



<http://dx.doi.org/10.16926/p.2022.31.01>

Sławomir SCHULTIS

<http://orcid.org/0000-0002-0258-2580>

Stadium Języków Obcych, Uniwersytet Rzeszowski, Rzeszów (Poland)

e-mail: [sschultis@ur.edu.pl](mailto:sschultis@ur.edu.pl)

Pablo LAFARGA OSTÁRIZ

<http://orcid.org/0000-0003-2033-9792>

Department of didactics and school organization, University of Zaragoza, Zaragoza (Spain)

e-mail: [681742@unizar.es](mailto:681742@unizar.es)

Rebeca SOLER COSTA

<http://orcid.org/0000-0002-6658-872X>

Department of didactics and school organization, University of Zaragoza

e-mail: [rsoler@unizar.es](mailto:rsoler@unizar.es)

## Gamification in Higher Education: an educational trend with digital needs

### Abstract

The last decade has shown the potential and limitations that Information and Communication Technologies (ICTs) represent in society. During these years it has been possible to appreciate the birth and development of devices whose incorporation into the daily routine has been almost immediate. Some of the most relevant cases are laptops and smartphones, media that have significantly altered the human paradigm. Its presence has meant the origin of new habits and the adaptation of others towards digital terrain, alternating face-to-face and virtual. The impact and repercussions can be observed in numerous areas, however, education is one of the most cohesive with these new ways of living. Gamification is one of the didactic strategies that are most closely linked with ICTs, an interaction that is conceived as natural as it is the translation of a methodology towards tools with resources that can be unlimited and asynchronous. However, as always happens when technology is incorporated into the educational field, these new teaching-learning paths require new approaches and reflections on the needs they demand. It is in the case of Higher Education that its implementation must involve an analysis of the past, present, and future in order to favor the true personal development of those who make up the process: teachers and students.

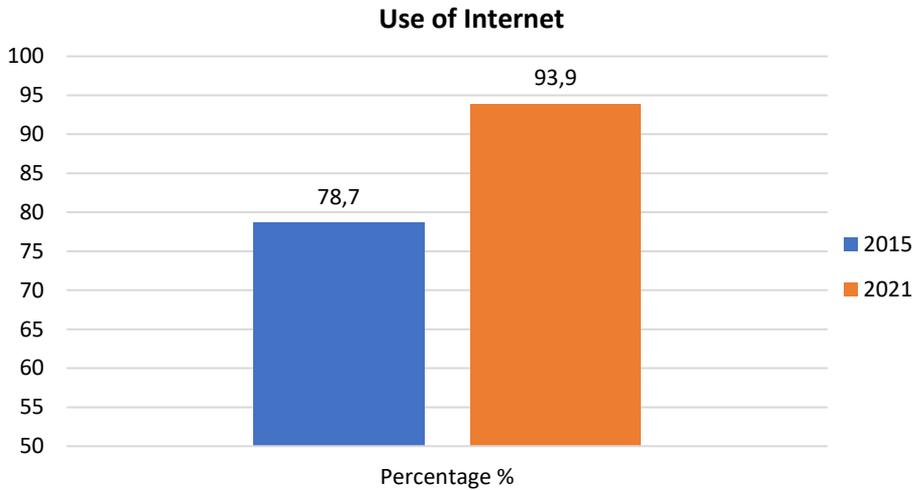
**Keywords:** gamification, ICT, higher education, digital competence, Spain.

## **New contexts supported by the digital: the Spanish case**

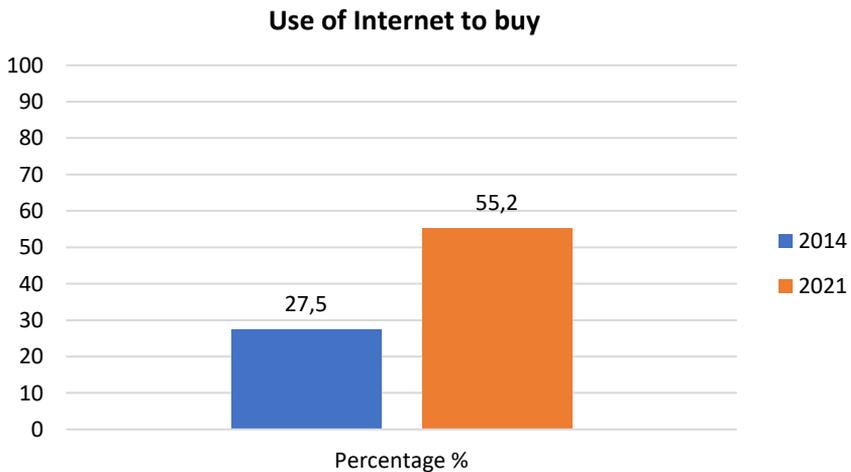
Human evolution has always been linked to the technological revolution. From the consideration of stone as a tool for hunting or communication to a new paradigm that goes beyond the physical. A constant of natural and innate adaptation to the human being that has led him towards a 21st century clearly marked by the appearance of Information and Communication Technologies (ICTs) (Carneiro, Toscano & Díaz, 2009). On this occasion, a new link in a deep process is discussed, which has been going on since prehistoric times and has continued to the present day through key milestones such as the creation of the printing press or the steam engine. Therefore, this stage must be considered a new evolutionary step, with its consequent appearances and settlements that favor more sustainable ways of living (Kovari, 2020). A journey that, inevitably, goes through the integration of technological means into the human routine.

ICTs are the axis of a new social stage, a new paradigm in which generational changes go beyond physical traditions but also confront digital trends. Among these trends, computers and, above all, smartphones (Alves, Antonio & Laux, 2021) emerge. These seconds have become the key device for day-to-day use, whose growth has been encouraged by the origin of a specific industry whose profits are on the rise and which has made it possible to democratize its access. However, unlike previous ones such as radio or television, its connectivity entails a complete change in the daily routine. Its origin, development, and integration suppose new levels in diverse fields such as socializing, participating in informative processes (Jiménez, García & de Ayala, 2021), entertaining (Cervi, 2021), or working. Alterations that no previous technology had encouraged so directly, previously being more punctual disruptions and always supported by attendance.

The inclination towards the digital, understood as the virtual, is probably the greatest human conditioning that will be experienced in the 21st century. The commitment to moving towards non-face-to-face interactions supposes the appearance of a paradigm that changes how living is conceived. Although ICTs have not yet eradicated all habits, it is clear that society is moving towards it in aspects such as bureaucratic, commercial or informative. As for bureaucracy, there are more and more administrative processes that must be carried out through digital means. The presence of businesses on the Internet is no longer conceived as a possibility but as a necessity, see how many of them are not born with a web page or social network. Regarding information, one of the most obvious signs is the decline in sales of physical newspapers or magazines in pursuit of instant digital versions. This trend also implies the appearance of risks such as Fake News, especially on social networks (Soler et al., 2021).



*Figure 1*  
Use of Internet by spanish population.



*Figure 2*  
Spanish population who has bought by Internet.

This revolution and hybridization between the physical and the digital is observed in Spain. A country that has experienced the appearance of devices such as computers or smartphones and whose integration has been exponential during the last five years (Vaterlaus et al., 2021). The data provided by the National Institute of Statistics (INE, 2022), reveal how ICTs are increasingly present in monthly habits. Some of the most relevant values are that almost 96% of households have a broadband connection and more than 83% have some type of com-

puter; and regarding the Internet, its weekly intensive use stands out: almost 86% of citizens. The phenomenon of Internet purchases is also striking since more than half of the Spanish population admits to having bought something through this channel in the last 3 months.

These trends show that the incorporation of ICTs is not an isolated process but that its roots will increase over the years. The establishment of habits such as Internet access, with the unlimited possibilities that this offers, is the most important disruption due to the repercussions it has on the day-to-day numerous habits (Ziamba, 2019). Despite this progress has been taking place for just over a decade, its impact can already be seen in practically any social or economic field. The appearance of new behaviors by the new generations is something usual, whether it is the designation of new words to explain facts contextualized in the digital or practices that collide with previous generations such as the preference for instant messaging instead of phone calls. All this has been increased and altered by the pandemic derived from SARS-Cov2, a situation that forced the forced reinvention of digital media for several months in 2020 (Lorente, 2020).

## **The incorporation of gamification in educational contexts**

Educational institutions are in a constant process of adaptation and change. The approaches developed in the 20th century are being readapted to new offers and demands, both personal and technological. In this sense, the great change that the adaptation of master classes towards active pedagogies entails stands out. Different perspectives imply a generational contrast, an issue on which the focus must be placed since the modifications that the teaching-learning processes have undergone can cause disparity. An evolution that is being accentuated by the integration of ICTs in the school. In short, a significant change is taking place in the educational field, which cannot be ignored in a context with a clear technological character and new forms of personal development (Moseikina, Toktamysov & Danshina, 2022).

The integration of ICTs is a specific issue within the educational field. During these first years of the 21st century, its inclusion in the teaching-learning processes is increasingly common and profound. In the Spanish context, the attempts in the 2010s to provide educational centers with technological materials such as computers, tablets, or digital whiteboards stand out. A fact that had a clear intention: to incorporate technology into learning processes. This responded to a social demand that has increased over the years, although it may not respond to those specific devices. However, these equipment endowments reflected and promoted the presence of ICTs in schools, a very relevant issue at a time when Internet access is more of a necessity than a complement to life.

The translation of all the changes and incorporations is the birth of new pedagogies, more active and oriented toward the active roles of the students (Krishnamurthy et al., 2022). A new perspective of the teaching-learning processes aimed at favoring the active participation of students in their learning through different strategies. In recent years there has been a boom in methodologies such as the Flipped Classroom, task-based learning or project-based learning. These are some examples of approaches that represent a striking change with respect to classical educational practices, the most used being the master class and represented by closed sessions taught by teachers to students. One of the characteristics offered by the new didactic approaches is the incorporation of ICTs in the process, some such as gamification or teaching through online courses (Para, 2021) being more and more frequent.

Gamification is one of the didactic practices whose boom has occurred during the last five years (Rodriguez & Martin, 2019). Its approach is based on the incorporation of gamified processes within teaching-learning, a nuance that supposes a new context of work and learning among students. This is a strategy that has been accentuated thanks to technological development. The incorporation of projectors in the classroom has been a tool that has allowed the integration of gamified processes in the classroom, which can be accompanied by physical materials or other devices such as smartphones. It is usually chosen for the first time since the incorporation of smartphones in the classroom is still an educational controversy between sectors. The advancement of the Internet allows a computer to serve as an axis for the development of playful dynamics through games, tours, or other possibilities (Palocz & Katona, 2021).

The justification for its use in the classroom is usually supported by some advantages it offers. It is conceived that student motivation can increase when dealing with practices that are different from traditional teaching and whose association with technology evokes a greater connection between learning in the classroom and the student's personal context (Hursen & Bas, 2019). Similarly, the ability of teachers or even students to manage the teaching process in terms of difficulty is also argued. The delimitation and segmentation of contents allow ordering the degrees of deepening in certain contents and learning.

As it has been commented, in turn, gamification commonly supposes a new attitude on the part of the students and that is usually associated with more fun participation (Hinojo et al., 2021). Another aspect is the attention capacity since this type of teaching-learning process supposes a new relationship in the classroom and a new presentation of content that requires the attention and total performance of the students (Almalki, 2022). Finally, social improvements are also suggested, provided that the process is shared. A controversial statement since the incorporation of gamification can also assume levels of competitiveness that can lead to discrepancies at the personal and social levels of students in the classroom.

In short, the possibilities offered by gamification can be unlimited. Its nature means adding a nuance to the learning process that can be very positive for the student, in terms of content and social aspects. The presentation of the contents is a very relevant issue, more so in the time of constant exposure that the new generations live, so favoring the creation and distribution of significant materials is something positive (Segade & la Cruz, 2021). In turn, these can be adapted to the needs and worked through mechanisms that can range from production by the students themselves to targeting students with learning difficulties. All this is supported by the physical and the digital since it is a pedagogy that can play with the hybridization of these two trends that are so representative of the current moment in society.

The limitations of gamification must also be taken into consideration. Incorporating active pedagogies supposes not only new needs but also being aware of new limitations. In this case, the treatment of the contents emerges, which can be treated as a procedure within a playful process and not be correctly acquired, just as social relations can be affected by the incorporation of competitive dynamics. Both questions imply profound reflections since the adaptation of the teaching-learning processes must be significant in improving the development of the student body. At the same time, the role of ICTs within this methodology must also be considered, since their application must be analyzed beyond their innovative contribution to the classroom. A playful process can be functional without the need for projectors or smartphones, it should not be customary to incorporate them by trend without considering their true value in learning.

The needs that arise from gamification derive in the two great roles of the educational process: students and teachers. On the one hand, the students and their participatory role, since incorporating this type of strategy is usually a differentiated element of the educational practices they receive. In this sense, it is necessary to consider what capacity the students have for gamification to be a significant strategy, both in terms of content learning and due to the dynamics themselves. For this reason, it is key to keep in mind the preparation of content to work on and its competence development in the case of incorporating ICTs or social dynamics. On the opposite side is the teaching staff, whose demands fall that range from the didactic to the organizational (Pimentel, Nunes & De Sales, 2020). When selecting and applying gamification, with or without ICTs, you must bear in mind: the organization of the teaching-learning process in terms of content, classroom distribution, and management of dynamics or have a good level of digital skills to apply ICTs transversally (Silva, Rodrigues & Leal, 2020).

## **A new paradigm in higher education**

The new pedagogical approaches, increased by the development of ICTs and their educational possibilities, have promoted the transfer of higher educational

institutions towards a new paradigm (Mauri et al., 2022). The nature of higher education, the most focused and oriented to professional work, supposes a constant rethinking of the teaching-learning processes that take place in it. In the same way that the topics and contents taught are updated, professional developments imply adaptations that must be reflected in university or professional training practices. Regarding the University environment, its ability to investigate and train new generations of workers, the need to reflect on the present and future from a prism that goes beyond specific learning is undeniable. On the other hand, vocational training has a clear practical and limited component that is far from university innovation contexts. Two higher stages require updating before the professions of the future through appropriate teachings to present paradigms.

Higher education has been in a process of change since the beginning of the century. The appearance and improvement of the Internet have significantly changed its conceptualization, especially with regard to organizational issues. In recent years, new pedagogical practices have emerged and been incorporated, just as ICTs have established themselves as a transversal tool. The new pedagogies, more oriented towards the active participation of the students instead of betting on a single information channel in the classroom, have altered the classic dynamics. Strategies that work through projects, in groups or with playful activities such as escape rooms are becoming more and more common. New approaches that correspond to work practices of current times, as well as interrelate with daily leisure practices. In the case of ICTs, higher education has a didactic approach that is consistent with practices such as Massive Open Online Courses (MOOCs) or the application of apps, platforms or web pages that facilitate the management of students in their own learning process (Bernik, 2021).

Gamification is a specific case within higher education. It is a methodology supported by the playful, as has already been commented on in previous sections, whose application can be supported by ICTs. A resource that is new in recent years in this superior context, although it is not a completely revolutionary and invented issue today. Its incorporation into educational practices represents a significant change with respect to methodologies such as the master class, in which students usually take a passive role within their knowledge process (Pinter et al., 2020). Currently, gamification offers advantages regarding the definition and work with content from different areas, just as it is adapting to new social dynamics that respond to new practices outside and inside the classroom. Some of the most striking activities around gamification in higher education are linked to the use of ICTs through quizzes or incorporation into methodologies such as escape rooms or flipped classrooms.

All this has positive aspects, negative aspects, and even risks. The positive that gamification can incorporate in higher learning environments is associated with attention, content management, participation dynamics, or classroom

management. Relevant aspects in the classroom can be positively affected by incorporating systems such as Kahoot (Magadan & Rivas, 2022), a gamified tool that simplifies didactic management. On the other hand, a series of limitations appear, understood as those altered issues that require reflection. The preparation of content falls on the teaching staff, a task that has always been like this but in this case, it is associated with a teaching digital competence capacity (TDC) that is normally acquired autonomously (Soler et al., 2020). In turn, the change in classroom dynamics, especially if competitiveness is incorporated into higher education, can cause conflicts among students and even disengagement from care.

Applying new educational practices associated with the game can have a positive value, as they have just been named, but they can also lead to risks. Gamification requires a profound rethinking of the need to make learning playful (Chung, Shen & Qiu, 2019). It is evident that there are methodologies that provide greater value to students, moving from being passive and receptive being to actively participating in their personal development (Monzonis et al., 2021). However, it is possible to contextualize the existence of educational risks that range from the organizational to the didactic, passing through the social.

Students and teachers acquire new needs in the face of the change in the educational paradigm (Aguar et al., 2021). The new generations live immersed in stimuli, digital devices, and competitiveness. Teachers, normally, have acquired prior training that is far from current technological means. In both cases, relevant training needs arise, especially from teachers immersed in constant legislative and procedural change.

## **Discussion and conclusions**

Technological development has revealed numerous economic, educational, and social changes. In the last five years, the changes in how society has integrated new devices such as smartphones have been remarkable. The incorporation of ICTs has become routine, a significant change compared to previous periods in history since on this occasion contact with them is practically constant. The revolution that all this entails is transferred to everyday areas, from entertainment to how information is accessed or adult life is managed. A change that represents a disruption between generations, especially in recent years, since any child today already grows up surrounded by technological devices. Although this supposes something positive, since scientific advances allow the advancement of society, it also entails a deep reflection regarding the degree to which human life and behavior are going to be automated through machines.

Gamification is an adaptation of this changing context, a new educational perspective that transfers playful processes to the didactic field. Although it is a pedagogy that responds better to active student approaches, it also involves altering

the teaching-learning processes. It is usual for this type of strategy to be complemented with ICTs, be it a projector or smartphones, so their inclusion acquires greater transversality than that of incorporating a tool (Navarro et al., 2022). This change requires studying the potentialities, limitations, and risks that derive from applying gamification in the classroom. More at a time when students are surrounded by stimuli, teachers are immersed in legislative and technical changes; and educational institutions are still moving toward hybrid learning spaces.

This is the case in higher education, an educational stage in which new generations, teachers, and researchers coexist. Their innate capacity for innovation must be the engine of change in the educational system through new proposals that enhance the teaching-learning processes. A specific case is a gamification, which has been applied for a few years in these contexts and whose results are ambiguous in some aspects (Magro & Pena, 2021). What is certain is that educational changes involve new organizations and new training, especially for teachers in training. TDC is a key element in personal and professional development, two worlds that are no longer isolated thanks to technological democratization. In the same way, it is urgent to rethink innovations, especially in higher education, since also during the last period there seems to be a tendency to innovate with ICTs (Rincon & Santos, 2021) without considering aspects as evident as their real repercussion beyond ratings.

## References

- Aguiar, L., Clavijo, A., Hernandez, L., De Saa, P., Perez, R. (2021). Gamification and Deep learning approaches in higher education. *Journal of hospitality leisure sport & tourism education*, 29. <https://doi.org/10.1016/j.jhlste.2020.100290>.
- Almalki, M. (2022). Didactic games and gamification in education. *International Journal of Computer Science and Network Security*, 22 (4), pp. 417–419. <https://doi.org/10.22937/IJCSNS.2022.22.4.49>.
- Alves, L., Antonio, D., Laux, R. (2021). Nomophobia: a bibliometric analysis. *Revista Tecnologia E Sociedade*, 17 (46), pp. 246–263. <https://doi.org/10.3895/rts.v17n46.12661>.
- Bernik, A. (2021). Gamification framework for e-learning systems in higher education. *Tehniki Glasnik – Technical Journal*, 15 (2), pp. 184–190. <https://doi.org/10.31803/tg-20201008090615>.
- 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), pp. 198–204. <https://doi.org/10.1080/19443927.2021.1915617>.
- Chung, C., Shen, C., Qiu, Y. (2019). Student's acceptance of gamification in higher education. *International Journal of Game-Based Learning*, 9 (2), pp. 1–19. <https://doi.org/10.4018/IJGBL.2019040101>.

- Hinojo, F., Gomez, G., Marin, J., Romero, J. (2021). Gamification by badges for gender equality in higher education. *Prisma Social*, 35, pp. 184–198.
- Hursen, C., Bas, C. (2019). Use of gamification applications in science education. *International Journal of Emerging Technologies in Learning*, 14 (1), pp. 4–23. <https://doi.org/10.3991/ijet.v14i01.8894>.
- Instituto Nacional de Estadística (2022). *Encuesta sobre equipamiento y uso de tecnologías de información y comunicación en los hogares*. Retrieved from [https://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica\\_C&cid=1254736176741&menu=ultiDatos&idp=125473557669](https://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_C&cid=1254736176741&menu=ultiDatos&idp=125473557669).
- Jiménez, A., García, C., de Ayala, M.C. (2021). Adolescents and Youtube: creation, participation and consumption. *Prisma Social*, pp. 60–89.
- Kovari, A. (2020). Synergy of digital society and digital education. *Civil Szemle*, 17 (1), pp. 69–72.
- Krishnamurthy, K., Selvaraj, N., Gupta, P., Cyriac, B., Dhurairaj, P., Abdullah, A., Krishnapillai, A., Lugova, H., Haque, M., Xie, S., Ang, E. (2022). Benefits of gamification in medical education. *Clinical Anatomy*, 35 (6), pp. 795–807. <https://doi.org/10.1002/ca.23916>.
- Lorente, L. (2020). The right to education and ICT during COVID-19: an international perspective. *Sustainability*, 12 (21), pp. 1–16. <https://doi.org/10.3390/su12219091>.
- Magadan, M., Rivas, J. (2022). Classroom gamification in online higher education: the use of Kahoot. *Campus Virtuales*, 11 (1), pp. 137–152. <https://doi.org/10.54988/cv.2022.1.9788>.
- Mauri, M., Lafarga, P., Del Barrio, L., Soler, R. (2022). Mobile learning and communication: educational change?; a systematic review. *Education and Training*. <https://doi.org/10.1108/ET-03-2022-0110>.
- Monzonis, N., Ariza, A., Mendez, V., Magana, E. (2021). Student's perception about gamification in higher education. *REIDOCREA – Revista electrónica de investigación y docencia creativa*, 10 (16), pp. 1–12. <https://doi.org/10.30827/Digibug.66757>.
- Moseikina, M., Toktamysov, S., Danshina, S. (2022). Modern technologies and gamification in historical education. *Simulation & Gaming*, 53 (2), pp. 135–156. <https://doi.org/10.1177/10468781221075965>.
- Navarro, J., Vaquero, M., Perea, A., Pedros, G., Martinez, A., Aparicio, P. (2022). Gamification as a promoting tool of motivation for creating sustainable higher education institutions. *International Journal of Environmental Research and Public Health*, 19 (5). <https://doi.org/10.3390/ijerph19052599>.
- Palocz, K., Katona, V. (2021). The applicability of gamification in architectural design education. *Symmetry – Culture and Science*, 32 (4), pp. 489–505. [https://doi.org/10.26830/symmetry\\_2021\\_4\\_489](https://doi.org/10.26830/symmetry_2021_4_489).
- Para, A. (2021). The use of gamification in distance education. *E-Mentor*, 1, pp. 21–29. <https://doi.org/10.15219/em88.1499>.

- Pimentel, F., Nunes, A., De Sales, V. (2020). Teacher education in digital culture through gamification. Formação de professores na cultura digital por meio da gamificação. *Educar Em Revista*, 36. <https://doi.org/10.1590/0104-4060.76125>.
- Pinter, R., Cisar, M., Balogh, Z., Manojlovic, H. (2020). Enhancing higher education student class attendance through gamification. *Acta Polytechnica Hungarica*, 17 (2), pp. 13–33. <https://doi.org/10.12700/APH.17.2.2020.2.2>.
- Rodriguez, J., Martin, F. (2019). Bibliographical analysis of gamification in Physical Education. *Revista Iberoamericana de Ciencias de la Actividad Física y el Deporte*, 8 (1), pp. 97–109. <https://doi.org/10.24310/riccafd.2019.v8i1.5770>.
- Segade, H., la Cruz, S. (2021). Benefits of gamification in secondary education music classroom. *Ensayos – Revista de la facultad de educación de Albacete*, 36 (1), pp. 167–182.
- Silva, R., Rodrigues, R., Leal, C. (2020). Gamification in management education—a literature mapping. *Education and Information Technologies*, 25 (3), pp. 1803–1835. <https://doi.org/10.1007/s10639-019-10055-9>.
- Soler, R., Lafarga, P., Mauri, M., Moreno, A. (2021). Netiquette: Ethic, Education, and Behavior on Internet – A systematic literature review. *International Journal of Environmental Research and Public Health*, 18 (3) pp. 1–15. <https://doi.org/10.3390/ijerph18031212>.
- Soler, R., Mauri, M., Lafarga, P., Moreno, A. (2020). How to teach pre-service teachers to make a didactic program? The collaborative learning associated with mobile devices. *Sustainability*, 12 (9). <https://doi.org/10.3390/su12093755>.
- Vaterlaus, J., Aylward, A., Tarabochia, D., Martin, J. (2021). “A Smartphone made my life easier”: An exploratory study on age of adolescent Smartphone acquisition and well-being. *Computers in Human Behavior*, 114. <https://doi.org/10.1016/j.chb.2020.106563>.
- Ziemba, E. (2019). The contribution of ICT adoption to the sustainable information society. *Journal of Computer Information Systems*, 59 (2), pp. 116–126. <https://doi.org/10.1080/08874417.2017.1312635>.

## **Gamifikacja w szkolnictwie wyższym: trend edukacyjny o potrzebach cyfrowych**

### **Streszczenie**

Ostatnia dekada pokazała potencjał i ograniczenia technologii informacyjnych i komunikacyjnych (ICT) występujących w społeczeństwie. W ciągu tych lat można było dostrzec narodziny i rozwój urządzeń, których włączenie do codziennej praktyki było niemal natychmiastowe. Jednymi z najczęściej pojawiających się urządzeń są laptopy i smartfony, czyli media, które znacząco zmieniły ludzki paradygmat społecznego funkcjonowania. Ich obecność oznaczała powstanie nowych

nawyków i dostosowanie innych do cyfrowego terenu, podczas edukacji prowadzonej na przemian twarzą w twarz i wirtualnie. Wpływ i reperkusje można zaobserwować w wielu obszarach, jednak edukacja jest jednym z najbardziej spójnych z tymi nowymi sposobami życia. Gamifikacja jest jedną ze strategii dydaktycznych, które są najściślej związane z ICT; to interakcja, która jest postrzegana jako naturalna, ponieważ jest to tłumaczenie metodologii na narzędzia z zasobami, które mogą być nieograniczone i asynchroniczne. Jednakże, jak to bywa, gdy technologia zostaje włączona do dziedziny edukacji, te nowe ścieżki nauczania-uczenia się wymagają nowego podejścia i refleksji nad implikowanymi potrzebami. W przypadku szkolnictwa wyższego jej wdrożenie musi obejmować analizę przeszłości, teraźniejszości i przyszłości, aby sprzyjać prawdziwemu rozwojowi osobistemu tych, którzy tworzą ten proces – nauczycieli i studentów.

**Słowa kluczowe:** gamifikacja, ICT, szkolnictwo wyższe, kompetencje cyfrowe, Hiszpania.