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Massive Open Online Courses: Combining Methodologies and Architecture for a Success Learning

J.UCS Special Issue

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Internet worldwide adoption has influenced several trends in human behavior, and social phenomena represented through the ever-increasing popularity of social networks have created new conversational arenas. New media-sharing technologies have allowed users to consume information from countless sources, including media that have been remixed and co-created by a crowd. Teachers' roles are evolving toward amplifying, curating, aggregating, filtering, modeling, knowledge sense-making, and so on in a course. Massive Open Online Courses (MOOCs) have emerged as an educational disruptive innovation. Early experiences from Wiley, Couros, Siemens, and Downes in North America were created to take advantage of the vast number of interested learners, eager to take such MOOCs. Moreover, Hernández Rizzardini and Delgado in Latin America had already achieved the same results some years earlier (from 2005 to 2007). Along with the opportunities that arose, a variety of problems appeared, including high dropout rates, student anonymity, insufficient support, and several other issues such as student assessment and communication overflow. Furthermore, MOOCs brought about a set of new challenges in meeting all these demands with enhanced and scalable technology, using innovative tools to improve the learning experience.

We have received excellent contributions which were included in this special issue. Different contexts are covered, such as analytics, adaptability, orchestration, tool innovation, course development, and mobile assistants. The use of Semantic Web technologies has become relevant, first by orchestrating innovative learning activities using cloud-based tools (Web 2.0 tools) through a Linked Data automatic advanced interoperability approach. Moreover, Linked Data is also used to find Open

Educational Resources to provide improved MOOCs development. Models for emotion detection analytics, adaptability, and knowledge management, along with their corresponding frameworks, provide enhanced insights into the educational experience. Finally, a personalized mobile application aimed to improve retention rates is presented. Several new technological frameworks are introduced, with a wide range of scenarios, case studies with learners from over 20 countries, various pedagogical perspectives, and a diverse array of evaluation approaches.

The first paper, by Derick Leony et al., titled "Detection and Evaluation of Emotions in Massive Open Online Courses" presents an innovative approach for determining learners' emotions by analyzing their behavior in a MOOC using the aforementioned platform. Four models are proposed based on pedagogical theories that support the models. The initial results are promising and could enable enhanced adaptability of the learning experience.

In the paper "Cloud Interoperability Service Architecture for Education Environments", Rocael Hernández Rizzardini introduces a robust architecture to enable the use of cloud-based tools (e.g., Web 2.0 tools) for MOOCs. Furthermore, this architecture can automatically identify such tools as Web APIs and process such APIs to present administrative UI controls to enable teachers to orchestrate the learning experience. The architecture uses advanced yet practical Semantic Web technologies and finally presents an actual MOOC that uses such architecture.

The article "Seeking Open Educational Resources to Compose Massive Open Online Courses in Engineering Education – An Approach Based on Linked Open Data" by Nelson Piedra et al. presents a comprehensive architecture for finding open educational resources using Semantic Web and Linked Data. The authors elaborated on a use case of building MOOC content through the presented architecture and provided a comparison with one published MOOC. This research fosters the possibility of enriching the content-production process for MOOCs.

The paper by Ángel Fidalgo-Blanco et al. titled "Methodological Approach and Technological Framework to Break the Current Limitations of MOOC Model" provides a methodology that integrates both cMOOCs and xMOOCs with adaptability and knowledge management along with the corresponding technology to support it. Results demonstrate improvements both quantitatively and qualitatively, developing a path to be followed by MOOCs, especially in terms of reducing current dropout rates.

Finally, the paper "My Learning Mentor: A Mobile App to Support Learners Participating in MOOCs" by Carlos Alario-Hoyos et al. offers another technological approach to help improve retention in MOOCs via a mobile application that focuses on support and personalized advice for learners enrolled in a MOOC. Practical examples are presented, with the related architecture to implement such service. The prototype needs further evaluation, but the early results show great potential.

We would like to recognize all our colleagues who served as reviewers for this special issue as well as the authors for their professionalism. The J.UCS Managing Editor Christian Gütl deserves special recognition for his continual support as does Assistant Editor Dana Kaiser for all her assistance offered throughout the process.

Finally, we hope this special issue contributes to the research community and sparks new ideas for future MOOC research.