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Teaching digital competencies after the pandemic: adaptation of higher education and b-learning in Spain

Nauczanie kompetencji cyfrowych po pandemii: adaptacja szkolnictwa wyższego i b-learningu w Hiszpanii

Abstract

The Spanish educational system has been significantly altered due to the pandemic caused by SARS-CoV-2, a fact that has encouraged the paradigm shift that was taking place during the last decade in relation to the integration of Information and Communication Technologies (ICTs) in educational contexts. New contexts imply constant reflection on the teaching-learning process, especially in a society whose commitment to digital integration increases annually. The most appreciable aspect of these new environments affects the field of higher education which during the last decade has already begun to delve into digital teaching and learning media for different contexts. For this reason, in the present work, a theoretical analysis is carried out that considers the role of ICTs in Spanish society with special interest in their adaptation to higher education - issues that support approaches that go beyond the pure application of ICTs and that highlight new needs in the training of teachers whose Digital Teaching Competence is in constant controversy and analysis. To favor the applicability of this theory, the Massive Open Online Courses (MOOCs) and the Open Educational Resources (OERs) are considered as two key tools of the present and future in relation to teacher training in higher education in Spain. All this is discussed in view of the need of the Institutions to adapt to the development of society and not remain in the sideline.

Key words: ICT, higher education, digital competence, Spain.

Streszczenie

Hiszpański system edukacyjny został znacząco zmieniony z powodu pandemii wywołanej przez SARS-CoV-2. Fakt ten zachęcił do zmiany paradygmatu, która miała miejsce w ostatniej dekadzie i polegała na integracji technologii informacyjnych i komunikacyjnych (ICT) w kontekstach edukacyjnych. Nowe warunki wymagają ciągłej refleksji nad procesem nauczania-uczenia się, szczególnie w społeczeństwie, którego zaangażowanie w integrację cyfrową wzrasta z roku na rok. Najbardziej odczuwalna obecność tych nowych środków występuje w obszarze szkolnictwa wyższego, w którym w ciągu ostatniej dekady coraz częściej wykorzystywano cyfrowe media w nauczaniu i uczeniu się w różnych kontekstach. Z tego powodu w niniejszej pracy przeprowadzona została analiza teoretyczna dotycząca roli ICT w społeczeństwie hiszpańskim ze szczególnym uwzględnieniem ich adaptacji

w szkolnictwie wyższym. Przedstawiono zagadnienia, które wykraczają poza czyste zastosowanie ICT i które podkreślają nowe potrzeby w szkoleniu nauczycieli, których kompetencje w zakresie nauczania cyfrowego są przedmiotem ciągłych kontrowersji i analiz. Aby ułatwić wdrażanie mediów cyfrowych w odniesieniu do szkolenia nauczycieli w szkolnictwie wyższym w Hiszpanii, realizowane są grupowe otwarte kursy online (MOOCs) i otwarte zasoby edukacyjne (OERs). Wszystko to wychodzi naprzeciw potrzebom instytucji, aby dostosować się do rozwoju społeczeństwa, a nie pozostawać na uboczu.

Słowa kluczowe: nowe technologie informacyjne (ICT), szkolnictwo wyższe, kompetencje cyfrowe, Hiszpania.

Digital integration in Spain: diachronic analysis of its evolution

During the two decades of the 21st century, a more than evident break from the past has been revealed. The technological revolution has become a new custom, resulting in an eternal variation and adaptation to new media. There has been a paradigm shift that ranges from the conception to the application of any technological element in daily life, which alters from how the time is checked to how a bureaucratic procedure is carried out. All of this has been consolidated in a context such as that of Spain, a country belonging to the European Union that has seen in recent years an irruption of ICTs in contexts as diverse as entertainment or economic management. A concatenation of alternatives that have been established in such a way that there are new ways of participating in society and new needs has emerged and there has been a significant alteration in interpersonal communication strategies.

The entire process of adaptation and integration of ICTs in Spain began during the first decade of the century¹. The emergence of smartphones was an axis of change. This technology is still evolving and that reflects the uncertainty about what its growth may be on a day-to-day basis, a more significant revolution than previous inventions such as television, radio, or laptops whose impact on Spanish society during the 20th century and the beginning of the current one already meant a great alteration in the habits of citizens. The consumer habits that are apparent today began to be established in the 2000s when the purchase of devices for home expanded.

These changes are supported by the figures provided by the National Institute of Statistics². It is a Spanish organisation that annually conducts surveys and analyses different key scientific questions to get closer to understanding the evolution of society. In the case of the integration of ICTs, each of the data it provides is enlightening as it clearly shows the trends of the population, focusing on people aged between 16 and 74 years of age.

¹ Carneiro, R., Toscano, J., & Díaz, T. (2009). *Los desafíos de las TIC para el cambio educativo*. Madrid: OEI – Fundación Santillana.

² Instituto Nacional de Estadística (2021). *Encuesta sobre equipamiento y uso de tecnologías de información y comunicación en los hogares*. Recuperado de https://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_C&cid=1254736176741&menu=ultiDatos&idp=125473557669

Internet access and use in homes are indicators that show the digital rise, with a significant annual growth, which trend is clearly positive. Over the period of five years the difference is remarkable: in 2015, 78.7% of households had access to the Internet, 78.7% of people used the Internet and 32.1% made a purchase through this medium. In 2020, 95.4% of households had access, 93.2% used the Internet in the last three months and purchases increased to 53.8% among the population considered (Figure 1).

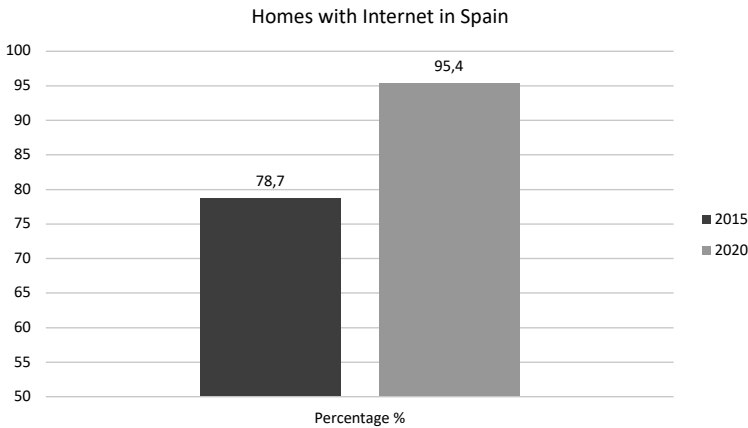


Figure 1. Moodle as a digital resource of the University of Zaragoza

These new contexts, apart from the figures, imply a necessity to rethink and reconsider the development of habits that have been altered by these new trends. The internalisation of the digital into the personal sphere is manifest, making it necessary to have certain resources. There are numerous resources, especially smartphones, which have emerged as a channeling tool for personal development: socialising, shopping, carrying out procedures, learning, etc.

More evident is the case of the new generations since if the figures are high among the older population, everything indicates that in the coming years the percentage will values increase. The translation towards current practices may be the consumption of entertainment, a communication strategy that has grown exponentially during SARS-CoV-2. In this sense, media or platforms such as YouTube³, Twitch⁴ or Tik Tok⁵ should be highlighted.

³ Jiménez, A.; García, C. & de Ayala, M. C. (2021). Adolescents and Youtube: creation, participation and consumption. *Prisma Social*, 60-89.

⁴ Pozo, S.; López, J.; Fuentes, A. & López, J. A. (2021). Twitch as a techno-pedagogical resource to complement the flipped learning methodology in a time of academic uncertainty. *Sustainability*, 13(9). doi: 10.3390/su13094901

⁵ Cervi, L. (2021). Tik Tok and generation Z. *Theatre Dance and Performance Training*, 12(2), 198-204. doi: 10.1080/19443927.2021.1915617

Faced with this new situation, which not only affects young people but also adults, a reflection must be proposed that leads to actions that allow the positive ties between human beings and technology to be strengthened, which is a relationship that during the last five years has notably intensified in Spanish society, generating negative scenarios in some cases⁶, so it is clear that the integration of ICTs is more than speculation.

All this has increased by the pandemic, not yet overcome, which has resulted in periods of confinement in homes⁷ and a reduction of interpersonal contact. One of the consequences has been that technology has gained momentum, which has accelerated hybridisation in many areas. In fact, one of the most widespread practices, in this specific context, has been working from home. A “new normal” that will mean re-relating already acquired habits, such as meetings through digital platforms or interactions through email, something that will obviously be present in education⁸.

New variables in Digital Teaching Competence

As stated in the previous section, the integration of ICTs in Spanish society has been an upward trend, especially during the last decade and since 2020 in the face of the pandemic caused by SARS-CoV-2. This has become noticeable in areas such as education being one of the most affected in this respect⁹. Educational centers, subordinated to other institutions themselves, have seen how, during this time of uncertainty and turmoil, numerous conditions necessary for the classic teaching-learning processes have been altered. This has been transferred and focused on the so-called non-face-to-face teaching, supported substantially by digital tools which has been the axis of almost the entirety of a school year in Spain¹⁰.

One of the main effects that have been produced as a result of this compulsory practice has been a change in perception on the part of the members of this process: students: teachers¹¹, families, and school directors. This digital strategy has shown that technological advances allow this alteration. It is inevitable to consider

⁶ Alves, L.; Antonio, D. & Laux, R. (2021). Nomophobia: a bibliometric analysis. *Revista Tecnologia E Sociedade*, 17(46), 246-263. doi: 10.3895/rts.v17n46.12661

⁷ Llorente, C.; Kolotouchkina, O. & Manas, L. (2021). *International Journal of Environmental Research and Public Health*, 18(8). doi: 10.3390/ijerph18083923

⁸ Pérez, D.; García, N. & García, J. (2021). *RETOS-Revista de Ciencias de la Administración y Economía*, 11(21), 5-24. doi: 10.17163/ret.n21.2021.01

⁹ Lorente, L. (2020). The right to education and ICT during COVID-19: an international perspective. *Sustainability*, 12(21). doi: 10.3390/su12219091

¹⁰ Virgili, M. (2021). Emergency remote teaching: ICT applied to education during confinement by Covid-19. *INNOEDUCA-Internacional Journal Of Technology and Educational Innovation*, 7(1), 122-136. doi: 10.24310/innoeduca.2021.v7i1.9079

¹¹ Cespon, M. (2021). ICT/LKT and COVID-19: Use and needs of Galician secondary teachers. *Digital Education Review*, 39, 356-373.

that traditional, face-to-face teaching is the most favorable for development by promoting not only a more direct interaction but also more meaningful learning for students, at least theoretically. However, it is also necessary, especially in the current context, to rethink what the role of ICTs is or should be in these processes.

This reflection can be supported by the ICTs evolution in the Spanish educational system, which is why the policies addressed during the last decades in these terms will be presented below. First of all, mention must be made of the fact that marked the Organic Law 2/2006 on Education (LOE). This legislation was the first major, mandatory impulse regarding the inclusion of technology in educational settings. Its impact remains in force in aspects such as Digital Competence (DC) and the need for training in it.

Initially, its incorporation into the educational system meant a great rethinking, as did the competence approach transferred from those developed in Europe decades ago, which began to focus on the role of technology not only in schools but also in personal development, an idea that is maintained today, through the Organic Law 8/2013 for the Improvement of Educational Quality (LOMCE). Therefore, it can be affirmed that the Spanish educational system, at least in legislative terms, has been exposing for years how ICTs represent a key reflection in the school of the present and future.

After 2006, more local delimitations and initiatives were introduced, essentially oriented to the provision of technological material to schools, as happened with computers and digital whiteboards. Some of these national programs were the Medusa Project (Canary Islands), Averroes (Andalusia), the Premia Program (Basque Country), the Ramón y Cajal Program (Aragon), Plumier (Murcia), the SIEGA Project (Galicia), EducaMadrid (Madrid) or the Argo Program in Catalonia¹².

In specific cases such as Aragon, one of the Autonomous Communities of Spain, the School 2.0 Project was developed, an attempt whose purpose was subordinated to providing educational centers with technological tools such as computers and digital whiteboards, proposals that can be considered a beginning of adaptation to the exponential growth of ICTs but that, after a decade, also expose a lack of continuity.

Educational research has not been alien to such developments and processes. From the end of the 20th century, especially in the last decade, a great interest in the applications of technologies began to be visible in society, a fact that, logically, from the beginning has tried to guide training contexts such as education. Proposals and research delving into the present and future problems are an issue that has as many advantages as complications when talking about constantly changing digital media.

An example of this would be to propose studies on the so-called m-learning¹³, as it is currently complex not to think about this type of methodologies, especially

¹² Area, M. (2008). Una breve historia de las políticas de incorporación de las tecnologías digitales al sistema escolar en España. *Quaderns digitals: Revista de Nuevas Tecnologías y Sociedad*, 51.

¹³ Criollo, S.; Abad, D.; Martic, M.; Velasquez, F., Pérez, J. & Luján, S. (2021). *Applied Sciences-Basel*, 11(11). doi: 10.3390/app11114921

in higher education. As is the case with b-learning¹⁴, new alternatives whose potentialities are imagined but represent a drastic contrast with traditional teaching.

An extensive sample of different ICTs tools studied, applied, and analysed by educational research could be made, since Spain is one of the most prolific countries in this area. However, the present work is intended to deal with other problems, such as the formative impact of this educational digitisation.

It is an increasingly necessary process to consider in the face of the change experienced in society since education cannot be oblivious to the processes that take place outside the educational centers when trying to fully develop the students. It is in this case, that of the youngest students, that the greatest contrast occurs in institutional terms. Currently, there are students who have been using devices such as smartphones, tablets, computers, or other smart devices, practically since their birth.

This type of student exposes new digital capabilities and new digital needs. That is why it is crucial to address the training processes, from earlier education to higher education, of the teachers of future generations who will be actively integrated into society¹⁵. There are new phenomena, such as access to the Internet or other devices, which are far from the approaches established more than a decade ago, such as the LOE (2006).

The competence approach also infers in the teaching part, as does the Teaching Digital Competence (TDC), and its relevance is increased as ICTs are introduced into daily habits¹⁶. Teaching relevance, 15 years after the biggest legislative challenge, acquires priority since it is considered that teaching staff is a key part of the teaching-learning process.

Teachers are the other side of the coin, a fundamental part of the commitment to the integral development of students. Their capacities and training, according to technological development, must be incessant to avoid great disparities and training losses. This has become evident during the pandemic in Spain, a situation in which teachers have had to alter their ways of teaching completely through ICTs. These processes that have revealed shortcomings, such as the existing digital divide¹⁷, and needs in a key element of the educational system that has had to combine bureaucracy with distance learning, with the efforts that this implies in times of medical uncertainty.

¹⁴ Area, M.; Bethencourt, A. & Martin, S. (2020). From blended teaching to online teaching in the days of Covid19. Student visions. *Campus Virtuales*, 9(2), 35-50.

¹⁵ Batanero, J.; Gravan, P. & Rojas, C. (2020). Are primary education teachers from Catalonia (Spain) trained on ICT and disability? *Digital Education Review*, 37, 288-303.

¹⁶ Area, M. (2010). El proceso de integración y uso pedagógico de las TIC en los centros educativos. Un estudio de casos. *Revista de Educación*, mayo-agosto (352), 77-97.

¹⁷ Montenegro, S.; Raya, E. & Navaridas, E. (2021). Teacher's perceptions of the effects on the digital divide in basic education during the Covid-19. *Revista Internacional de Educación para la Justicia Social*, 9(3), 317-333. doi: 10.15366/riejs2020.9.3.017

CDD has been a concern especially observed, studied, and analysed during the last five years through different perspectives: how teachers react and their attitude towards ICTs¹⁸, what the role of the teachers is when incorporating this technology in the classroom¹⁹ or how educational policies are oriented for its implementation²⁰, among other topics.

There is a concern that has increased due to the arrival of the pandemic and the urgency of not having an educational presence in the face of medical conditions. In this sense, there have been investigations that ranged from the formative perspective of teachers²¹ to their virtual-educational relationship with families²².

The existence of frameworks such as the Common for TDC²³ is the best evidence of the need to analyse, reflect upon and define an area in eternal change such as correct digital teacher training. It is a document that, especially after what has happened since 2020, needs to be reviewed as the needs of teachers have changed significantly. Despite this, it should be noted how this framework has already undergone substantial modifications in the 2017 version, with new areas appearing and reflecting that the integration of ICTs in educational contexts is a living trend. It is a fundamental issue since it exposes that the digital teaching definition²⁴ is in constant adaptation.

ICTs for Higher Education: Open Educational Resources and Massive Open Online Courses as key tools

The translation of everything previously commented upon in practice is evident. The integration of ICTs in the educational context has been progressive, with regard to

¹⁸ Mejía, A., Silva, C. A., Villareal, C. P., Suarez, D. A. & Villamizar, C. F. (2018). Estudio de los factores de resistencia al cambio y actitud hacia el uso educativo de las TIC por parte del personal docente. *Revista Boletín REDIPE*, 7(2), 53-63.

¹⁹ Viñals, A. & Cuenca, J. (2016). El rol del docente en la era digital. *Revista Interuniversitaria de formación del profesorado*, 86, 103-114.

²⁰ González, A. & De Pablos, J. (2015). Factores que dificultan la integración de las TIC en las aulas. *Revista de Investigación Educativa*, 33(2), 401-417.

²¹ Nunez, Q.; Gomez, S.; Ganete, A. & Goncalves, D. (2021). Professional culture and ICT teacher education in times of crisis: the perception of teachers. *Revista Electrónica Interuniversitaria de Formación del Profesorado*, 24(2), 153-165. doi: 10.6018/reifop.470831

²² Gonzalez, J.; Montolio, M.; Ortega, S. & Sanchez, P. (2021). Teachers' digital learning ecologies: school at home during COVID-19 in the Valencian Region. *Revista Publicaciones*, 51(3), 191-214. doi: 10.30827/publicaciones.v51i3.20743

²³ INTEF. (2017). *Marco Común de Competencia Digital Docente – Septiembre 2017*. Retrieved from http://aprende.intef.es/sites/default/files/2018-05/2017_1020_Marco-Com%C3%BAAn-de-Competencia-Digital-Docente.pdf

²⁴ Tejada, J. & Pozos, K. V. (2018). Nuevos escenarios y competencias digitales docentes: hacia la profesionalización docente con tic. *Profesorado, Revista de Currículum y Formación de Profesorado*, 22(1), 25-51.

the policies supported by the LOE (2006) and LOMCE (2013), but it is not a finished process. The case of higher education in Spain can more accurately reflect the digital approach and reality in educational practice. This level of education stands out since it is the most open or the one that offers a greater openness to the incorporation of new methodologies that favour the teaching-learning processes. In addition, the current context of the pandemic has promoted a greater consideration of these, so it has been revealed which of these ICTs can be more accessible to the university standards.

In this period, in relation to the home confinement established in Spain, a technological revolution has developed in the educational system supported by remote teaching. Faced with this new educational pattern, two tools must be highlighted: the Open Educational Resources (OERs)²⁵ and the Massive Open Online Courses (MOOC)²⁶.

Two aids, in the case of MOOCs and via teaching, have supported academic courses. Despite this, other examples should also be adduced such as educational apps²⁷ or video platforms²⁸, since nowadays new strategies have emerged whose educational purpose can be more than just a one-time resource.

The commitment to non-face-to-face teaching in higher education in Spain is a trend developed by several institutions. They came up with a proposal that has been very similar to the one developed during the 2019–2020 and 2020–2021 courses. Therefore, it is relevant to consider proposals such as OERs and MOOCs since they are strategies closely associated with this type of approach, already used, whose presence may be greater in the coming years if more commitment is made to e-learning²⁹.

The pandemic context has made digital and face-to-face proposals alternatives, especially deriving the latter from teaching processes limited to MOOCs with videoconferences or other multimedia resources. Progressively, a variation towards b-learning has been sought³⁰, a strategy that has been developed in different stages

²⁵ Alberola, I.; Iglesias, M. & Lozano, I. (2021). Teachers' beliefs about the rol of digital educational resources in educational practice: a qualitative study. *Education Sciences*, 11(5). doi: 10.3390/educsci11050239

²⁶ Lorente, A.; Despujol, I. & Castaneda, L. (2021). MOOC as a leveling strategy in higher Education: the case of the Polytechnic University of Valencia. *Campus Virtuales*, 10(2), 9-25.

²⁷ Alvarez, A.; Velazquez, A. & Castillo, M. (2021). Technology acceptance of an interactive augmented reality app on resistive circuits for engineering students. *Electronics*, 10(11). doi: 10.3390/electronics10111286

²⁸ Barrio, R. (2021). 'Youtuberism' as a response in times of lock down. A teaching experience of the subject of Crimilan Procedural Law. *Revista de Educación y Derecho-Educational and Law Review*, 23. doi: 10.1344/REYD2021.23.33889

²⁹ San, S.; Jimenez, N.; Rodríguez, P. & Pineiro, I. (2020). The determinants of teachers' continuance commitment to e-learning in higher education. *Education and Information Technologies*, 25(4), 3205-3225. doi: 10.1007/s10639-020-10117-3

³⁰ Fernandez, P.; Rodriguez, M. & Fernandez, A. (2020). Blended learning model for university training. Application to technical degrees. *Enseñanza de las Ciencias*, 38(3), 179-196. doi: 10.5565/rev/ensciencias.3300

of the 2020-2021 academic year and that has involved a hybridisation between methodologies, bearing in mind the present medical conditions in Spain during 2020 and 2021.

In short, it is relevant to know what are or can be those tools that allow maintaining the educational process, especially when for several years it has been interrupted. In addition, it must be borne in mind that resources, strategies, and even methodologies based on ICTs can mark the future of an education in which comprehensive development involves learning to adapt to a changing technological context. An example of this is m-learning³¹, which a decade ago was unfeasible but is currently one of the most important strategies to consider after the social data provided by the INE (2020). It is a natural tool, considering that Internet access on smartphones is already common, and a device that both students and teachers are more than used to.

Regarding OERs, these are the result of a pedagogical approach to resources³², an informational paradigm shift³³, and an urgent need for personal criteria to select and use these digital tools³⁴. Its very nature has meant that there emerged, open educational practices (OEP), a very interesting trend for higher education and training. MOOCs as well as OERs in relevant world reports such as the EDUCAUSE Horizon Report³⁵, are both complementary strategies channeling the didactic proposals of the 21st century. It is an online training format which can be applicable to b-learning, whose boom before the pandemic was more than evident. Since its origin in 2008, it has showed its potentialities, as its very nature makes it a channel of content because its themes are more defined and closed by its creators, so its role between higher education and students can be significant.

The impact of MOOCs in recent years, especially in higher education, is being produced by a technological boom associated with new digital needs and conditioning factors. In full immersion in digital changes, this tool can and does play a clear role as a training medium as well as a didactic transformer³⁶.

³¹ Soler, R.; Medrano, M.; Lafarga, P. & Moreno, A. J. (2021). How to teach pre-service teachers to make a didactic program? The collaborative learning associated with mobile devices. *Sustainability*, 12(9). doi: 10.3390/su12093755

³² Cobb, D. (2018). Placing the spotlight on Open Educational Resources: Global phenomenon or cultural guise? *International Educational Journal-Comparative Perspectives*, 17(3), 15-29.

³³ Deimann, M. (2019). Openness. Open and distance education theory revisited: implications for the digital era. *SpringerBriefs in Education*, 39-46. doi: 10.1007/978-981-13-7740-2_5.

³⁴ Belikov, O. & Kimmons, R. (2018). Can I Use This? Developing Open Literacies or Understanding the Basics and Implications of Copyrights. *Fair Use, and Open Licensing for e-Learning. Educational Communications and Technology-Issues and Innovations*, 155-168. doi: 10.1007/978-3-319-61780-0_12.

³⁵ Brown, M., McCormack, M., Reeves, J., Brooks, C., & Grajek, S. (2020). *2020 EDUCAUSE Horizon Report, Teaching and Learning Edition*. Louisville, EE. UU.: Educause.

³⁶ Mahajan, R., Gupta, P. & Singh, T. (2019). Massive Open Online Courses: concept and implications. *Medical Education*, 56, 489-495.

Discussion and conclusions

The pandemic has accelerated or increased the process of educational digital transformation already on the rise during the last two decades in Spain. The present paper is a reflection of an increasingly deep and constant change in society, with smartphones being the channel of a process of integration of ICTs that has altered numerous habits. New students have grown up surrounded by digital devices and teachers are immersed in a constant evolution of media, a positive issue due to possibilities but negative due to the real problems they pose. In this sense, it is urgent to consider teacher training, especially in higher education. However, at the same time, the development of ICTs is experienced more personally than professionally. This has an influence on the fact that professionals have to be able to combine their teaching work with their training, a fact that is usually complex given the annual curriculum.

The training of current and future teachers is a key need in the Spanish educational system. The perspective offered by verifying how ICTs have been integrated in Spain entails thinking beyond the provision of materials, bearing in mind that there is still a digital divide³⁷, to their preparation³⁸ and use in teaching contexts, a complex situation given the rapidity of technological changes. Yet, that has to be faced if higher education wants to favor the development of students framed in a digital future.

Bibliography

- Alberola, I.; Iglesias, M. & Lozano, I. (2021). Teachers' beliefs about the role of digital educational resources in educational practice: a qualitative study. *Education Sciences*, 11(5). doi: 10.3390/educsci11050239
- Alvarez, A.; Velazquez, A. & Castillo, M. (2021). Technology acceptance of an interactive augmented reality app on resistive circuits for engineering students. *Electronics*, 10(11). doi: 10.3390/electronics10111286
- Alves, L.; Antonio, D. & Laux, R. (2021). Nomophobia: a bibliometric analysis. *Revista Tecnologia E Sociedade*, 17(46), 246-263. doi: 10.3895/rts.v17n46.12661
- Area, M. (2008). Una breve historia de las políticas de incorporación de las tecnologías digitales al sistema escolar en España. *Quaderns digitals: Revista de Nuevas Tecnologías y Sociedad*, 51.
- Area, M. (2010). El proceso de integración y uso pedagógico de las TIC en los centros educativos. Un estudio de casos. *Revista de Educación*, mayo-agosto (352), 77-97.

³⁷ Perez, T.; Vlarezo, A.; Lopez, R. & Garin, T. (2021). Digital divides across consumers of internet services in Spain using panel data 2007-2019. Narrowing or not? *Telecommunications Policy*, 45(2). doi: 10.1016/j.telpol.2020.102093

³⁸ Soler, R.; Lafarga, P.; Medrano, M. & Moreno, A.J. (2021). Netiquette: ethic, education, and behaviour on Internet-a systematic literature review. *International Journal Of Environmental Research and Public Health*, 18(3). doi: 10.3390/ijerph18031212

- Area, M.; Bethencourt, A. & Martin, S. (2020). From blended teaching to online teaching in the days of Covid19. Student visions. *Campus Virtuales*, 9(2), 35-50.
- Barrio, R. (2021). 'Youtuberism' as a response in times of lock down. A teaching experience of the subject of Crimilan Procedural Law. *Revista de Educación y Derecho-Educational and Law Review*, 23. doi: 10.1344/REYD2021.23.33889
- Batanero, J.; Gravan, P. & Rojas, C. (2020). Are primary education teachers from Catalonia (Spain) trained on ICT and disability? *Digital Education Review*, 37, 288-303.
- Belikov, O. & Kimmons, R. (2018). Can I Use This? Developing Open Literacies or Understanding the Basics and Implications of Copyrights. *Fair Use, and Open Licensing for e-Learning. Educational Communications and Technology-Issues and Innovations*, 155-168. doi: 10.1007/978-3-319-61780-0_12.
- Brown, M., McCormack, M., Reeves, J., Brooks, C., & Grajek, S. (2020). *2020 EDUCAUSE Horizon Report, Teaching and Learning Edition*. Louisville, EE. UU.: Educause.
- Carneiro, R., Toscano, J., & Díaz, T. (2009). *Los desafíos de las TIC para el cambio educativo*. Madrid: OEI – Fundación Santillana.
- Cervi, L. (2021). Tik Tok and generation Z. *Theatre Dance and Performance Training*, 12(2), 198-204. doi: 10.1080/19443927.2021.1915617
- Cespon, M. (2021). ICT/LKT and COVID-19: Use and needs of Galician secondary teachers. *Digital Education Review*, 39, 356-373.
- Cobb, D. (2018). Placing the spotlight on Open Educational Resources: Global phenomenon or cultural guise? *International Educational Journal-Comparative Perspectives*, 17(3), 15-29.
- Costa, R.; Medrano, M.; Lafarga, P. & Moreno, A. J. (2021). How to teach pre-service teachers to make a didactic program? The collaorative learning associated with mobile devices. *Sustainability*, 12(9). doi: 10.3390/su12093755
- Criollo, S.; Abad, D.; Martic, M.; Velasquez, F., Pérez, J. & Luján, S. (2021). *Applied Sciences-Basel*, 11(11). doi: 10.3390/app11114921
- Deimann, M. (2019). Openness. Open and distance education theory revisited: implications for the digital era. *SpringerBriefs in Education*, 39-46. doi: 10.1007/978-981-13-7740-2_5.
- Fernandez, P.; Rodriguez, M. & Fernandez, A. (2020). Blended learning model for university training. Application to technical degrees. *Enseñanza de las Ciencias*, 38(3), 179-196. doi: 10.5565/rev/ensciencias.3300
- González, A. & De Pablos, J. (2015). Factores que dificultan la integración de las TIC en las aulas. *Revista de Investigación Educativa*, 33(2), 401-417.
- Gonzalez, J.; Montolio, M.; Ortega, S. & Sanchez, P. (2021). Teachers' digital learning ecologies: school at home during COVID-19 in the Valencian Region. *Revista Publicaciones*, 51(3), 191-214. doi: 10.30827/publicaciones.v51i3.20743
- Instituto Nacional de Estadística (2021). *Encuesta sobre equipamiento y uso de tecnologías de información y comunicación en los hogares*. Recuperado de https://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_C&cid=1254736176741&menu=ultiDatos&idp=125473557669
- INTEF. (2017). *Marco Común de Competencia Digital Docente – Septiembre 2017*. Recuperado de http://aprende.intef.es/sites/default/files/2018-05/2017_1020_Marco-Com%C3%BAAn-de-Competencia-Digital-Docente.pdf
- Jiménez, A.; García, C. & de Ayala, M. C. (2021). Adolescents and Youtube: creation, participation and consumption. *Prisma Social*, 60-89.
- Lorente, A.; Despujol, I. & Castaneda, L. (2021). MOOC as a leveling strategy in higher Education: the case of the Polytechnic University of Valencia. *Campus Virtuales*, 10(2), 9-25.
- Lorente, L. (2020). The right to education and ICT during COVID-19: an international perspective. *Sustainability*, 12(21). doi: 10.3390/su12219091
- Llorente, C.; Kolotouchkina, O. & Manas, L. (2021). *International Journal of Environmental Research and Public Health*, 18(8). doi: 10.3390/ijerph18083923

- Mahajan, R., Gupta, P. & Singh, T. (2019). Massive Open Online Courses: concept and implications. *Medical Education*, 56, 489-495.
- Mejía, A., Silva, C. A., Villareal, C. P., Suarez, D. A. & Villamizar, C. F. (2018). Estudio de los factores de resistencia al cambio y actitud hacia el uso educativo de las TIC por parte del personal docente. *Revista Boletín REDIPE*, 7(2), 53-63.
- Montenegro, S.; Raya, E. & Navaridas, E. (2021). Teacher's perceptions of the effects on the digital divide in basic education during the Covid-19. *Revista Internacional de Educación para la Justicia Social*, 9(3), 317-333. doi: 10.15366/riejs2020.9.3.017
- Nunez, Q.; Gomez, S.; Ganete, A. & Goncalves, D. (2021). Professional culture and ICT teacher education in times of crisis: the perception of teachers. *Revista Electrónica Interuniversitaria de Formación del Profesorado*, 24(2), 153-165. doi: 10.6018/reifop.470831
- Pérez, D.; García, N. & García, J. (2021). RETOS-Revista de Ciencias de la Administración y Economía, 11(21), 5-24. doi: 10.17163/ret.n21.2021.01
- Perez, T.; Vlarez, A.; Lopez, R. & Garin, T. (2021). Digital divides across consumers of internet services in Spain using panel data 2007-2019. Narrowing or not? *Telecommunications Policy*, 45(2). doi: 10.1016/j.telpol.2020.102093
- Pozo, S.; López, J.; Fuentes, A. & López, J. A. (2021). Twitch as a techno-pedagogical resource to complement the flipped learning methodology in a time of academic uncertainty. *Sustainability*, 13(9). doi: 10.3390/su13094901
- San, S.; Jimenez, N.; Rodríguez, P. & Pineiro, I. (2020). The determinants of teachers' continuance commitment to e-learning in higher education. *Education and Information Technologies*, 25(4), 3205-3225. doi: 10.1007/s10639-020-10117-3
- Soler, R.; Lafarga, P.; Medrano, M. & Moreno, A.J. (2021). Netiquette: ethic, education, and behaviour on Internet-a systematic literature review. *International Journal Of Environmental Research and Public Health*, 18(3). doi: 10.3390/ijerph18031212
- Tejada, J. & Pozos, K. V. (2018). Nuevos escenarios y competencias digitales docentes: hacia la profesionalización docente con tic. *Profesorado, Revista de Currículum y Formación de Profesorado*, 22(1), 25-51.
- Viñals, A. & Cuenca, J. (2016). El rol del docente en la era digital. *Revista Interuniversitaria de formación del profesorado*, 86, 103-114.
- Virgili, M. (2021). Emergency remote teaching: ICT applied to education during confinement by Covid-19. *INNOEDUCA-International Journal Of Technology and Educational Innovation*, 7(1), 122-136. doi: 10.24310/innoeduca.2021.v7i1.9079