Proceso de transformación digital en instituciones de educación superior

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Resumen
Conferencia invitada en la actividad inaugural del CECED 2022 de la UNED de Costa Rica, celebrada el 15 de febrero de 2022.
En esta conferencia se establecen las bases para definir una estrategia de transformación digital de una universidad.

Palabras clave
Transformación digital; Universidad; Misiones de la universidad; Conocimiento abierto

Referencias
1. D. Agostino, M. Arnaboldi y M. D. Lema, "New development: COVID-19 as an accelerator of digital transformation in public service delivery," *Public Money & Management,* vol. 41, no. 1, pp. 69-72, 2021. doi: 10.1080/09540962.2020.1764206.
2. A. J. Argüelles, H. D. Cortés, O. E. Piñal Ramirez y O. A. Bustamante, "Technological Spotlights of Digital Transformation - Uses and Implications under COVID-19 Conditions," en *Information Technology Trends for a Global and Interdisciplinary Research Community*, F. J. García-Peñalvo, Ed. pp. 19-49, Hershey PA, USA: IGI Global, 2021. doi: 10.4018/978-1-7998-4156-2.ch002.
3. B. Bilgili y E. Koc, "Digital transformation in tourism," en *Emerging Transformations in Tourism and Hospitality*, A. Farmaki y N. Pappas, Eds. pp. 53-65, London, UK: Routledge, 2021.
4. N. Brown y I. Brown, "From Digital Business Strategy to Digital Transformation - How: A Systematic Literature Review," en *Proceedings of the South African Institute*

of Computer Scientists and Information Technologists 2019 (Skukuza, South Africa, 17 – 18 September 2019), New York, NY, USA: ACM, 2019. doi: 10.1145/3351108.3351122.

5. M. G. do Nascimento *et al.*, "Covid-19: A digital transformation approach to a public primary healthcare environment," en *Proceedings of the 2020 IEEE Symposium on Computers and Communications (ISCC) (Rennes, France, 7-10 July 2020)*, USA: IEEE, 2020. doi: 10.1109/ISCC50000.2020.9219643.

6. F. Filgueiras, C. Flávio y P. Palotti, "Digital Transformation and Public Service Delivery in Brazil," *Latin American Policy,* vol. 10, no. 2, pp. 195-219, 2019/11/01 2019. doi: 10.1111/lamp.12169.

7. D. Furtner, S. P. Shinde, M. Singh, C. H. Wong y S. Setia, "Digital Transformation in Medical Affairs Sparked by the Pandemic: Insights and Learnings from COVID-19 Era and Beyond," *Pharmaceutical Medicine,* vol. In Press, 2021. doi: 10.1007/s40290-021-00412-w.

8. M. Ghobakhloo y M. Iranmanesh, "Digital transformation success under Industry 4.0: A strategic guideline for manufacturing SMEs," *Journal of Manufacturing Technology Management,* vol. 32, no. 8, pp. 1533-1556, 2021. doi: 10.1108/JMTM-11-2020-0455.

9. S. Kraus, F. Schiavone, A. Pluzhnikova y A. C. Invernizzi, "Digital transformation in healthcare: Analyzing the current state-of-research," *Journal of Business Research,* vol. 123, pp. 557-567, 2021. doi: 10.1016/j.jbusres.2020.10.030.

10. A. Kutnjak, I. Pihiri y M. T. Furjan, "Digital Transformation Case Studies Across Industries – Literature Review," en *Proceedings of the 2019 42nd International Convention on Information and Communication Technology, Electronics and Microelectronics (MIPRO) (Opatija, Croatia, Croatia, 20-24 May 2019)* pp. 1293-1298, USA: IEEE, 2019. doi: 10.23919/MIPRO.2019.8756911.

11. U. Winkelhake, "Challenges in the Digital Transformation of the Automotive Industry," *ATZ worldwide,* vol. 121, no. 7, pp. 36-43, 2019/07/01 2019. doi: 10.1007/s38311-019-0074-7.

12. L. M. Castro Benavides, J. A. Tamayo Arias, M. D. Arango Serna, J. W. Branch Bedoya y D. Burgos, "Digital Transformation in Higher Education Institutions: A Systematic Literature Review," *Sensors,* vol. 20, no. 11, art. 3291, 2020. doi: 10.3390/s20113291.

13. F. J. García-Peñalvo, "Digital Transformation in the Universities: Implications of the COVID-19 Pandemic," *Education in the Knowledge Society,* vol. 22, art. e25465, 2021. doi: 10.14201/eks.25465.

14. F. Llorens-Largo. (2020). Transformación digital versus digitalización. En: *Universídad*. Disponible en: https://bit.ly/2tmYFMr

15. L. Floridi, "La clave es gobernar lo digital," *El País*, 2021. https://bit.ly/34efc44

16. A. Rodríguez de las Heras, "Con las smart cities estamos ante una revolución cultural," A. Pérez, Ed., ed: Cuatroochenta, 2020. https://bit.ly/2PYU8Yu

17. S. Grajek y B. Reinitz. (2019, July 8) Getting Ready for Digital Transformation: Change Your Culture, Workforce, and Technology. *Educase Review*. Disponible en: https://bit.ly/2TrIurJ

18. J. Vidal, "La misión de la Universidad," en *Investigación educativa en escenarios diversos, plurales y globales*, C. Cardona y E. Chiner, Eds. pp. 41-54, Madrid, España: EOS, 2014.

19. R. Rivero-Ortega, "Misión de la Universidad española en el siglo XXI," *Revista de Occidente,* no. 487, pp. 39-50, 2021.

20. F. J. García-Peñalvo, "The Third Mission," *Education in the Knowledge Society,* vol. 17, no. 1, pp. 7-18, 2016. doi: 10.14201/eks2016171718.
21. L. Compagnucci y F. Spigarelli, "The Third Mission of the university: A systematic literature review on potentials and constraints," *Technological Forecasting and Social Change,* vol. 161, 2020. doi: 10.1016/j.techfore.2020.120284.
22. R. de la Torre. (2022). Investigación vs transferencia, ¿Cómo distribuir el tiempo del profesorado? En: *Universídad*. Disponible en: https://bit.ly/3fLQwpn
23. A. García-Holgado y F. J. García-Peñalvo, "Análisis de integración de soluciones basadas en software como servicio para la implantación de ecosistemas tecnológicos corporativos," en *Avances en Informática y Automática. Séptimo Workshop*, J. Cruz Benito, A. García Holgado, S. García Sánchez, D. Hernández Alfageme, M. Navarro Cáceres y R. Vega Ruiz, Eds. pp. 55-72, Salamanca, Spain: Departamento de Informática y Automática de la Universidad de Salamanca, 2013.
24. F. J. García-Peñalvo *et al.*, "Enhancing Education for the Knowledge Society Era with Learning Ecosystems," en *Open Source Solutions for Knowledge Management and Technological Ecosystems*, F. J. García-Peñalvo y A. García-Holgado, Eds. Advances in Knowledge Acquisition, Transfer, and Management (AKATM), pp. 1-24, Hershey PA, USA: IGI Global, 2017. doi: 10.4018/978-1-5225-0905-9.ch001.
25. A. García-Holgado y F. J. García-Peñalvo, "Validation of the learning ecosystem metamodel using transformation rules," *Future Generation Computer Systems,* vol. 91, pp. 300-310, 2019. doi: 10.1016/j.future.2018.09.011.
26. F. J. García-Peñalvo, "Digital identity as researchers. The evidence and transparency of scientific production," *Education in the Knowledge Society,* vol. 19, no. 2, pp. 7-28, 2018. doi: 10.14201/eks2018192728.
27. J. Cabero-Almenara y C. Llorente-Cejudo, "Covid-19: radical transformation of digitization in university institutions," *Campus Virtuales,* vol. 9, no. 2, pp. 25-34, 2020.
28. F. J. García-Peñalvo y A. Corell, "La COVID-19: ¿enzima de la transformación digital de la docencia o reflejo de una crisis metodológica y competencial en la educación superior?," *Campus Virtuales,* vol. 9, no. 2, pp. 83-98, 2020.
29. F. J. García-Peñalvo. (2020). El sistema universitario ante la COVID-19: Corto, medio y largo plazo. En: *Universídad*. Disponible en: https://bit.ly/2YPUeXU
30. F. Llorens-Largo y A. Fernández. (2020). Coronavirus, la prueba del algodón de la universidad digital. En: *Universídad*. Disponible en: https://bit.ly/2Rm917X
31. J. Gómez Ed. "UNIVERSITIC 2020. Análisis de la madurez digital de las Universidades Españolas." Madrid: Crue Universidades Españolas, 2021. Disponible en: https://bit.ly/3sqSilN
32. K. Fahey, "How higher education can overcome barriers to digital transformation," *EDUCASE Review,* vol. Special Report, no. October, pp. 52-53, 2021.
33. F. Llorens-Largo. (2019). Siete claves para preparar a tu universidad para su transformación digital. En: *Universídad*. Disponible en: https://bit.ly/2klRdwM
34. F. J. García-Peñalvo, "Ecosistemas tecnológicos universitarios," en *UNIVERSITIC 2017. Análisis de las TIC en las Universidades Españolas*, J. Gómez, Ed. pp. 164-170, Madrid, España: Crue Universidades Españolas, 2018.
35. F. J. García-Peñalvo, C. García de Figuerola y J. A. Merlo-Vega, "Open knowledge: Challenges and facts," *Online Information Review,* vol. 34, no. 4, pp. 520-539, 2010. doi: 10.1108/14684521011072963.
36. Open Definition Project. (2015). *The Open Definition Version 2.1*. Disponible en: https://goo.gl/HD1wtq
37. P. Suber, *Open Access*. Cambridge, MA, USA: MIT Press, 2012.

38. M. S. Ramírez-Montoya, "Acceso abierto y su repercusión en la Sociedad del Conocimiento: Reflexiones de casos prácticos en Latinoamérica," *Education in the Knowledge Society,* vol. 16, no. 1, pp. 103-118, 2015. doi: 10.14201/eks2015161103118.

39. A. García-Holgado *et al.*, "Promoting Open Education Through Gamification in Higher Education: the OpenGame project," en *Proceedings TEEM'20. Eighth International Conference on Technological Ecosystems for Enhancing Multiculturality (Salamanca, Spain, October 21st - 23rd, 2020)*, F. J. García-Peñalvo, Ed. ICPS: ACM International Conference Proceedings Series, New York, NY, USA: ACM, 2020. doi: 10.1145/3434780.3436688.

40. F. Nascimbeni y D. Burgos, "Unveiling the Relationship between the Use of Open Educational Resources and the Adoption of Open Teaching Practices in Higher Education," *Sustainability,* vol. 11, no. 20, art. 5637, 2019. doi: 10.3390/su11205637.

41. F. J. García-Peñalvo, Á. Fidalgo-Blanco y M. L. Sein-Echaluce, "An adaptive hybrid MOOC model: Disrupting the MOOC concept in higher education," *Telematics and Informatics,* vol. 35, pp. 1018-1030, 2018. doi: 10.1016/j.tele.2017.09.012.

42. F. Miedema, *Open Science: the Very Idea*. Dordrecht, The Netherlands: Springer, 2022. doi: 10.1007/978-94-024-2115-6.

43. R. Vicente-Saez y C. Martínez-Fuentes, "Open Science now: A systematic literature review for an integrated definition," *Journal of Business Research,* vol. 88, pp. 428-436, 2018. doi: 10.1016/j.jbusres.2017.12.043.

44. T. Ferreras-Fernández, H. Martín-Rodero, F. J. García-Peñalvo y J. A. Merlo-Vega, "The Systematic Review of Literature in LIS: An approach," en *Proceedings of the Fourth International Conference on Technological Ecosystems for Enhancing Multiculturality (TEEM'16) (Salamanca, Spain, November 2-4, 2016)*, F. J. García-Peñalvo, Ed. pp. 291-298, New York, NY, USA: ACM, 2016. doi: 10.1145/3012430.3012531.

45. T. Ferreras-Fernández, J. A. Merlo-Vega y F. J. García-Peñalvo, "Science 2.0 supported by Open Access Repositories and Open Linked Data," en *Proceedings of the First International Conference on Technological Ecosystems for Enhancing Multiculturality (TEEM'13) (Salamanca, Spain, November 14-15, 2013)*, F. J. García-Peñalvo, Ed. ACM International Conference Proceeding Series (ICPS), pp. 331-332, New York, NY, USA: ACM, 2013. doi: 10.1145/2536536.2536586.

46. T. Ferreras-Fernández, F. J. García-Peñalvo, J. A. Merlo-Vega y H. Martín-Rodero, "Providing open access to PhD theses: Visibility and citation benefits," *Program: Electronic library and information systems,* vol. 50, no. 4, pp. 399-416, 2016. doi: 10.1108/PROG-04-2016-0039.

47. E. G. Tse, D. M. Klug y M. H. Todd, "Open science approaches to COVID-19," (in eng), *F1000Research,* vol. 9, art. 1043, 2020. doi: 10.12688/f1000research.26084.1.

48. A. Ríos-Hilario, D. Martín-Campo y T. Ferreras Fernández, "Linked data y linked open data: su implantación en una biblioteca digital. El caso de Europeana," *El Profesional de la Información,* vol. 21, no. 3, pp. 292-297, 2012. doi: 10.3145/epi.2012.may.10.

49. S. Auer, V. Bryl y S. Tramp Eds., "Linked Open Data – Creating Knowledge Out of Interlinked Data. Results of the LOD2 Project," Lecture Notes in Computer Science LNCS 8661. Heidelberg: Springer, 2014. doi: 10.1007/978-3-319-09846-3.

50. D. Bretthauer, "Open Source Software: A History," *Published Works,* vol. 7, 2001.

51. L. Benussi, "Analysing the technological history of the open source phenomenon. Stories from the free software evolution, FLOSS history. Working paper, Version 3.0," 2005. Disponible en: https://goo.gl/oELrnQ

52. L. D. Glasserman, F. J. Mortera y M. S. Ramírez-Montoya, "Caracterizando recursos educativos abiertos (REA) y objetos de aprendizaje (OA) que fomentan un aprendizaje activo en los alumnos de primaria," en *Conexión de repositorios educativos digitales: Educonector.info*, F. J. Mortera y M. S. Ramírez-Montoya, Eds. pp. 26-34, México: Lulú editorial digital, 2013.

53. E. M. Morales, F. J. García-Peñalvo, Á. Barrón, A. J. Berlanga y C. López, "Propuesta de Evaluación de Objetos de Aprendizaje," en *Actas del II Simposio Pluridisciplinar sobre Diseño, Evaluación y Descripción de Contenidos Educativos Reutilizables, SPDECE'05 (Barcelona, 19, 20 y 21 de Octubre de 2005)*, 2005.

54. R. DeRosa y S. Robison, "From OER to Open Pedagogy: Harnessing the Power of Open," en *Open: The Philosophy and Practices that are Revolutionizing Education and Science*, R. S. Jhangiani y R. Biswas-Diener, Eds. pp. 115–124, London, UK: Ubiquity Press, 2018. doi: 10.5334/bbc.i.

55. H. W. Chesbrough, *Open Innovation: The new imperative for creating and profiting from technology*. Boston: Harvard Business School Press, 2003.

56. M. S. Ramírez-Montoya y F. J. García-Peñalvo, "Co-creation and open innovation: Systematic literature review," *Comunicar,* vol. 26, no. 54, pp. 9-18, 2018. doi: 10.3916/C54-2018-01.

57. OECD, *Open Government. The Global Context and the Way Forward*, Paris: OECD Publishing, 2016. [Online]. Disponible en: https://goo.gl/dbscLr. doi: 10.1787/9789264268104-en.

58. L. Schmidthuber y D. Hilgers, "Trajectories of local open government: An empirical investigation of managerial and political perceptions," *International Public Management Journal,* vol. 24, no. 4, pp. 537-561, 2021. doi: 10.1080/10967494.2020.1853291.

59. A. García-Holgado *et al.*, *Handbook of successful open teaching practices*, Logroño, La Rioja: Universidad Internacional de La Rioja (UNIR), 2020. [Online]. Disponible en: https://bit.ly/3eU2cXu. doi: 10.5281/zenodo.4062529.

60. A. García-Holgado *et al.*, *Guía de buenas prácticas para la educación abierta*, Logroño, La Rioja: Universidad Internacional de La Rioja (UNIR), 2021. [Online]. Disponible en: https://bit.ly/3hydl1W. doi: 10.5281/zenodo.4765969.

61. F. Nascimbeni *et al.*, "The Opengame competencies framework: An attempt to map open education attitudes, knowledge and skills," en *Enhancing the Human Experience of Learning with Technology: New challenges for research into digital, open, distance & networked education European Distance and E-Learning Network (EDEN) Proceedings 2020 Research Workshop (Lisbon, Portugal, 21-23 October, 2020)* pp. 105-112, UK: EDEN, 2020. doi: 10.38069/edenconf-2020-rw0012.

62. B. Fecher y S. Friesike, "Open Science: One Term, Five Schools of Thought," en *Opening Science. The Evolving Guide on How the Web is Changing Research, Collaboration and Scholarly* S. Bartling y F. S., Eds. pp. 17-47, Cham: Springer, 2014. doi: 10.1007/978-3-319-00026-8_2.

63. UNESCO, "Proyecto de Recomendación de la UNESCO sobre la Ciencia Abierta," UNESCO, SC-PCB-SPP/2021/OS-IGM/WD3, 31 de marzo 2021. Disponible en: https://bit.ly/3viGPFb

64. European Commission. (2018). *Open Science Monitor*. Disponible en: https://goo.gl/479Cz9

65. The Lisbon Council, ESADE Business School, CWTS y ELSEVIER, "Open Science Monitor. Study on Open Science: Monitoring trends and drivers," European Commission, Brussels, D.2.4 Final Report, PP-05622-2017, 2019. Disponible en: https://bit.ly/3dHCUIW

66. S. Grajek. (2020, January 27) Top 10 IT Issues, 2020: The Drive to Digital Transformation Begins. *EDUCASE Review*. Disponible en: https://bit.ly/3ce5v9S

67. F. J. García-Peñalvo, "La transformación digital de las universidades. Hoja de ruta," presentado en Seminario La Administración Electrónica en la Universidad Pública, Salamanca, España, 2021. Disponible: https://bit.ly/3bQHTIC. doi: 10.5281/zenodo.4784074

68. P. Weill, S. L. Woerner y H. A. Rubin, "Managing the IT Portfolio (Update Circa 2008): It's All about What's New," *Researh Briefing,* vol. VIII, no. 2B, 2008. https://bit.ly/3GAVNuU

69. A. Fernández, F. Llorens-Largo, C. Juiz, F. Maciá y J. M. Aparicio, *Cómo priorizar los proyectos TI estratégicos para tu universidad*. San Vicente del Raspeig: Publicaciones de la Universidad de Alicante, 2018.

70. F. J. García-Peñalvo, "Modelo de referencia para la enseñanza no presencial en universidades presenciales," *Campus Virtuales,* vol. 9, no. 1, pp. 41-56, 2020.

71. F. J. García-Peñalvo, "Avoiding the Dark Side of Digital Transformation in Teaching. An Institutional Reference Framework for eLearning in Higher Education," *Sustainability,* vol. 13, no. 4, art. 2023, 2021. doi: 10.3390/su13042023.

72. E. Bueno Campos y F. Casani, "La tercera misión de la Universidad. Enfoques e indicadores básicos para su evaluación," *Economía Industrial,* vol. 366, pp. 43-59, 2007.

73. F. J. García-Peñalvo, M. Á. Conde, M. Johnson y M. Alier, "Knowledge co-creation process based on informal learning competences tagging and recognition," *International Journal of Human Capital and Information Technology Professionals (IJHCITP),* vol. 4, no. 4, pp. 18-30, 2013. doi: 10.4018/ijhcitp.2013100102.

74. H. Etzkowitz y L. Leydesdorff, *Universities and the Global Knowledge Economy. A triple of a Triple Helix of University-Industry-Government Relations*. London: Pinter, 1997.

75. F. Llorens-Largo y A. Vallecillo. (2022). El intra-emprendimiento en la transformación digital de la universidad. En: *Universídad*. Disponible en: https://bit.ly/3Ja4qOM

76. O. D. Apuke y B. Omar, "Fake news and COVID-19: modelling the predictors of fake news sharing among social media users," *Telematics and Informatics,* vol. 56, art. 101475, 2021. doi: 10.1016/j.tele.2020.101475.

77. F. J. García-Peñalvo, A. Corell, V. Abella-García y M. Grande-de-Prado, "La evaluación online en la educación superior en tiempos de la COVID-19," *Education in the Knowledge Society,* vol. 21, art. 12, 2020. doi: 10.14201/eks.23013.

78. F. J. García-Peñalvo, A. Corell, V. Abella-García y M. Grande-de-Prado, "Recommendations for Mandatory Online Assessment in Higher Education During the COVID-19 Pandemic," en *Radical Solutions for Education in a Crisis Context. COVID-19 as an Opportunity for Global Learning*, D. Burgos, A. Tlili y A. Tabacco, Eds. Lecture Notes in Educational Technology, pp. 85-98: Springer Nature, 2021. doi: 10.1007/978-981-15-7869-4_6.

79. United Nations, "The Sustainable Development Goals Report 2019," United Nations, New York, USA, 2019. Disponible en: https://bit.ly/34nbq60

80. F. J. García-Peñalvo, R. Rivero-Ortega, M. J. Rodríguez-Conde y N. Rodríguez-García, "The institutional decisions to support remote learning and teaching during

the COVID-19 pandemic," en *Proceedings of the 2020 X International Conference on Virtual Campus (JICV) (Tetouan, Marooc, 3-5 December 2020)*, USA: IEEE, 2020. doi: 10.1109/JICV51605.2020.9375683.

81. F. J. García-Peñalvo, A. Corell, R. Rivero-Ortega, M. J. Rodríguez-Conde y N. Rodríguez-García, "Impact of the COVID-19 on Higher Education: An Experience-Based Approach," en *Information Technology Trends for a Global and Interdisciplinary Research Community*, F. J. García-Peñalvo, Ed. Advances in Human and Social Aspects of Technology (AHSAT) Book Series, pp. 1-18, Hershey, PA, USA: IGI Global, 2021. doi: 10.4018/978-1-7998-4156-2.ch001.