

# Extract of the paper “Engineering capstone project as a service-learning activity: A case study in Geomatics degree”

Judit Fernández-Puerto <sup>1</sup>, Paula García-Osorio <sup>1</sup>, Manuel Rodríguez-Martín <sup>2</sup>, Pablo Rodríguez-González <sup>1</sup>

<sup>1</sup> Department of Mining Technology, Topography and Structures, Universidad de León, 24401 Ponferrada, Spain. Email: [ttojfp00@estudiantes.unileon.es](mailto:ttojfp00@estudiantes.unileon.es); [pgaro@unileon.es](mailto:pgaro@unileon.es); [p.rodriguez@unileon.es](mailto:p.rodriguez@unileon.es)

<sup>2</sup> Department of Mechanical Engineering, University of Salamanca, 49029 Zamora, Spain. Email: [ingmanuel@usal.es](mailto:ingmanuel@usal.es)

## Abstract

Capstone projects are the culminating experience of engineering students, where they are focused on real-world application, so they will be better prepared for their professional life. In the present communication it is raised an application approach of incorporation of a service-learning methodology into the capstone projects to improve the acquisition of skills, as well as motivation and engagement. The activity is contextualized in the so-called depopulated Spain, which includes towns and villages with a high risk of depopulation and a shortage of investment and resources. The experience was carried out in the capstone project of a Geomatics Engineering degree.

## Citation

J. Fernández-Puerto, P. García-Osorio, M. Rodríguez-Martín, and P. Rodríguez-González. 2021. Engineering capstone project as a service-learning activity: A case study in Geomatics degree. In *Ninth International Conference on Technological Ecosystems for Enhancing Multiculturality (TEEM'21)*. Association for Computing Machinery, New York, NY, USA, 373–377. DOI: <https://doi.org/10.1145/3486011.3486477>

## Keywords

Service Learning; Capstone project; Engineering Education; Geomatics

## Link to the publisher

<https://dl.acm.org/doi/10.1145/3486011.3486477>

## References

- [1] Francisco J. García-Peñalvo (2016). La tercera misión. Education in the Knowledge Society, 17(1), 7-18. DOI: <https://doi.org/10.14201/eks2016171718>
- [2] Francisco J. García-Peñalvo, and Faraón Llorens-Largo (2015). Design of an innovative approach based on Service Learning for Information Technology Governance Teaching. 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. 159-164). New York, USA: ACM. DOI: <http://dx.doi.org/10.1145/2808580.2808605>

- [3] Kamrowska-Zaluska, D. D., and Parteka, T. (2020). Design thinking (DT) for the design and planning education of engineer-architects. *World Transactions on Engineering and Technology Education*, 18, 97-101.
- [4] Lewis, R., Strachan, A., and M. M. Smith (2012). Is high fidelity simulation the most effective method for the development of non-technical skills in nursing? A review of the current evidence. *The Open Nursing Journal*, 6, 82. DOI: <https://doi.org/10.2174/1874434601206010082>
- [5] Sigmon, R.L., 1979. Service-learning: Three principles. *Synergist* 8, 9-11.
- [6] Howard, J. (ed.). (2001). *Service-learning course design. Workbook*. Michigan, Edward Ginsberg Center for Community Service, The University of Michigan
- [7] Preradović, N. M., & Stark, W. (2019). 7 Identified service learning practices in European higher education. *Embedding service learning in European higher education: Developing a culture of civic engagement*, 109.
- [8] Tee, P. L. K., & Kalidas, C. S. (2016). Positive impacts of service learning on students' personal outcome and social outcome. In *Assessment for learning within and beyond the classroom* (pp. 211-223). Springer, Singapore
- [9] Najmr, S., Chae, J., Greenberg, M. L., Bowman, C., Harkavy, I., & Maeyer, J. R. (2018). A service-learning chemistry course as a model to improve undergraduate scientific communication skills. *Journal of Chemical Education*, 95(4), 528-534.
- [10] Izquierdo Escrig, R., Royo González, M., Carlos Alberola, M. D. M., Cabedo, L., & Guraya, T. (2019). Towards Competencies of Sustainability in Engineering Degrees: Project based service-learning experiences.
- [11] Weiler, L., Haddock, S., Zimmerman, T. S., Krafchick, J., Henry, K., & Rudisill, S. (2013). Benefits derived by college students from mentoring at-risk youth in a service-learning course. *American Journal of Community Psychology*, 52(3-4), 236-248. <https://doi.org/10.1007/s10464-013-9589-z>
- [12] Nabors, L., Welker, K., & Faller, S. E. (2018). Impact of service learning: High school students as health coaches for children. *Journal of Community Engagement and Scholarship*, 10(2), 10.
- [13] Instituto Geográfico Nacional. Centro de Descargas del CNIG. Retrieved May 24, 2021 from <https://centrodedescargas.cnig.es/CentroDescargas/>
- [14] Diario de León. 2020. Santa Marina y Congosto se unen para que la CHMS arregle su carretera. Retrieved May 24, 2021 from

<https://www.diariodeleon.es/articulo/bierzo/santa-marina-congosto-unen-chms-arregle-carretera/202010220132092054531.html>

- [15] La nueva crónica. 2020. Vecinos de Santa Marina del Sil: "Tenemos que dar un rodeo de 30 kilómetros estando a diez". Retrieved May 24, 2021 from <https://www.lanuevacronica.com/vecinos-de-santa-marina-del-sil-tenemos-que-dar-un-rodeo-de-30-kilometros-estando-a-diez>
- [16] Ministerio de transportes, movilidad y agenda urbana. 2020. Norma 3.1-IC de la instrucción de carreteras. Retrieved July 24, 2021 from <https://apps.fomento.gob.es/CVP/handlers/pdfhandler.ashx?idpub=ICW050>