (Figure 4), mainly the social and economic consequences. Several professors indicate that they pay special attention to the professional aspects of the future graduates. Only 13% consider the broader implications regardless of the course contents. ERF points out the need to discuss its implications because digital technology is a cross-cutting theme which otherwise will remain ignored in higher education.

Overall, the analysis of the implications of mobile devices is still limited. It becomes evident that teaching staff should be made aware of the need to integrate these issues in their classes even though they are only tangentially related to the contents since the competency based curriculum advocated by most faculty requires it.

3.4. Level of media literacy of students

The perception of faculty members of the level of media literacy of students is a determining factor to conduct any innovation project. As indicated above, the dimensions of media literacy can be grouped into six categories: language, technology, processes of production and dissemination, processes of reception and interaction, ideology and values, and aesthetics.

Only 38% of the respondents indicate that on the basis of their observations and class practice their students have a high level of media competence in all dimensions. On the other hand, 12% admit that they are unable to assess the media competence of their students because class practice does not provide sufficient evidence. The other 50% of professors consider that the competence of their students shows mixed results, with weaknesses in three dimensions that should be addressed by university courses, as seen in Figure 5.

All the respondents in the latter group say that the weakest dimension is ideological. Students show very little critical sense when they interpret information, which may be partly due to their young age. The verbal dimension of students is considered inadequate by half of the professors. MVL explains that the students' verbal competence is restricted to a communicative code which has become a true social metalanguage. This limitation compromises their capacity to adapt to other registers (eg., formal, academic) and seems derived from self-training and non-formal education acquired in the use of digital media only for leisure activities. Lastly, interaction processes are considered deficient by 25% of professors. This dimension is closely related to individual personality traits and how selective users are in their relationships.

At the same time, the strongest dimension in students is technological (75%), as a result of their continued use of digital devices since childhood. Some faculty admit to being less skilled than their students.

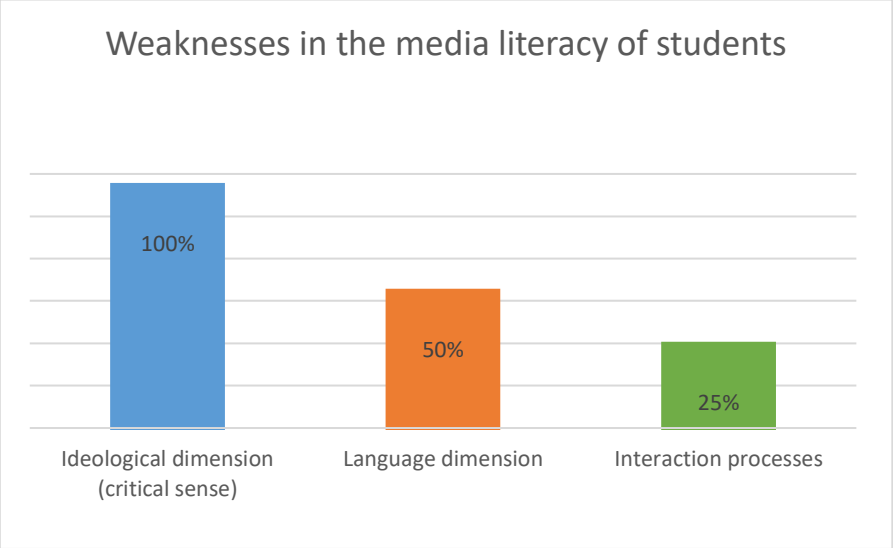

Figure 5: Weaknesses in the media literacy of students.
Source: prepared by the authors.

The dimensions of media competence targeted specifically in class, not simply as cross-cutting content, are the processes of dissemination and the aesthetic dimension, according to professors of Audiovisual Communication and Journalism, since these are basic for media professionals. Some initiatives are now in place such as "cafetería", a forum created in the learning platform of the course taught by JLG, used to share and debate news and interesting topics among students, and between them and the professor, to strengthen the ideological, verbal and interactive dimensions in a formal and academic environment.

3.5. Level of teacher training in mobile technologies

In terms of teacher training in the use of mobile technologies for didactic, methodological and technical purposes, we find three groups of answers shown in Figure 6.

Over a half of respondents (55%), between 39 and 64 years of age, declare that their entire training was self-taught and motivated by individual needs arising in their teaching in recent years. Little over a quarter (27%) of the faculty attended one or more basic training courses and only 18% of professors developed their skills formally through specific training courses and resources offered by the university where they work or in undergraduate and postgraduate courses.

As a result, 75% of the respondents consider their training in the didactic use of mobile devices and media competence insufficient, while 25% say theirs is adequate for the current context. But given the

speed with which digital technologies are changing, life-long learning seems to be the only way to meet the demands of new generations regarding learning tools, methodology and knowledge.

University faculty are increasingly receiving media training and learning about the didactic use of mobile technologies but many professors acknowledge limitations in their media training and technical skills which compromise teaching innovation.

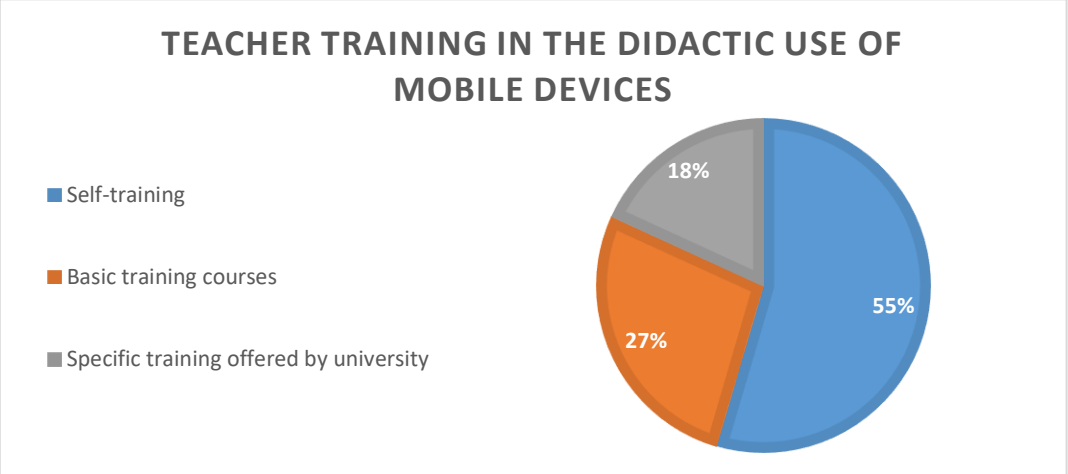

Figure 6: Teacher training in the didactic use of mobile devices.
Source: prepared by the authors.

4. Conclusions

After revising recent research in the field of educommunication and analyzing the questionnaires completed by 100 faculty members currently teaching in Spanish universities, the following conclusions can be drawn.

The laptop is still the electronic device most frequently used by students in university classrooms due to its performance and ease of use according to 87% of faculty respondents. Smartphones are the second most-widely used device (75%) and tablets are the third (50%). Evidence shows an increasing use of mobile devices associated to specific academic tasks and conditioned by the evolution of technology and performance of devices. Technology is assuming an ever more central role in teaching and learning for new generations and accordingly its potential should be developed beyond new ways of doing old things (eg., taking class notes) to bring about a qualitative change in teaching and learning approaches (collaborative learning, "second-screen" learning).

Overcoming the obstacles to innovative approaches requires a change in mentality. University faculty who feel reluctant to allow electronic devices in class because of the risk of distractions and time waste can learn from the successful experiences of colleagues and reconsider the introduction mobile devices

in their teaching perhaps in task-based activities as a first step. University administrators should be aware that new technologies, both hardware and software, can be a primary learning resource and tool in some fields of study for future professionals so investment here should be a priority for higher education institutions.

All the same, in developing new approaches, it is advisable to take into account the point of view and media competence of the students so that the learning process is adequate and efficient for their needs, empowers them to combine theory with experience, and favors their integration in the society of knowledge and the labor market. Assessing students' abilities allows teaching staff to strengthen weaker dimensions (ideological, verbal) and capitalize on their strengths (technology skills).

As to the implications of mobile devices and ICTs in general, it becomes increasingly evident that they should not be dealt with exclusively as cross-disciplinary content and become specific university subjects to be taught in most degrees and especially those related to communication and education. Until such subjects are offered as part of the curriculum, professors are responsible for the media training of students in higher education, when their maturity and knowledge enables a more in-depth study and reflection than in lower levels.

The level of training in the use of mobile devices for didactic purposes of faculty members is still insufficient in many cases according to the answers given by respondents in spite of a growing offer in courses and resources. Universities should encourage and motivate teaching staff to engage in lifelong learning in addition to training new staff so that change becomes widespread.

Finally, university faculty perceive clearly the unstoppable advance of technology and the adaptability of mobile devices as tools for cooperative and autonomous learning, and as motivating forces. Mobile technologies are expected to be fully integrated in higher education within the next ten years. It is our collective and individual responsibility to secure that such integration develops its massive educational potential.

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