

Track 16: TEEM 2019 Doctoral Consortium

Francisco José García-Peñalvo
GRIAL Research Group
Computer Science Department
Research Institute for Educational Sciences
University of Salamanca
37008 Salamanca, Spain
fgarcia@usal.es

Alicia García-Holgado
GRIAL Research Group
Computer Science Department
University of Salamanca
37008 Salamanca, Spain
aliciagh@usal.es

María Soledad Ramírez-Montoya
Escuela de Humanidades y Educación
Tecnológico de Monterrey
Monterrey, Mexico
solramirez@itesm.mx

ABSTRACT

Once again, the doctoral consortium track plays a central role in TEEM Conference. This track exists since the first edition on the conference in 2013 and still looks for Ph.D. candidates present the advances of their theses and do networking with other peers and more experienced researchers. This track was born linked to the Ph.D. Programme on Education in the Knowledge Society of the University of Salamanca (Spain), but we are happy to receive exciting proposals from another Ph.D. Programmes around the world, enriching the debates and the networking.

KEYWORDS

Knowledge society; technology; education; Ph.D. programme; doctoral consortium.

1 Introduction

We present the seventh edition of the Doctoral Consortium track within the context of the TEEM Conference [1-6].

All the editions of TEEM Conference [7-12] have had a strong link with the Education in the Knowledge Society Ph.D. Programme at the University of Salamanca (Spain) (<https://knowledgesociety.usal.es>) [1, 13-17], independently of the place the conference was held.

Besides, the Education in the Knowledge Society Ph.D. Programme has been aligned with Open Access / Open Knowledge / Open Science movement [18-25], promoting that all the educational and research resources will be available in open access on the programme web portal or on the institutional repositories [26-28] (using both green and gold routes [29]).

Moreover, in this edition we have contributions from different Ph.D. Programmes around the world.

The TEEM 2019 Doctoral Consortium provides an opportunity for Ph.D. students to explore and develop their research interests in an interdisciplinary track, under the guidance of a panel of distinguished and international researchers.

The TEEM Doctoral Consortium has the following primary goals:

- Providing a support for feedback on students' current research and guidance on future research directions.
- Offering each student comments and fresh perspectives on their work from researchers and students outside their own institutions.
- Promoting the development of a supportive community of scholars and a spirit of collaborative research, this means make networks.
- Contributing to the TEEM goals through interaction with other researchers and conference events.

The topics that will be the axes of this doctoral consortium are:

- Education Assessment and Orientation.
- Human-Computer Interaction.
- eLearning.

- Computers in Education.
- Communication Media and Education.
- Medicine and Education.
- Robotics in Education.
- Engineering and Education.
- Information Society and Education.

This edition invites Ph.D. students that are in different levels of the development of their research. The aim is, besides presenting the research works, to have the opportunity of sharing the experiences of the process associated to the development of the thesis from different perspectives.

2 Papers in the track

Now, the accepted papers will be briefly presented.

2.1 Higher education for social entrepreneurship in the quadruple helix framework: co-construction in open innovation

García-González [30], from the Ph.D. Programme in Educational Innovation of Tecnológico de Monterrey (Mexico), presents his Ph.D. research plan regarding the development of competencies for social entrepreneurship from the linkage in higher education institutions.

2.2 Techno-andragogic Ecosystem Model for Active Learning: Digital Age Learners

Pérez-González [31], from the Education in the Knowledge Society Ph.D. Programme of the University of Salamanca (Spain), introduces her Ph.D. research plan, which is oriented to create a model of a techno-andragogic ecosystem for active learning with diverse architectures integrated into e-learning models that enhance the development of competences.

2.3 Evaluative model of practice-based teacher education (core practices) to enhance metacognition and lifelong learning

Matsumoto-Royo [32], from the Education in the Knowledge Society Ph.D. Programme of the University of Salamanca (Spain), presents the core of her Ph.D. research referring to the initial training of teachers based on practice, which promotes metacognitive processes and lifelong learning.

2.4 Theoretical and methodological proposal on the development of critical thinking through mathematical modeling in the training of engineers

Acebo Gutiérrez [33], from the Ph.D. Programme in Educational Innovation of Tecnológico de Monterrey (Mexico), presents a research advance, which takes up previous work where the teaching of Mathematics in higher education is modified through

experimentation in the classroom using the modeling of real phenomena and / or simulation.

2.5 Spread and reception of fake news promoting hate speech against migrants and refugees in social media

Blanco-Herrero [34], from the Education in the Knowledge Society Ph.D. Programme of University of Salamanca (Spain), presents his research plan in which he proposes to triangulate three methods to study how fake contents in social media contribute to the spread of hate speech against migrants and refugees.

2.6 Hate speech against Central American immigrants in Mexico: Analysis of xenophobia and racism in politicians, media and citizens

Frías-Vázquez [35], from the Education in the Knowledge Society Ph.D. Programme of the University of Salamanca (Spain), proposes analyzing messages published in the social network of Twitter, to identify the origin of hate speech against Central American migrants in Mexico according to the three spheres of the agenda building (Media, Politics and Public) to determine where it starts and which of the three has more influence on the propagation of this discourse.

2.7 Narrative tools to quit smoking. Indirect effects of audience-character similarity and narrative voice in the intention to quit smoking

Rodríguez-Contreras [36], from the Education in the Knowledge Society Ph.D. Programme of the University of Salamanca (Spain), will try to contrast how certain characteristics of the narrative messages of smoking prevention induce states of involvement that facilitate persuasion. The main objective of her thesis is to analyze the factors that can increase the effectiveness of narrative interventions for smoking prevention aimed at adults.

2.8 Education to mobilize society for Climate Change action

Ferrari-Lagos [37], from the Education in the Knowledge Society Ph.D. Programme of the University of Salamanca (Spain), establishes these objectives for his Ph.D. thesis: 1) creating an objective diagnosis of the current state of formal education on Climate Change; 2) proposing new strategies to develop the important tasks that Education must complete on this issue and finally; 3) building new concepts and frameworks to push the role of Education as a real solution.

2.9 Connotative framing of refugees and migrants in Western Europe and their effects on the attitudes of Europeans towards these groups

Amores [38], from the Education in the Knowledge Society Ph.D. Programme of the University of Salamanca (Spain), has the intention in his doctoral research to know exactly how refugees and migrants are being represented through frames both in the main news media of Western Europe, and in social media such as Twitter.

2.10 Learning strategies and digital interventions: An analysis in the context of education for sustainable development

Santillán-Rosas [39], from the Ph.D. Programme in Educational Innovation of Tecnológico de Monterrey (Mexico), will make an exploratory study with mixed design, using both quantitative and qualitative approaches to hear the voice of the users and receive feedback on how can digital learning strategies and interventions help shape and raise awareness about sustainable development?, and how can online tools, such as Massive Open Online Courses (MOOCs) [40] become better, more efficient and even more successful in reaching out to the general audience?

2.11 Analysis of the relationship between computational thinking and mathematical abstraction in primary education

Chaabi [41] broadens her view on the relationship between computational thinking [42] and the development of the abstraction skill applied to mathematic. Chaabi is currently completing a co-tutored Ph.D. between the University of Cadiz (Spain) and The Abdelmalek Essaadi University (Morocco).

2.12 Digital adult literacy in virtual learning environments

Canchola González's [43] thesis goals focus on analyzing the digital skills, that affect the completion of xMOOC courses [44]. In addition to setting a reference framework or digital literacy assessment scale to know the skills of the participant in those courses. Canchola González belongs to the Ph.D. Programme in Educational Innovation of Tecnológico de Monterrey (Mexico).

2.13 Blending machines, learning, and ethics

Mouta [45], from the Education in the Knowledge Society Ph.D. Programme of University of Salamanca (Spain), will explore throughout the research if and how ethical impact assessment of Artificial Intelligence in Education [46] 1) influences primary teachers' capacity to design learning sequences that intentionally and systematically address the challenges AI poses to learning signification processes; and (2) benefiting students' critical thinking upon Artificial Intelligence.

2.14 Analysis of instruments focused on gender gap in STEM education

Verdugo-Castro [47], from the Education in the Knowledge Society Ph.D. Programme of University of Salamanca (Spain), makes a review of instruments focused on gender gap in STEM education with the scope of her Ph.D. thesis.

2.15 Automatic generation of software interfaces for supporting decision-making processes. An application of domain engineering and machine learning

Vázquez-Ingelmo's [48] Ph.D. thesis main goal is to automatize the design process of dashboards [49] by learning from the context, including the end-users and the target data to be displayed, Vázquez-Ingelmo belongs to the Software Engineering Ph.D. Programme of University of Salamanca (Spain).

2.16 An Empirical Study of Students and Teaching Staff's Digital Competence in Western China

Zhao [50], from the Education in the Knowledge Society Ph.D. Programme of University of Salamanca (Spain), investigates the actual status about digital competence of university students and teachers in China, especially Western China, to create their own digital competence profile.

2.17 Teaching and learning strategies of programming for university courses

Figueiredo [51], from Software Engineering Ph.D. Programme of University of Salamanca (Spain), wants improving student achievement in courses where programming is essential [52], looking for each student will be able to improve and deepen their programming skills, performing a set of exercises appropriate and worked for each student and situation. To do that, he intends to build a dynamic learning model of constant evaluation and build the student's profile.

2.18 Use of ICT to promote and analyze argumentative and metacognitive processes in higher education

MacCann-Alfaro [53], from the Education in the Knowledge Society Ph.D. Programme of University of Salamanca (Spain), explains and analyzes the processes of argumentation and metacognitive thinking that activate university students when they undergo a process of systematic discussion to solve a problem and evaluate the effectiveness of the software Digalo2 for the development of argumentative and metacognitive competences.

2.19 The virtual modality in Higher Education of the Dominican Republic: Current situation, needs and challenges

Bastardo-Cedeño [54], from the Education in the Knowledge Society Ph.D. Programme of University of Salamanca (Spain), is starting his Ph.D. research with the goal of verifying the current state of virtual modality [55, 56] in higher education in the Dominican Republic.

2.20 The educational potential of the podcast: an emerging communications medium educating outside the classroom

Celaya [57], from Psychology and Education Ph.D. Programme of the University of Navarra (Spain), addresses the educational potential of the podcast, an emerging digital communications medium. Consequently, the research focus is based on educommunication, an interdisciplinary field combining communications and education. The main aim of the work is an in-depth study of the educational potential of podcasting.

2.21 The role of basic mathematics concepts in programming teaching and learning

Martínez-Valdés [58], from Software Engineering Ph.D. Programme of University of Salamanca (Spain), implements an algorithm that uses the integer division theorem in response to a problem detected among mathematics teachers interested in teaching programming.

2.22 Longitudinal design and evaluation of a child education intervention program based on stories and tales mediated by technology, for the development of oral expression

Cabrero-Hernández [59], from the Education in the Knowledge Society Ph.D. Programme of University of Salamanca (Spain), will carry out a longitudinal evaluation of an experimental program based on the curricular integration of children's stories and tales mediated by technology in Early Childhood Education.

REFERENCES

- [1] F. J. García-Peñalvo. 2013. Education in knowledge society: A new PhD programme approach. In 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, New York, NY, USA, 575-577. DOI:10.1145/2536536.2536624.
- [2] F. J. García-Peñalvo. 2014. Technological Ecosystems for Enhancing Multiculturality Doctoral Consortium. In Proceedings of the Second International Conference on Technological Ecosystems for Enhancing Multiculturality (TEEM'14) (Salamanca, Spain, October 1-3, 2014), F.J. García-Peñalvo Ed. ACM, New York, USA, 627-631. DOI:http://dx.doi.org/10.1145/2669711.2669965.
- [3] F. J. García-Peñalvo. 2015. Doctoral Consortium. In Proceedings of the Third International Conference on Technological Ecosystems for Enhancing Multiculturality (TEEM'15) (Porto, Portugal, October 7-9, 2015), G.R. Alves and M.C. Felgueiras Eds. ACM, New York, USA, 619-621. DOI:http://dx.doi.org/10.1145/2808580.2808675.
- [4] A. García-Holgado, F. J. García-Peñalvo, and M. S. Ramírez-Montoya. 2016. Education in the Knowledge Society Doctoral Consortium. In 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. ACM, New York, NY, USA, 1083-1087. DOI:10.1145/3012430.3012650.
- [5] F. J. García-Peñalvo, M. S. Ramírez-Montoya, and A. García-Holgado. 2017. TEEM 2017 Doctoral Consortium Track. In Fifth International Conference on Technological Ecosystems for Enhancing Multiculturality (TEEM'17) (Cádiz, Spain, October 18-20, 2017) J.M. Dodero, M.S. Ibarra Sáiz and I. Ruiz Rube Eds. ACM, New York, NY, USA, Article 93. DOI:10.1145/3144826.3145440.
- [6] F. J. García-Peñalvo, A. García-Holgado, and M. S. Ramírez-Montoya. 2018. The PhD Corner: TEEM 2018 Doctoral Consortium. In TEEM'18 Proceedings of the Sixth International Conference on Technological Ecosystems for Enhancing Multiculturality (Salamanca, Spain, October 24th-26th, 2018), F.J. García-Peñalvo Ed. ACM, New York, NY, USA, 979-983. DOI:10.1145/3284179.3284343.
- [7] Francisco José García-Peñalvo. 2013. Proceedings of the First International Conference on Technological Ecosystems for Enhancing Multiculturality, TEEM 2013. ACM, New York, USA.
- [8] Francisco José García-Peñalvo. 2014. Proceedings of the Second International Conference on Technological Ecosystems for Enhancing Multiculturality, TEEM 2014. ACM, New York, USA.
- [9] Gustavo Ribeiro Alves. 2015. Proceedings of the 3rd International Conference on Technological Ecosystems for Enhancing Multiculturality, TEEM 2015. ACM, New York, USA.
- [10] F. J. García-Peñalvo (Ed.). 2016. Proceedings of the Fourth International Conference on Technological Ecosystems for Enhancing Multiculturality (TEEM'16) (Salamanca, Spain, November 2-4, 2016). ACM, New York, USA.
- [11] J. M. Dodero, M. S. Ibarra Sáiz, and I. Ruiz Rube (Ed.). 2017. Proceedings of the Fifth International Conference on Technological Ecosystems for Enhancing Multiculturality (TEEM'17) (Cádiz, Spain, October 18-20, 2017). ACM, New York, NY, USA.
- [12] F. J. García-Peñalvo (Ed.). 2018. TEEM'18 Proceedings of the Sixth International Conference on Technological Ecosystems for Enhancing Multiculturality (Salamanca, Spain, October 24th-26th, 2018). ACM, New York, USA.
- [13] Francisco José García Peñalvo. 2013. Aportaciones de la Ingeniería en una Perspectiva Multicultural de la Sociedad del Conocimiento. IEEE VAEP-RITA 1, 4, 201-202.
- [14] Alicia García-Holgado, Francisco José García-Peñalvo, and M^a José Rodríguez Conde. 2015. Definition of a Technological Ecosystem for Scientific Knowledge Management in a PhD Programme. In Proceedings of the Third International Conference on Technological Ecosystems for Enhancing Multiculturality (TEEM'15) (Porto, Portugal, October 7-9, 2015) ACM, New York, NY, USA, 695-700. DOI:http://dx.doi.org/10.1145/2808580.2808686.
- [15] Francisco José García-Peñalvo. 2015. Engineering contributions to a Knowledge Society multicultural perspective. IEEE Revista Iberoamericana de Tecnologías del Aprendizaje (IEEE RITA) 10, 1, 17-18. DOI:10.1109/RITA.2015.2391371.
- [16] Francisco José García-Peñalvo. 2014. Formación en la sociedad del conocimiento, un programa de doctorado con una perspectiva interdisciplinar. Revista Teoría de la Educación: Educación y Cultura en la Sociedad de la Información 15, 1, 4-9.
- [17] F. J. García-Peñalvo. 2017. Education in the Knowledge Society PhD Programme. 2017 Kick-off Meeting. In Proceedings of the Seminarios del Programa de Doctorado en Formación en la Sociedad del Conocimiento (16 de noviembre de 2017) (Salamanca, España2017). Instituto Universitario de Ciencias de la Educación.
- [18] F. J. García-Peñalvo, C. García De Figuerola, and J. A. Merlo-Vega. 2010. Open knowledge management in higher education. Online Information Review 34, 4, 517-519.
- [19] F. J. García-Peñalvo, C. García De Figuerola, and J. A. Merlo-Vega. 2010. Open knowledge: Challenges and facts. Online Information Review 34, 4, 520-539. DOI:10.1108/14684521011072963.
- [20] M. S. Ramírez-Montoya and F. J. García-Peñalvo. 2015. Movimiento Educativo Abierto. Virtualis 6, 12, 1-13.
- [21] F. J. García-Peñalvo. 2017. Open Access Myths and Realities. Education in the Knowledge Society 18, 1, 7-20. DOI:10.14201/eks2017181720.
- [22] F. J. García-Peñalvo. 2017. Publishing in open access. Journal of Information Technology Research 10, 3, vi-viii.
- [23] M. S. Ramírez-Montoya and F. J. García-Peñalvo. 2018. Co-creation and open innovation: Systematic literature review. Comunicar 26, 54, 9-18. DOI:10.3916/C54-2018-01.
- [24] M. S. Ramírez-Montoya, F. J. García-Peñalvo, and R. Mcgreal. 2018. Shared Science and Knowledge. Open Access, Technology and Education. Comunicar 26, 54, 1-5.
- [25] J. A. Merlo-Vega (Ed.). 2018. Ecosistemas del acceso abierto. Ediciones Universidad de Salamanca, Salamanca, España.
- [26] T. Ferreras-Fernández, F. J. García-Peñalvo, and J. A. Merlo-Vega. 2015. Open access repositories as channel of publication scientific grey literature. In Proceedings of the Third International Conference on Technological Ecosystems for Enhancing Multiculturality (TEEM'15) (Porto, Portugal, October 7-9, 2015), G.R. Alves and M.C. Felgueiras Eds. ACM, New York, USA, 419-426. DOI:10.1145/2808580.2808643.

- [27] F. J. García-Peñalvo. 2017. The Future of Institutional Repositories. *Education in the Knowledge Society* 18, 4, 7-19. DOI:10.14201/eks2017184719.
- [28] L. I. González-Pérez, M. S. Ramírez-Montoya, and F. J. García-Peñalvo. 2018. User experience in institutional repositories: A systematic literature review. *International Journal of Human Capital and Information Technology Professionals (IJHCITP)* 9, 1, 70-86. DOI:10.4018/IJHCITP.2018010105.
- [29] H.; Piwowar, J. Priem, V.; Larivière, J. Alperin, L. Matthias, B. Norlander, A. Farley, J. West, and S. Haustein. 2018. The State of OA: A large-scale analysis of the prevalence and impact of Open Access articles. *PeerJ* 6.
- [30] A. García-González and M. S. Ramírez-Montoya. 2019. Higher education for social entrepreneurship in the quadruple helix framework: co-construction in open innovation. In *Seventh International Conference on Technological Ecosystems for Enhancing Multiculturality - TEEM 2019 ACM*, León, Spain.
- [31] M. E. Pérez-González and M. S. Ramírez-Montoya. 2019. Techno-andragogic Ecosystem Model for Active Learning: Digital Age Learners. In *Seventh International Conference on Technological Ecosystems for Enhancing Multiculturality - TEEM 2019 ACM*, León, Spain.
- [32] K. Matsumoto-Royo and M. S. Ramírez-Montoya. 2019. Evaluative model of practice-based teacher education (core practices) to enhance metacognition and lifelong learning. In *Seventh International Conference on Technological Ecosystems for Enhancing Multiculturality - TEEM 2019 ACM*, León, Spain.
- [33] J. Acebo Gutiérrez and R. Rodríguez Gallegos. 2019. Theoretical and methodological proposal on the development of critical thinking through mathematical modeling in the training of engineers. In *Seventh International Conference on Technological Ecosystems for Enhancing Multiculturality - TEEM 2019 ACM*, León, Spain.
- [34] D. Blanco-Herrero and C. Arcila Calderón. 2019. Spread and reception of fake news promoting hate speech against migrants and refugees in social media. In *Seventh International Conference on Technological Ecosystems for Enhancing Multiculturality - TEEM 2019 ACM*, León, Spain.
- [35] M. Frias-Vázquez and C. Arcila Calderón. 2019. Hate speech against Central American immigrants in Mexico: Analysis of xenophobia and racism in politicians, media and citizens. In *Seventh International Conference on Technological Ecosystems for Enhancing Multiculturality - TEEM 2019 ACM*, León, Spain.
- [36] L. Rodríguez-Contreras and J. J. Igartua. 2019. Narrative tools to quit smoking. Indirect effects of audience-character similarity and narrative voice in the intention to quit smoking. In *Seventh International Conference on Technological Ecosystems for Enhancing Multiculturality - TEEM 2019 ACM*, León, Spain.
- [37] E. Ferrari-Lagos, F. Martínez-Abad, and C. Ruiz. 2019. Education to mobilize society for Climate Change action. The Climate competence in education. In *Seventh International Conference on Technological Ecosystems for Enhancing Multiculturality - TEEM 2019 ACM*, León, Spain.
- [38] J. J. Anores and C. Arcila Calderón. 2019. Connotative framing of refugees and migrants in Western Europe and their effects on the attitudes of Europeans towards these groups. In *Seventh International Conference on Technological Ecosystems for Enhancing Multiculturality - TEEM 2019 ACM*, León, Spain.
- [39] I. M. Santillán-Rosas and Y. Heredia-Escorza. 2019. Learning strategies and digital interventions: An analysis in the context of education for sustainable development. In *Seventh International Conference on Technological Ecosystems for Enhancing Multiculturality - TEEM 2019 ACM*, León, Spain.
- [40] F. J. García-Peñalvo, Á. Fidalgo-Blanco, and M. L. Sein-Echaluce. 2018. An adaptive hybrid MOOC model: Disrupting the MOOC concept in higher education. *Telematics and Informatics* 35, 1018-1030. DOI:10.1016/j.tele.2017.09.012.
- [41] H. Chaabi, A. Azmani, and J. M. Dodero. 2019. Analysis of the relationship between computational thinking and mathematical abstraction in primary education. In *Seventh International Conference on Technological Ecosystems for Enhancing Multiculturality - TEEM 2019 ACM*, León, Spain.
- [42] C. S. González-González. 2019. State of the art in the teaching of computational thinking and programming in childhood education. *Education in the Knowledge Society* 20. DOI:10.14201/eks2019_20_a17.
- [43] J. A. Canchola González and L. D. Glasserman Morales. 2019. Digital adult literacy in virtual learning environments. The case of xMOOCs in energy sustainability. In *Seventh International Conference on Technological Ecosystems for Enhancing Multiculturality - TEEM 2019 ACM*, León, Spain.
- [44] Á. Fidalgo-Blanco, M. L. Sein-Echaluce, and F. J. García-Peñalvo. 2016. From massive access to cooperation: Lessons learned and proven results of a hybrid xMOOC/cMOOC pedagogical approach to MOOCs. *International Journal of Educational Technology in Higher Education (ETHE)* 13, 24. DOI:10.1186/s41239-016-0024-z.
- [45] A. Mouta, E. M. Torrecilla-Sánchez, and A. Pinto-Llorente. 2019. Blending machines, learning, and ethics. In *Seventh International Conference on Technological Ecosystems for Enhancing Multiculturality - TEEM 2019 ACM*, León, Spain.
- [46] David Mearthur, Matthew Lewis, and Miriam Bishary. 2005. The Roles of Artificial Intelligence in Education: Current Progress and Future Prospects. *Journal of Educational Technology* 1, 4, 42-80.
- [47] S. Verdugo-Castro, A. García-Holgado, and M. C. Sánchez-Gómez. 2019. Analysis of instruments focused on gender gap in STEM education. In *Seventh International Conference on Technological Ecosystems for Enhancing Multiculturality - TEEM 2019 ACM*, León, Spain.
- [48] A. Vázquez-Ingelmo, F. J. García-Peñalvo, and R. Therón. 2019. Automatic generation of software interfaces for supporting decision-making processes. An application of domain engineering and machine learning. In *Seventh International Conference on Technological Ecosystems for Enhancing Multiculturality - TEEM 2019 ACM*, León, Spain.
- [49] A. Vázquez-Ingelmo, F. J. García-Peñalvo, and R. Therón. 2019. Information Dashboards and Tailoring Capabilities - A Systematic Literature Review. *IEEE Access* 7, 109673-109688. DOI:10.1109/ACCESS.2019.2933472.
- [50] Y. Zhao, A. M. Pinto-Llorente, and M. C. Sánchez-Gómez. 2019. An Empirical Study of Students and Teaching Staff's Digital Competence in Western China. Based on a case study of Gansu Agricultural University. In *Seventh International Conference on Technological Ecosystems for Enhancing Multiculturality - TEEM 2019 ACM*, León, Spain.
- [51] J. Figueiredo and F. J. García-Peñalvo. 2019. Teaching and learning strategies of programming for university courses. In *Seventh International Conference on Technological Ecosystems for Enhancing Multiculturality - TEEM 2019 ACM*, León, Spain.
- [52] J. A. Q. Figueiredo. 2017. How to improve computational thinking: A case study. *Education in the Knowledge Society* 18, 4, 35-51. DOI:10.14201/eks20171843551.
- [53] N. Maccann-Alfaro, A. García-Valcárcel Muñoz-Repiso, and E. M. Morales-Morgado. 2019. Use of ICT to promote and analyze argumentative and metacognitive processes in higher education. In *Seventh International Conference on Technological Ecosystems for Enhancing Multiculturality - TEEM 2019 ACM*, León, Spain.
- [54] M. Bastardo-Cedeño, M. J. Rodríguez-Conde, and A. M. Seoane-Pardo. 2019. The virtual modality in Higher Education of the Dominican Republic: Current situation, needs and challenges. In *Seventh International Conference on Technological Ecosystems for Enhancing Multiculturality - TEEM 2019 ACM*, León, Spain.
- [55] F. J. García-Peñalvo and A. M. Seoane-Pardo. 2015. An updated review of the concept of eLearning. Tenth anniversary. *Education in the Knowledge Society* 16, 1, 119-144. DOI:http://dx.doi.org/10.14201/eks2015161119144.
- [56] D. D. Martínez. 2017. Profesorado en formación y ambientes educativos virtuales. *Campus Virtuales. Revista Científica Iberoamericana de Tecnología Educativa* 6, 2, 69-78.
- [57] I. Celaya, M. S. Ramírez-Montoya, C. Naval, and E. Arbués. 2019. The educational potential of the podcast: an emerging communications medium educating outside the classroom. In *Seventh International Conference on Technological Ecosystems for Enhancing Multiculturality - TEEM 2019 ACM*, León, Spain.
- [58] J. A. Martínez-Valdés, F. J. García-Peñalvo, and J. Á. Velázquez-Iturbide. 2019. The role of basic mathematics concepts in programming teaching and learning. In *Seventh International Conference on Technological Ecosystems for Enhancing Multiculturality - TEEM 2019 ACM*, León, Spain.
- [59] R. Cabrero-Hernández, A. García-Rodríguez, and M. J. Rodríguez-Conde. 2019. Longitudinal design and evaluation of a child education intervention program based on stories and tales mediated by technology, for the development of oral expression. In *Seventh International Conference on Technological Ecosystems for Enhancing Multiculturality - TEEM 2019 ACM*, León, Spain.