RESEARCH ARTICLE

Digital Competences in Higher Education Professors

Competencias digitales en docentes de Educación Superior

Competências digitais em professores do Ensino Superior

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▶ **Abstract.** This article describes a university experience whose objectives were (a) to define the digital competences of professors, (b) to state how they use Information and Communications Technology (ITC), and (c) to know their perceptions on the importance of facilitating this type of competences in the students. Through the CODIPES questionnaire, a total of 53 professors from the Social and Legal Sciences area of the University of Malaga (2016/2017 academic year) were assessed. Among the conclusions obtained from this study, we underscore the importance given to ICTs in training and their consideration as such in the teaching and learning processes, pointing out several factors that have a bearing on their use, such as lack of time or resources, the individual's ideas, or lack of information.

▶ **Resumen. El presente artículo describe una experiencia universitaria cuyos objetivos fueron (a) delimitar las competencias digitales que poseen los docentes**, (b) señalar cómo utilizan las Tecnologías de la Información y la Comunicación (TIC) y (c) conocer sus percepciones sobre la importancia de favorecer este tipo de competencias en el alumnado.

A través del cuestionario CODIPES se evaluó a un total de 53 profesores de Ciencias Sociales y Jurídicas de la Universidad de Málaga, del curso académico 2016/2017. De las conclusiones extraídas de dicho estudio, destacamos la importancia reconocida a las TIC en la docencia y su consideración como tal en los procesos de enseñanza – aprendizaje, indicándose diversos factores que influyen en el uso de las mismas, tales como la falta de tiempo o de recursos, las propias concepciones o la falta de formación.

Digital, Formación Docente, TIC.

▸ **Resumo.** Este artigo descreve uma experiência universitária cujos objetivos foram (a) definir as competências digitais possuídas pelos professores, (b) identificar como eles usam a Tecnologia da Informação e a Comunicação (TIC) e (c) conhecer as suas percepções sobre a importância de favorecer este tipo de competências nos alunos. Através do questionário CODIPES foram avaliados um total de 53 professores de Ciências Sociais e Direito da Universidade de Málaga, no ano letivo de 2016/2017. Entre as conclusões deste estudo destacamos a importância atribuída às TIC na docência e sua consideração como tal nos processos de ensino - aprendizagem, indicando vários fatores que influenciam na sua utilização, como a falta de tempo ou recursos, as concepções próprias ou a falta de treinamento.

Palavras-chave: ensino superior, competência digital, formação de professores, tic.

The current society in which we live is undergoing a technological globalization that reigns in our lives and, inevitably, the communicative ecosystem grows where hyper-communication prevails (Caldeiro-Pedreira & Aguaded-Gómez, 2015). This new society requires ways of organizing social, political, economic and educational life of the countries and, consequently, new professionals with a wide range of competences, among them, the so-called digital competence (Marín-Díaz, Reche & Maldonado, 2013).

In this regard, in accordance with the indications of the European Higher Education Area (EHEA), the University is conceived as an institution whose *raison d'être* is justified as a facilitator of professional competences necessary for entering the labor market and the performance of professional tasks of each sector. For this, the University must have the necessary resources and qualified personnel to train future graduates. It is in this group that we focus our attention, because of its influence on the teaching and learning processes.

Teachers had suddenly found themselves facing a progressive technological "imposition" in the performance of their tasks (Gutiérrez & Prendes, 2012), from academic management (Canales, 2006) to communication channels, having to acquire new roles (Gisbert, Martínez & Mon, 2016,

Marquès, 2000, Tejada, 1999), becoming mediators, facilitators and motivators of significant, contextualized and autonomous learning processes (De Miguel, 2005; Marquès, 2000), as well as modifying the methodologies they have traditionally been used, accommodating the didactic use of technologies (Zabalza, 2009), in benefit of the students, so they could acquire of the aforementioned digital competences (Flores, Gómez & Zambrano, 2015).

In this sense, digital competencies are reflected in every dimension of a teacher professionalization, and therefore, defines the need to adapt their competences (see Figure 1).
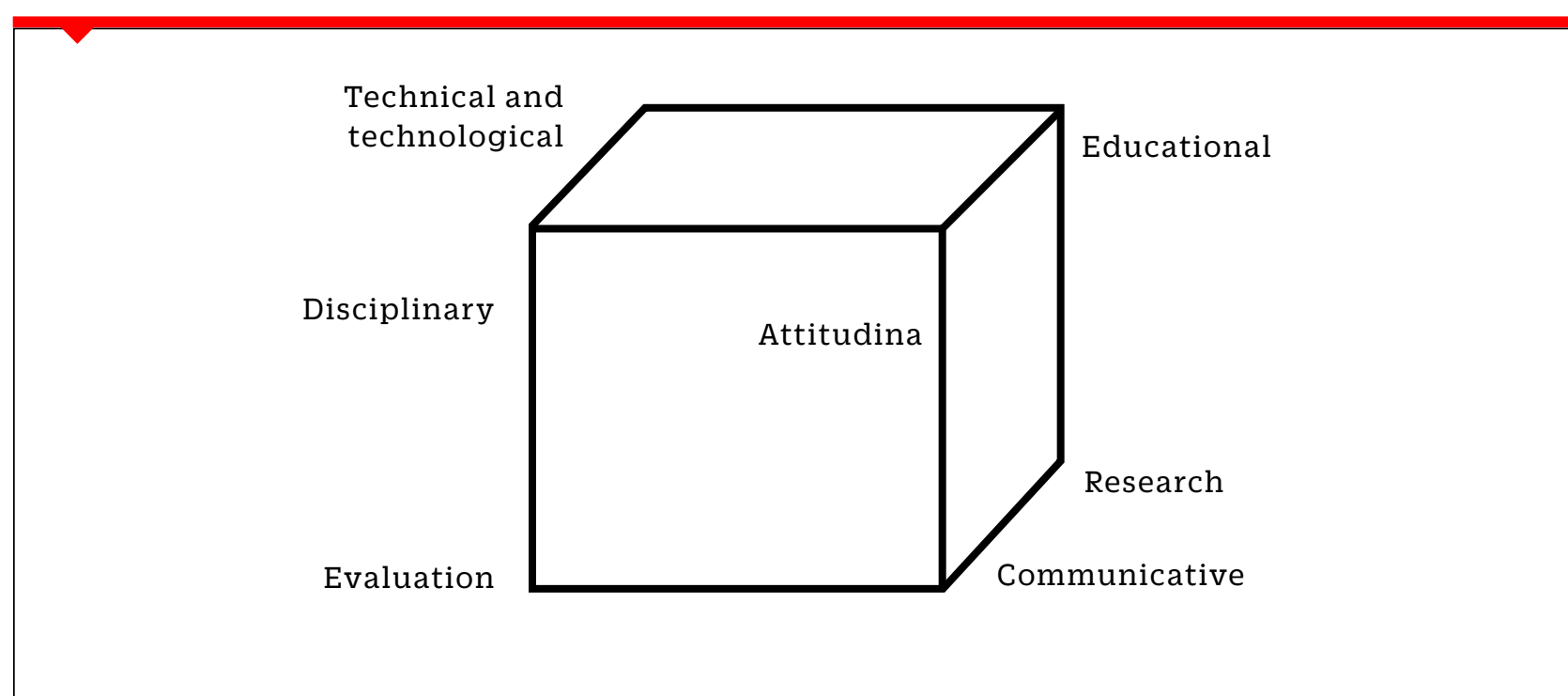

Figure 1: Competences of the ICT teacher. Adapted from "ICT Competencies for Teachers of Higher Education," by C. Hernández, A. Gamboa & E. Ayala, 2014, *Memories of the Ibero-American Congress of Science, Technology, Innovation and Education.*

Based on these competences, teachers must have at least basic knowledge about Information and Communication Technologies, be able to develop an in-depth knowledge of those related to their area of work and encourage students to create knowledge. (Unesco, 2008).

Description of the Experience

Several studies carried out on digital competences in Higher Education are clearly showing the importance of their treatment at the University (Castellanos, Sánchez & Calderero, 2017, Cortés, Orozco, Rodríguez & Luna, 2015, De Pablos, 2010, Trujillo, 2015, Veytia, 2016), and specifically focus on the digital competences of teachers (Cabero & Marín, 2017, Marquès, 2008, Zempoalteca, Barragán, González & Flores, 2017).

On this topic is based our research, from experiences at the University on the digital competences of the Social and Legal Sciences faculty of the University of Malaga. The study has been developed during the 2016/2017 academic year.

The general objective of the experience is to delimit the digital competences of the Social and Legal Sciences faculty of the Universidad de Málaga, from the use of Information and Communication Technologies (ICT) and their perceptions on the importance of favoring the development in this type of competences in the students.

METHOD

Participants

For this research we have opted for a study of finite population and probability random sample, with the purpose of obtaining representative and extrapolatable results, with exploratory character. A stratified sampling technique is used and the formula for finite populations is applied, of which the total population size is known, composed of the professors who teach in the Social and Legal Sciences studies of the University of Malaga (N = 1140), with a level of confidence (Z = 95%) and a level of precision (d = 5.75%) obtaining a sample (n) composed of 53 Social and Legal Sciences professors from the University of Malaga, 29 women and 24 men, aged between 30 years and over 60 years.

Instrument

To collect data, the CODIPES questionnaire (Competencias Digitales en el Profesorado de Educación Superior - *Digital Skills in Higher Education Teachers*) was applied, which consists of 30 questions structured in the following sections:

· Title and presentation of the questionnaire.
· Battery of questions, differentiated into three sections:
  o *Personal data:* It consists of six questions that allow us to define the sample.
  o *Regular use of technologies:* Through the seven questions that compose it, information about the knowledge and regular use of new technologies is collected.
  o Technologies at the University: Formed by seventeen questions (one of them subdivided into five questions), which will be used to define the use of technologies at the University and the perceptions and attitudes towards its use, specifying possible influential factors.
· Closing.

Procedure

We contacted by email the teachers who made up the population, explaining the research project and requesting their collaboration by completing the questionnaire, which could be accessed through the web address https://docs.google.com/forms/d/e/1FAIpQLSfWa-3BhD7tGX9XZKME34a8OPTgE7ZJG_bBfJuNM8OuKE1X8w/viewform, using the Google Form application, and the results were subsequently dumped and treated using the IBM SPSS analysis program (see Figure 2), following the guidelines established by different authors (Bogdan & Biklen, 1992; Miles & Huberman, 1994):

• First Phase: In the first instance we have proceeded to reduce data by categorization into units of meaning, considering the delimited variables (age, sex, subject of study), proceeding subsequently to the synthesis and grouping of the mentioned units. Once categorized, the data has been coded, assigning each category with a textual unit, for its frequency and percentage count.

• Second Phase: Interpretation and inference. Once analyzed and categorized the data, it was completed with the interpretation of the different categorized information units, and the information obtained is organized in a systematic way in tables and graphic representations to facilitate the interpretation phase and explanation of the results.

Figure 2: *Categorical analysis prepared with IBM SPSS Statistics 20.0*

Results

First of all, it should be mentioned that all teachers have access to information and communication technologies (computer, internet connection, mobile telephone, …), being the computer the device they spend most of their time (average of four hours a day, approximately), followed by the mobile phone (two and a half hours), and the least use is the tablet (less than 1 hour a day).

Regarding their use at the university, we conclude that they mainly work with basic digital competences related to the search, production and treatment of information (text and data processing programs, use of search engines, preparation of presentations), as well as communication and access to the virtual classroom. This is shown in Figure 3:
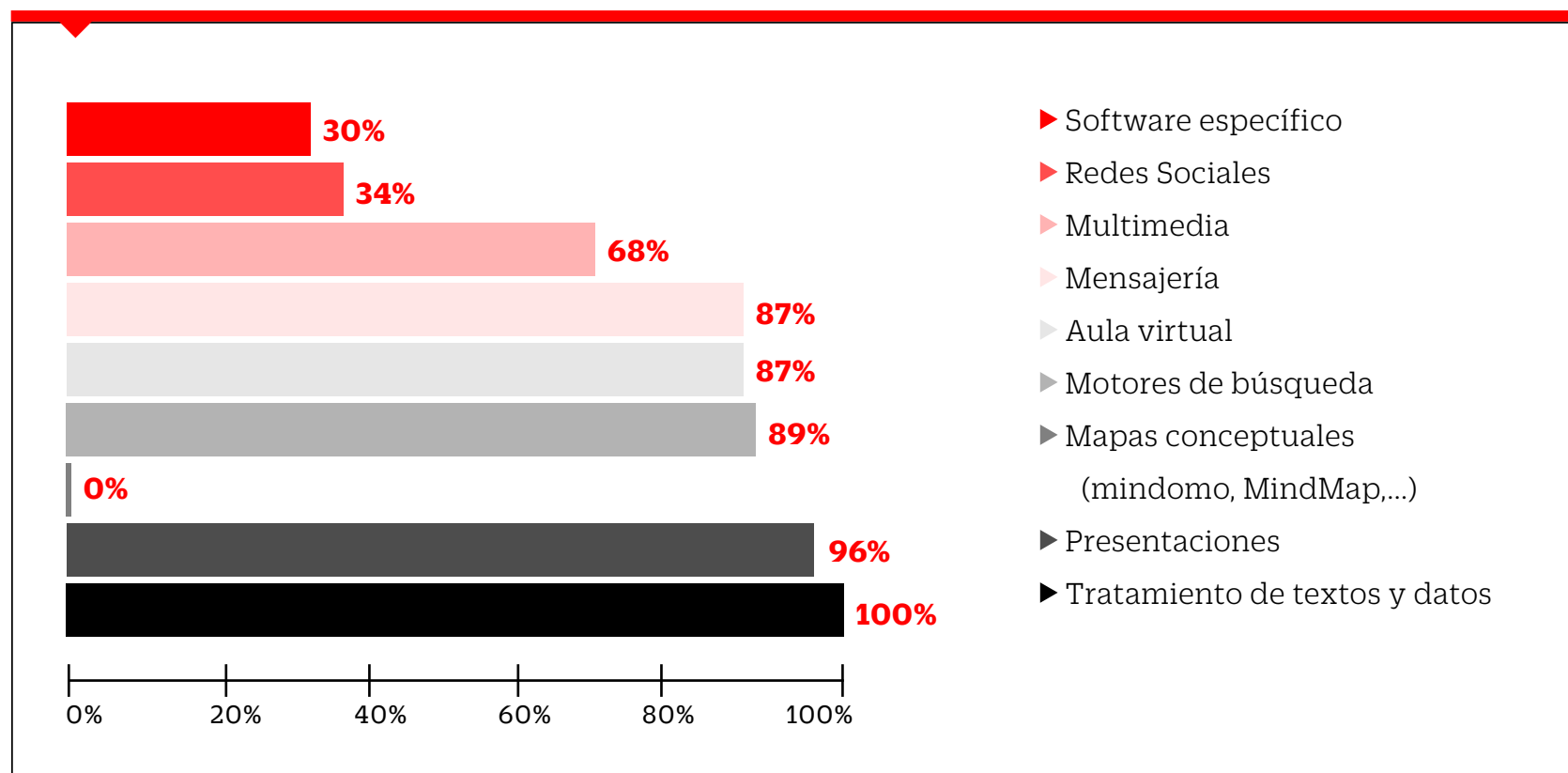
Figura 3. *Applications used by university faculty to perform their teaching tasks.*
Note: P.22, Questionnaire Digital Competencies of Teachers in Higher Education.

Focusing on the perceptions they have about the usefulness and necessity of having digital competences for the performance of their teaching tasks (see Figure 4), it is worth to highlight that this is considered as essential (69%) or necessary (24%).

Despite this, most of them have had to acquire these digital competences autonomously (96%), although the percentage of training received from the university (59%) is also significant, and the percentage of teachers who have learned the use of certain tools thanks to other colleagues is also considerable (31%) or those who have had to train through non-university courses (29%), as can be seen in Figure 5.
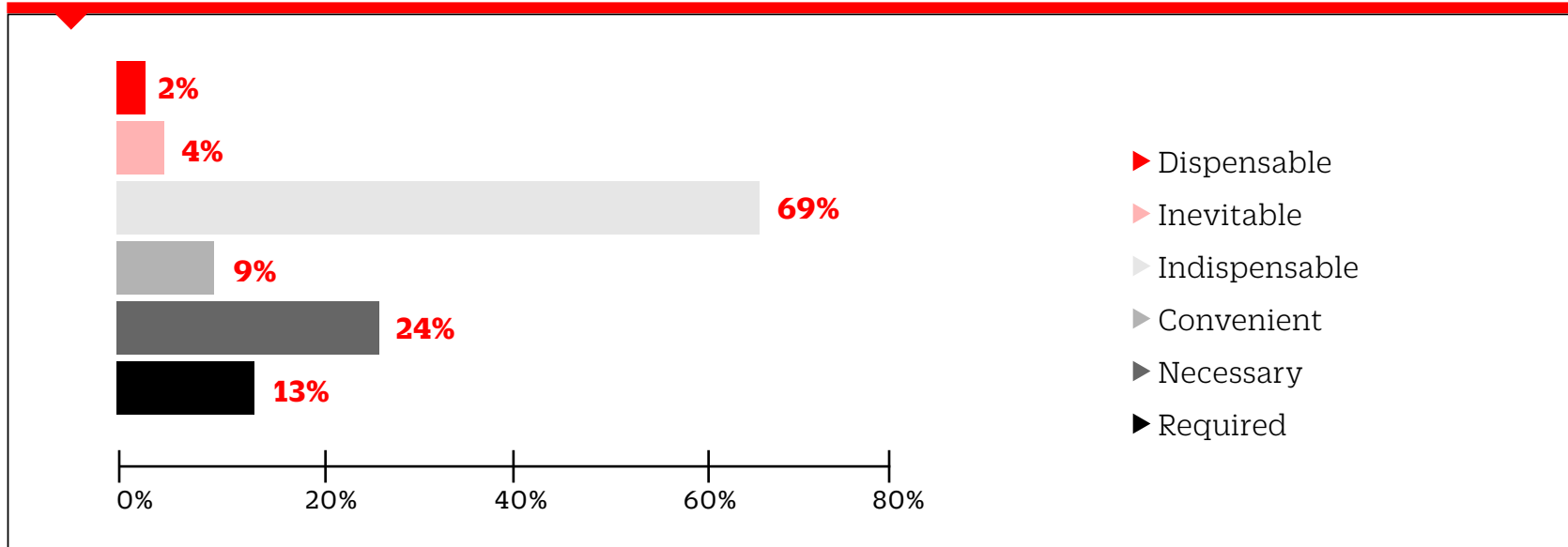
Figure 4. *Assessment of the use of ICT in the university teaching task. Note: P.14, Questionnaire Digital Competencies of Teachers in Higher Education.*
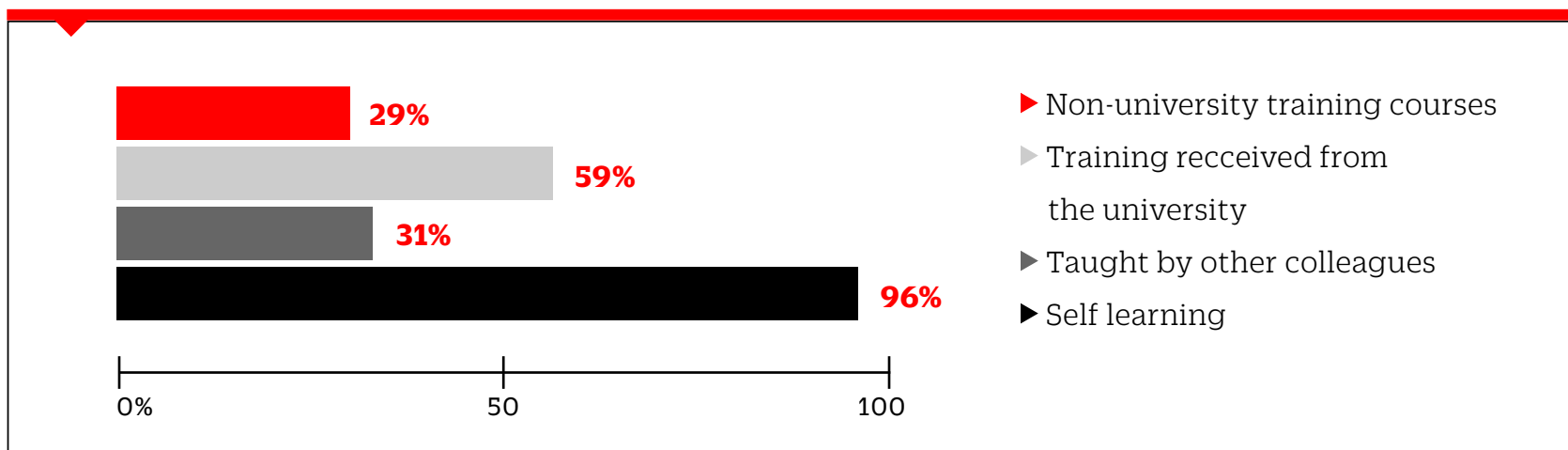
Figure 5. *Form of acquisition of digital knowledge.*
Note: P. 16, Questionnaire Digital Competencies of Teachers in Higher Education.

Regarding the considerations on the relevance the teachers give to the fact that the students may have technological competences, since they could be useful for their educational competences, as well as for the performance of their future professional functions, they reflect a great importance, giving them an 8 out of 10 (CODIPES Questionnaire, P. 28 and P. 29).

Another appreciation of the faculty reflects the opinion that their teaching work plays a key role in the acquisition of these competences, constituting 70% of their training (CODIPES Questionnaire, P.30), although it should be considered the fact that 13% of them recognize that they do not have the necessary training to implement them to the extent required for teaching (Questionnaire CODIPES, P.15).

But from the remaining 87% who consider that they do have specific knowledge, only 35% have requested the University, Center or Department, training courses for the acquisition of

digital competencies in accordance with the teaching activity (CODIPES Questionnaire, P.20).

Likewise, it is necessary to highlight other factors indicated by the teachers besides the training, which also influence the use of ICT in the classrooms (see Figure 6), such as the lack of time available to prepare the sessions through the technologies (39 %), absence of necessary technologies (26%), the consideration that their use is not necessary for students to acquire the knowledge they need (22%), among others.

Finally, despite these difficulties, teachers use technologies in their classes 67% of the time (CODIPES Questionnaire, p.24), even 46% of them say that they would use them to a greater extent for teaching if they had the necessary means (see Figure 7), although 55% of them have not made the request (CODIPES Questionnaire, p.19).

Figure 6. *Influential factors in the use of ICT in the classroom.*
Note: P.26, Questionnaire Digital Competencies of Teachers in Higher Education.

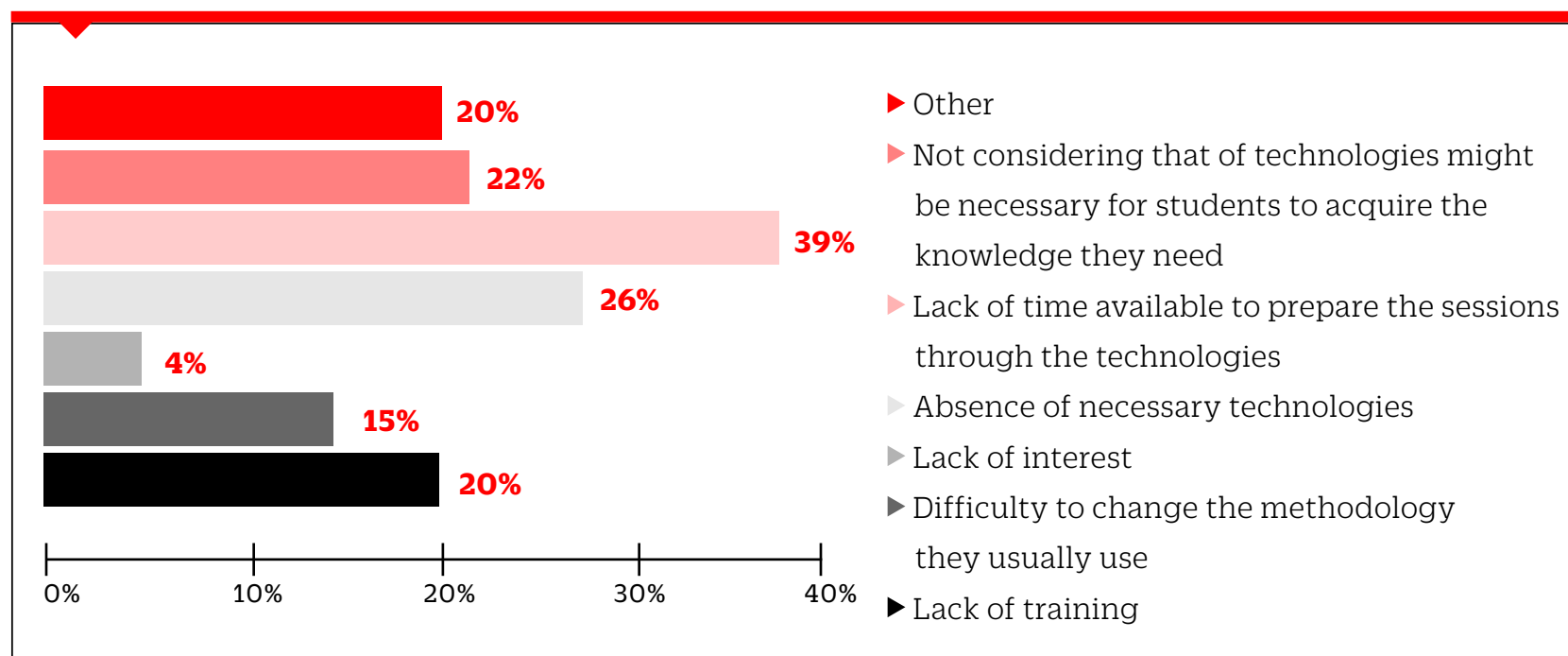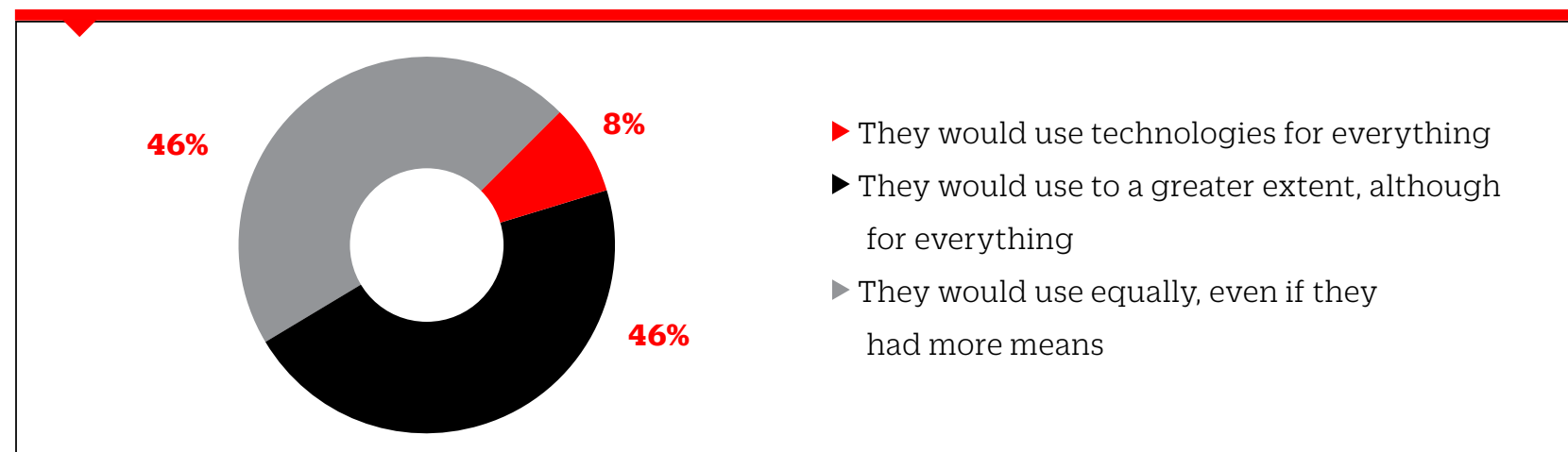**Figura7.** *Intention of use of ICT for teaching in relation to the availability of necessary means.*
Note: P.25, Questionnaire Digital Competencies of Teachers in Higher Education.

DISCUSSION

In this knowledge and information society in which we live, technologies prevail in our lives (Tobón, 2008), but its continuous updating requires a critical attitude and open to continuous training, in order to respond to the demands arising every day, which is more valuable when we are professionals in education. We must be aware that the competency development of the students is highly defined by the actions we carry out, the didactic and methodological planning we design in the classrooms, and of course, the role we choose to maintain. It would be ideal if, from the knowledge, we act as guides and facilitators of self-learning processes.

Among the main conclusions obtained, it is worth mentioning the achievement of the proposed objective, and the digital competences of the faculty must be evident, as influential factors as well as their perceptions about them at the University, specifically in the Social Sciences and Legal Studies of the University of Malaga.

As corroborated by the results obtained in this educational research, the faculty at the University dedicate most of their time to the computer, over the use of the mobile phone or connecting to the Internet, and by using it, they mainly work with basic digital competences and, in a more detailed way, advanced and specific competences. Among its considerations is the fact of having digital competences, regarding the teaching profession as something essential, as well as the perceptions indicating that the acquisition of these competences for students is of great importance for both their studies and future work life.

And as influential factors, in the results obtained from research of other authors (Dominguez, 2003, Marquès, 2012, Riera & Civis, 2004), are pointed out training, time of preparation of the sessions, availability of technologies, degree of need and relationship with the subject. It is emphasized that, in several times, they have to get their training by their own means.

Regarding the limitations of the university experience, and partially agreeing with previous experiences (Cabero, López Meneses & Ballesteros, 2009, López Meneses & Ballesteros, 2008, López Meneses & Llorente, 2010), it is necessary to indicate the lack of time, the low participation of the teachers and the difficulty in contacting them.

To conclude, we must point out the relevance of the non-isolation of this type of research, but prepare it with other universities, to obtain a global vision and study the problem in a more objective manner.

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Appendix A

Questionnaire for the faculty

The use of technologies at the University – Faculty version

Fill in this questionnaire will only take a few minutes, is completely anonymous. It aims to collect information on student habits in relation to information technology and communication in their daily lives, specifically in relation to their studies.

> *Thank you for your time and sincerity. Thank you very much.*
>
> *The use of technologies at the University_ Faculty version is CODIPES Registered Trademark*
>
> *Fields with * are required*

Personal Information

1. Sex
2. Age
3. University
4. City /Country
5. Department to which you are appointed
6. Degree of relationship of the contents of the subject or subjects that you teach with computer technologies.

	1	2	3	4	5	6	7	8	9	10	
They have no relation											They are essential

Regular use of technologies

7. Do you have access to the use of technologies?
8. What technologies do you have access to?

   Check all the technologies to which you have access.

   ( ) Computer

   ( ) Mobile phone

   ( ) Tablet

   ( ) Internet

   ( ) Other

9. At what age did you start using them?

10. Do you have access to the Internet?

Yes, I have data connection / Yes, but only if there is Wi-Fi available / No.

11. How many hours a day do you use them?

	I don't use it	Less than 1 hour a day	1-3 hours a day	3-5 hours a day	More than 5 hours a day
Computer					
Mobile phone					
Tablet					

12. How often do you connect to the Internet from the technologies used?

	I don't connect	Less than 1 hour a day	1-3 hours a day	3-5 hours a day	More than 5 hours a day
Computer					
Mobile phone					
Tablet					

13. How do you usually use computer technologies?

	I don't use it	Less than 1 hour a day	1-3 hours a day	3-5 hours a day	More than 5 hours a day
Processing of information (word and data processors)					

	I don't use it	Less than 1 hour a day	1-3 hours a day	3-5 hours a day	More than 5 hours a day
Prepare presentations for classes					
Search information					
Search videos and music					
Download information					
Download multimedia (music, movies, videos, ...)					
Connect to social networks					
Emails					
Instant messaging (MySpace)					
E-Learning (Develop / tutor virtual courses)					
Management and Use of virtual platform for teaching					

Technologies at the University

14. How would you rate the use of technologies for a proper performance of your educational work
    ( ) Essential
    ( ) Necessary
    ( ) Convenient
    ( ) Unavoidable
    ( ) Obligatory
    ( ) Other

15. Do you consider that you have the necessary training to "implement" the use of technologies in teaching?
    Yes / No

16. If yes, how have you acquired this knowledge?
    ( ) Self-directed learning (by myself, without help)
    ( ) Training courses provided by the university
    ( ) Non-university training courses
    ( ) I have been taught by other teachers
    ( ) Other

17. Does the university have the necessary technologies (hardware and software) so that you can teach in your area, if necessary?
    ( ) No
    ( ) Yes, but mainly material resources.
    ( ) Yes, but mainly the software.
    ( ) Yes, both the media and the necessary applications.
    ( ) Don't know / No answer

18. Indicate the resources and applications available in the university to teach your specific classes related to your subject.

19. Have you ever requested to the University, Center or Department specific technologies (hardware or software) to teach in class?
    If yes, indicate which and for what purpose

20. Have you ever asked the University, Center or Department for specific training to acquire the technological competences you do not have?
Explain your answer

21. What has been the response to your requests by the University, Center or Department?
( ) I have not requested to the University training or resources.
( ) They have facilitated both the training and the means requested.
( ) Every time I have requested technological resources for the classroom, they have provided it to me.
( ) Every time I have requested training, they have provided it to me.
( ) I have only received a positive response in some cases, in the contribution of resources.
( ) I have only received a positive response in some cases, in terms of training.
( ) I have not received an answer.
( ) Other.

22. What applications do you usually use to develop your university educational work?
( ) Text and data processing (Word - Writer, Excel – Calc., Access - Base, …)
( ) Presentations (Power Point, Slideshare, Prezi, …)
( ) Search engines (Google, Yahoo, …)
( ) Multimedia (YouTube, Grooveshark, …)
( ) Social Networks (Facebook, Twitter, Linkedin, …)
( ) Virtual classroom
( ) Messaging (Email, Chat, Forums, …)
( ) Blog
( ) Specific software (Photographic processing, Data analysis, Design and Management, …) Other

23. Indicate why you use the computer applications in relation to your teaching (Select all the options you use in the following questions below)

    23.1. Prepare class sessions
    ( ) Messaging (Email, Chat, Forums, …)
    ( ) Social Networks
    ( ) Virtual classroom
    ( ) Data processing
    ( ) Specific software
    ( ) Other

23.2. Exchange files

    (   ) Messaging (Email, Chat, Forums, ...)

    (   ) Social Networks

    (   ) Virtual classroom

    (   ) Data processing

    (   ) Specific software

    (   ) Other

23.3. Communicate with colleagues and students

    (   ) Messaging (Email, Chat, Forums, ...)

    (   ) Social Networks

    (   ) Virtual classroom

    (   ) Data processing

    (   ) Specific software

    (   ) Other

23.4. Teach

    (   ) Messaging (Email, Chat, Forums, ...)

    (   ) Social Networks

    (   ) Virtual classroom

    (   ) Data processing

    (   ) Specific software

    (   ) Other

23.5. Develop investigative functions

    (   ) Messaging (Email, Chat, Forums, ...)

    (   ) Social Networks

    (   ) Virtual classroom

    (   ) Data processing

    (   ) Specific software

    (   ) Other

24.   How do you distribute the use of technologies during your classes?

	0	1	2	3	4	5	6	7	8	9	10	
They are not used												They are used for everything

25. The distribution of the time of use of computer technologies in your classes, would it change if you had the necessary means?
Yes, I would use them for everything. / Yes, I would use them to a greater extent, but not for everything. / No, I would continue to use them equally, even if I had more means.

26. What reasons justify not using technology to a greater extent for your classes?
( ) Lack of training
( ) Lack of time available to prepare sessions through technologies
( ) Lack of interest
( ) Difficulty to change the methodology you usually use
( ) Lack of necessary technologies in the classroom
( ) Do not consider that the use of technologies may be necessary for the acquisition of accurate knowledge by students
( ) Other

27. What opinion do you think students have of the methodology and resources that you use in class?
( ) It facilitates the acquisition of professional skills that I will need in my professional future
( ) It facilitates the performance of my duties as a student
( ) I do not obtain positive aspects
( ) Other

28. To what degree do you think that the use of technologies can improve educational competences in students?

	1	2	3	4	5	6	7	8	9	10	
They are unnecessary											They are essential

29. To what degree do you think that the use of technologies will be necessary for the performance of professional functions, in the field for which students have studied?

	1	2	3	4	5	6	7	8	9	10	
Unnecessary											Essential

30. To what extent do you think that your teaching work facilitates the acquisition or improvement of digital skills in students?

	1	2	3	4	5	6	7	8	9	10	
Nothing											Total

Thank you for your collaboration

Voluntarily, you can leave your email, and we can send you the results obtained. Thank you