

# Interacción en los ecosistemas tecnológicos de aprendizaje

## Interaction in the learning technological ecosystems

### Editorial de la revista

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### Resumen

En julio de 2018 se celebró en Las Vegas la segunda edición de la sesión especial sobre Interacción en los ecosistemas tecnológicos de aprendizaje, en el contexto del congreso HCI International 2018, 20th International Conference on Human-Computer Interaction. Se va a hacer un breve repaso de los tópicos más importantes que allí se trataron.

### Palabras Clave

Interacción; Ecosistemas tecnológicos; Educación; Aprendizaje

### Abstract

In July 2018, the second edition of the special session on Interaction in Technological Learning Ecosystems was held in Las Vegas, in the context of the HCI International Conference 2018, 20th International Conference on Human-Computer Interaction. A brief review of the most important topics that were discussed there will be made.

### Keywords

Interaction; Technological ecosystems; Education; Learning

## 1. Ecosistemas y ecologías

Durante los últimos seis años se ha venido celebrando en el contexto del Congreso HCI International una sesión que unía los tópicos de interacción y educación. Más concretamente en 2017 y 2018 el hilo conductor de la sesión ha sido el concepto de ecosistema tecnológico (García-Holgado & García-Peñalvo, 2018b; García-Peñalvo, 2016) aplicados al contexto educativo (García-Peñalvo et al., 2017; García-Peñalvo et al., 2015). Los ecosistemas tecnológicos suponen una evolución de los sistemas de información basados en servicios (Casany, Alier, Conde & García-Peñalvo, 2009; Conde-González, García-Peñalvo, Alier, Mayol & Fernández-Llamas, 2014), de forma que los componentes de este ecosistema, software y personas, interactúen e interoperen de forma natural, sin verse afectados por la evolución de la parte software, para construir ecologías de aprendizaje (García-Peñalvo, 2018).

Concretamente en la edición de 2018 se aceptaron 21 artículos, que se podrían clasificar en los siguientes descriptores.

- Los ecosistemas tecnológicos y la interacción con los usuarios, destacando las propuestas (García-Holgado & García-Peñalvo, 2018a; Vázquez-Ingelmo, García-Peñalvo & Therón, 2018).

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- La gamificación desde diversas perspectivas, como por ejemplo en apoyo al aprendizaje de la programación (Rojas-López & Rincón-Flores, 2018) o el urbanismo (Calvo et al., 2018).
  - La evaluación de la usabilidad y la accesibilidad, destacando los estudios de usabilidad de apps de mLearning (Hussain, Hussain & Ali, 2018) o de la plataforma WYRED (García-Peñalvo & Durán-Escudero, 2017; García-Peñalvo, García-Holgado, Vázquez-Ingelmo & Seoane-Pardo, 2018); y la accesibilidad en Ingeniería del Software (Silva, Gonçalves, Martins, Branco & Pereira, 2018).
  - Miscelánea, con temas que tocan la clase invertida (Fidalgo-Blanco, Sein-Echaluce & García-Peñalvo, 2018), la retención del interés de los estudiantes en los cursos MOOC (Massive Open Online Course) (Hernández Rizzardini & Amado-Salvaterra, 2018), la aplicación de técnicas de deep learning con fines de soporte al aprendizaje autónomo (Cruz-Benito, Faro, Martínez-Fernández, Therón & García-Peñalvo, 2018), la medición de la competencia de trabajo en equipo (Rodríguez-Sedano, Conde & Fernández-Llamas, 2018) o el aprendizaje personalizado (Kondratova, Molyneaux & Fournier, 2018).

Como conclusión de la sesión se destaca que en los sistemas interactivos educativos el factor humano es un componente de extrema importancia en el ecosistema de aprendizaje y, por tanto, en las ecologías de aprendizaje que de ellos se derivan.

## 2. Composición del número

Este tercer número del volumen 19 de EKS consta de cinco artículos. En el primero de ellos Astudillo Torres y Chévez Ponce presentan resultados de una investigación en curso, que analiza la implementación de un programa institucional de tutoría por parte de los participantes, centrándose en la experiencia del tutor y el tutorado en el devenir del proceso educativo en un programa académico universitario.

El segundo artículo, “Beneficios educativos y videojuegos: revisión de la literatura española”, realiza una revisión bibliográfica de artículos en español (y editados en España) durante el periodo 2013-2017 dentro del ámbito educativo sobre los videojuegos y con especial atención a sus beneficios.

Aznar Díaz et al. establecen en su artículo “Indicadores de calidad para evaluar buenas prácticas docentes de mobile learning en Educación Superior” un sistema de indicadores de calidad para evaluar buenas prácticas de mobile learning en educación superior.

El cuarto artículo de Casillas González et al. se dedica a realizar el estudio psicométrico de un cuestionario para medir la competencia digital de los estudiantes universitarios.

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Por último, Lozano-Díaz y Fernández-Prados cierran este número con su artículo "Ciudadanía digital y su medida: propiedades psicométricas de una escala y retos para la educación superior", en el que, partiendo de una conceptualización amplia de la ciudadanía digital, se selecciona un instrumento que permite medir dichas conductas de ciudadanía, así como analizar las propiedades psicométricas de dicho instrumento en una muestra de jóvenes universitarios españoles.

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## 1. Ecosystems and ecologies

During the last six years, a session has been held in the context of the HCI International Congress that combined the topics of interaction and education. More specifically in 2017 and 2018, the theme of the session was the technological ecosystem concept (García-Holgado & García-Peñalvo, 2018b; García-Peñalvo, 2016) applied to the educational context (García-Peñalvo et al., 2017; García-Peñalvo et al., 2015). Technological ecosystems represent an evolution of information systems based on services (Casany et al., 2009; Conde-González et al., 2014), that the components of this ecosystem, software and people, interact and interoperate naturally, without being affected by the evolution of the software part, to build learning ecologies (García-Peñalvo, 2018).

Explicitly, in the 2018 edition, 21 articles were accepted, which could be classified in the following descriptors.

- Technological ecosystems and interaction with users, highlighting the proposals (García-Holgado & García-Peñalvo, 2018a; Vázquez-Ingelmo et al., 2018).
- Gamification from different perspectives, such as in support of learning programming (Rojas-López & Rincón-Flores, 2018) or urban planning (Calvo et al., 2018).
- The evaluation of usability and accessibility, highlighting usability studies of mLearning apps (Hussain et al., 2018) or the WYRED platform (García-Peñalvo & Durán-Escudero, 2017; García-Peñalvo et al., 2018); and accessibility in Software Engineering (Silva et al., 2018).
- Miscellaneous, with topics that touch the inverted class (Fidalgo-Blanco et al., 2018), the retention of students' interest in the MOOCs (Massive Open Online Courses) (Hernández Rizzardini & Amado-Salvaterra, 2018), the application of deep learning techniques for the purpose of supporting autonomous learning (Cruz-Benito et al., 2018), the measurement of teamwork competence (Rodríguez-Sedano et al., 2018) or personalized learning (Kondratova et al., 2018).

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As a conclusion of the session, it is emphasised that in interactive educational systems, the human factor is a component of extreme importance in the learning ecosystem and, therefore, in the learning ecologies that derive from them.

## 2. Presentation of the current issue

This third issue of volume 19 of EKS consists of five articles. In the first of them, Astudillo Torres & Chévez Ponce present results of an ongoing investigation, which analyses the implementation of an institutional program of tutoring by the participants, focusing on the experience of the tutor and the tutor in the evolution of the educational process in an academic university program.

The second article "Educational Benefits of Videogames: Review of Spanish Journals" makes a literature review of articles in Spanish (and published in Spain) in the period 2013-2017 within the educational field on video games and with particular attention to their benefits.

Aznar Díaz et al. establish in their article "Quality indicators to evaluate good teaching practices of mobile learning in Higher Education" a system of quality indicators to evaluate good practices of mobile learning in higher education.

The fourth article by Casillas González et al. is dedicated to performing the psychometric study of a questionnaire to measure the digital competence of university students.

Finally, Lozano-Díaz & Fernández-Prados close this issue with their article "Digital Citizenship and its Measurement: Psychometric Properties of one Scale and Challenges for Higher Education", in which, starting from a broad conceptualization of digital citizenship, authors select an instrument that allows to measure said citizenship behaviours, as well as to analyse the psychometric properties of said instrument in a sample of young spanish university students.

## 3. Referencias

Calvo, X., Fonseca, D., Sánchez-Sepúlveda, M., Amo, D., Llorca, J. & Redondo, E. (2018). Programming Virtual Interactions for Gamified Educational Proposes of Urban Spaces. In P. Zaphiris & A. Ioannou (Eds.), *Learning and Collaboration Technologies. Design, Development and Technological Innovation. 5th Micro flip teaching with collective intelligence International Conference, LCT 2018, Held as Part of HCI International 2018, Las Vegas, NV, USA, July 15-20, 2018, Proceedings, Part II* (pp. 128-140). Cham, Switzerland: Springer. doi: [https://doi.org/10.1007/978-3-319-91152-6\\_10](https://doi.org/10.1007/978-3-319-91152-6_10)

Casany, M. J., Alier, M., Conde, M. Á. & García-Peñalvo, F. J. (2009). SOA initiatives for eLearning. A

---

Moodle case. 23rd International Conference on Advanced Information Networking and Applications, AINA 2009, Workshops Proceedings. The International Symposium on Mining and Web (MAW 2009) (pp. 750-755). Los Alamitos, California, USA: IEEE Computer Society. doi: <https://doi.org/10.1109/waina.2009.196>

Conde-González, M. Á., García-Péñalvo, F. J., Alier, M., Mayol, E. & Fernández-Llamas, C. (2014). Implementation and design of a service-based framework to integrate personal and institutional learning environments. *Science of Computer Programming*, 88, 41-53. doi: <https://doi.org/10.1016/j.scico.2013.10.012>

Cruz-Benito, J., Faro, I., Martínez-Fernández, F., Therón, R. & García-Péñalvo, F. J. (2018). A Deep-Learning-based proposal to aid users in Quantum Computing programming. In P. Zaphiris & A. Ioannou (Eds.), *Learning and Collaboration Technologies. Design, Development and Technological Innovation. 5th International Conference, LCT 2018, Held as Part of HCI International 2018, Las Vegas, NV, USA, July 15-20, 2018, Proceedings, Part II* (pp. 421-430). Cham, Switzerland: Springer. doi: [https://doi.org/10.1007/978-3-319-91152-6\\_32](https://doi.org/10.1007/978-3-319-91152-6_32)

Fidalgo-Blanco, Á., Sein-Echaluce, M. L. & García-Péñalvo, F. J. (2018). Micro flip teaching with collective intelligence. In P. Zaphiris & A. Ioannou (Eds.), *Learning and Collaboration Technologies. Design, Development and Technological Innovation. 5th International Conference, LCT 2018, Held as Part of HCI International 2018, Las Vegas, NV, USA, July 15-20, 2018, Proceedings, Part I* (pp. 400-415). Cham, Switzerland: Springer. doi: [https://doi.org/10.1007/978-3-319-91743-6\\_30](https://doi.org/10.1007/978-3-319-91743-6_30)

García-Holgado, A. & García-Péñalvo, F. J. (2018a). Human interaction in learning ecosystems based on open source solutions. In P. Zaphiris & A. Ioannou (Eds.), *Learning and Collaboration Technologies. Design, Development and Technological Innovation. 5th International Conference, LCT 2018, Held as Part of HCI International 2018, Las Vegas, NV, USA, July 15-20, 2018, Proceedings, Part I* (pp. 218-232). Cham, Switzerland: Springer. doi: [https://doi.org/10.1007/978-3-319-91743-6\\_17](https://doi.org/10.1007/978-3-319-91743-6_17)

García-Holgado, A. & García-Péñalvo, F. J. (2018b). Validation of the learning ecosystem metamodel using transformation rules. *Future Generation Computer Systems*, In Press. doi: <https://doi.org/10.1016/j.future.2018.09.011>

García-Péñalvo, F. J., Hernández-García, Á., Conde-González, M. Á., Fidalgo-Blanco, Á., Sein-Echaluce Lacleta, M. L., Alier-Forment, M., . . . Iglesias-Pradas, S. (2015). Learning services-based technological ecosystems. In G. R. Alves & M. C. Felgueiras (Eds.), *Proceedings of the Third International Conference on Technological Ecosystems for Enhancing Multiculturality (TEEM'15) (Porto, Portugal, October 7-9, 2015)* (pp. 467-472). New York, USA: ACM. doi: <https://doi.org/10.1145/2808580.2808650>

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García-Peñalvo, F. J. (2016). Technological ecosystems. *IEEE Revista Iberoamericana de Tecnologías del Aprendizaje (IEEE RITA)*, 11(1), 31-32. doi: <https://doi.org/10.1109/RITA.2016.2518458>

García-Peñalvo, F. J. & Durán-Escudero, J. (2017). Interaction design principles in WYRED platform. In P. Zaphiris & A. Ioannou (Eds.), *Learning and Collaboration Technologies. Technology in Education. 4th International Conference, LCT 2017. Held as Part of HCI International 2017, Vancouver, BC, Canada, July 9–14, 2017. Proceedings, Part II* (pp. 371-381). Switzerland: Springer International Publishing. doi: [https://doi.org/10.1007/978-3-319-58515-4\\_29](https://doi.org/10.1007/978-3-319-58515-4_29)

García-Peñalvo, F. J., Hernández-García, Á., Conde, M. Á., Fidalgo-Blanco, Á., Sein-Echaluce, M. L., Alier-Forment, M., . . . Iglesias-Pradas, S. (2017). Enhancing Education for the Knowledge Society Era with Learning Ecosystems. In F. J. García-Peñalvo & A. García-Holgado (Eds.), *Open Source Solutions for Knowledge Management and Technological Ecosystems* (pp. 1-24). Hershey PA, USA: IGI Global. doi: <https://doi.org/10.4018/978-1-5225-0905-9.ch001>

García-Peñalvo, F. J. (2018). Ecosistemas tecnológicos universitarios. In J. Gómez (Ed.), *UNIVERSITIC 2017. Análisis de las TIC en las Universidades Españolas* (pp. 164-170). Madrid, España: Crue Universidades Españolas.

García-Peñalvo, F. J., García-Holgado, A., Vázquez-Ingelmo, A. & Seoane-Pardo, A. M. (2018). Usability test of WYRED Platform. In P. Zaphiris & A. Ioannou (Eds.), *Learning and Collaboration Technologies. Design, Development and Technological Innovation. 5th International Conference, LCT 2018, Held as Part of HCI International 2018, Las Vegas, NV, USA, July 15-20, 2018, Proceedings, Part I* (pp. 73-84). Cham, Switzerland: Springer. doi: [https://doi.org/10.1007/978-3-319-91743-6\\_5](https://doi.org/10.1007/978-3-319-91743-6_5)

Hernández Rizzardini, R. & Amado-Salvatierra, H. R. (2018). Exploring New Ways to Increase Engagement in Full-Path MOOC Programs. In P. Zaphiris & A. Ioannou (Eds.), *Learning and Collaboration Technologies. Design, Development and Technological Innovation. 5th International Conference, LCT 2018, Held as Part of HCI International 2018, Las Vegas, NV, USA, July 15-20, 2018, Proceedings, Part II* (pp. 16-25). Cham, Switzerland: Springer. doi: [https://doi.org/10.1007/978-3-319-91152-6\\_2](https://doi.org/10.1007/978-3-319-91152-6_2)

Hussain, N., Hussain, Z. & Ali, B. (2018). Assessing the Usability of Urdu Learning Mobile Apps for Children. In P. Zaphiris & A. Ioannou (Eds.), *Learning and Collaboration Technologies. Design, Development and Technological Innovation. 5th International Conference, LCT 2018, Held as Part of HCI International 2018, Las Vegas, NV, USA, July 15-20, 2018, Proceedings, Part I* (pp. 117-126). Cham, Switzerland: Springer. doi: [https://doi.org/10.1007/978-3-319-91743-6\\_8](https://doi.org/10.1007/978-3-319-91743-6_8)

Kondratova, I., Molyneaux, H. & Fournier, H. (2018). Supporting Trust and Engagement in Personalized Learning. In P. Zaphiris & A. Ioannou (Eds.), *Learning and Collaboration Technologies. Design,*

---

*Development and Technological Innovation. 5th International Conference, LCT 2018, Held as Part of HCI International 2018, Las Vegas, NV, USA, July 15-20, 2018, Proceedings, Part II* (pp. 44-59). Cham, Switzerland: Springer. doi: [https://doi.org/10.1007/978-3-319-91152-6\\_4](https://doi.org/10.1007/978-3-319-91152-6_4)

Rodríguez-Sedano, F. J., Conde, M. Á. & Fernández-Llamas, C. (2018). Measuring Teamwork Competence Development in a Multidisciplinary Project Based Learning Environment. In P. Zaphiris & A. Ioannou (Eds.), *Learning and Collaboration Technologies. Design, Development and Technological Innovation. 5th International Conference, LCT 2018, Held as Part of HCI International 2018, Las Vegas, NV, USA, July 15-20, 2018, Proceedings, Part I* (pp. 466-479). Cham, Switzerland: Springer. doi: [https://doi.org/10.1007/978-3-319-91743-6\\_34](https://doi.org/10.1007/978-3-319-91743-6_34)

Rojas-López, A. & Rincón-Flores, E. G. (2018). Gamification as Learning Scenario in Programming Course of Higher Education. In P. Zaphiris & A. Ioannou (Eds.), *Learning and Collaboration Technologies. Design, Development and Technological Innovation. 5th International Conference, LCT 2018, Held as Part of HCI International 2018, Las Vegas, NV, USA, July 15-20, 2018, Proceedings, Part II* (pp. 200-210). Cham, Switzerland: Springer. doi: [https://doi.org/10.1007/978-3-319-91152-6\\_16](https://doi.org/10.1007/978-3-319-91152-6_16)

Silva, J., Gonçalves, R., Martins, J., Branco, F. & Pereira, A. (2018). Accessibility in Software Engineering: Pursuing the Mainstream from a Classroom. In P. Zaphiris & A. Ioannou (Eds.), *Learning and Collaboration Technologies. Design, Development and Technological Innovation. 5th International Conference, LCT 2018, Held as Part of HCI International 2018, Las Vegas, NV, USA, July 15-20, 2018, Proceedings, Part II* (pp. 505-517). Cham, Switzerland: Springer. doi: [https://doi.org/10.1007/978-3-319-91152-6\\_39](https://doi.org/10.1007/978-3-319-91152-6_39)

Vázquez-Ingelmo, A., García-Peña, F. J. & Therón, R. (2018). Application of domain engineering to generate customized information dashboards. In P. Zaphiris & A. Ioannou (Eds.), *Learning and Collaboration Technologies. Design, Development and Technological Innovation. 5th International Conference, LCT 2018, Held as Part of HCI International 2018, Las Vegas, NV, USA, July 15-20, 2018, Proceedings, Part II* (pp. 518-529). Cham, Switzerland: Springer. doi: [https://doi.org/10.1007/978-3-319-91152-6\\_40](https://doi.org/10.1007/978-3-319-91152-6_40)