

# Learning Analytics Summer Institute Spain 2020: Learning Analytics. Time for Adoption?

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## 1 Preface to the Conference Proceedings

The eight edition of the Learning Analytics Summer Institute Spain, LASI Spain 2020<sup>1</sup> was held on June 15th and 16th, 2020. Under the main theme of “Learning Analytics: Time for adoption?”, the conference was organized by the University of Valladolid, in collaboration with the SNOLA (Spanish Network of Learning Analytics) research network. This conference is part of the global LASI network<sup>2</sup>, conceived as a platform to catalyze educators, technologists, researchers, enterprise and policymakers around shaping the next generation of learning infrastructures to truly serve the needs that the education sector is facing. The event was backed by the official support from the Society of Learning Analytics Research (SoLAR).

This LASI Spain 2020 edition was planned to happen in Valladolid, but due to the situation of uncertainty derived from the CoVid-19 outbreak, it was held online. We tried to take advantage of this (a priori negative) situation by promoting the participation of members of the Latin American Learning Analytics community. This was materialized in the organization of a panel with experts from Latin America that closed the conference.

The benefits of the transition to an on-line event were reflected in the high number of registered participants. LASI Spain 2020 had up to 120 people registered, with more than 80 people participating in the keynotes and an average of 60 participants in the

<sup>1</sup> <https://lasi20.snola.es/>

<sup>2</sup> <https://www.solaresearch.org/events/lasi>

sessions. The participants of the conference came mainly from Spain and Latin American countries like Uruguay, Brazil, Mexico, Chile, Costa Rica, and Ecuador, but there were also researchers connecting from UK, Finland, Sweden, Switzerland and Greece.

The main theme this year was adoption of Learning Analytics (LA). Learning Analytics has been called to improve learning practice by transforming the ways we develop and carry out learning and teaching activities and processes. The Horizon Report 2019 considers Learning Analytics a technology ready for short-term adoption, a signal of the maturity this area has reached in a relatively short period of time. However, many challenges still remain to reach all the potential benefits attributed to this field, and there exist open debates regarding the evolution of Learning Analytics and its consequences on learning and on the educational system overall. LASI Spain 2020 aimed at contributing with reflections and experiences related to this issue.

LASI Spain 2020 included two keynotes by international experts and the aforementioned panel that gave us the opportunity to get closer to research in LA in Latin America. The keynotes and the panel offered a rich panorama of experiences and perspectives related to the main theme of adoption. The conference included 4 paper sessions, and, for the first time in the LASI Spain series, a Doctoral Consortium. Altogether, the conference provided an updated panorama of research in LA at different parts of the globe, with a special coverage of the current research efforts being made by different groups in Spain.

### 1.1 Keynote Speakers

LASI Spain 2020 had the honor to count with two outstanding researchers from the LA field, coming from two remote places in the world: Abelardo Pardo and Michail Giannakos.

Under the title “*Effective adoption of Learning Analytics in Educational Institutions*” Abelardo Pardo, current President of SoLAR, and Professor at the University of South Australia (UniSA), Australia, shared his experience and reflections related to adoption of Learning Analytics technologies. In his talk, he stressed the importance of the productive tensions between two parts involved in adoption at institutional levels: actors involved in innovation and entrepreneurship on the one side, and people concerned about operational functions and administration on the other. On top of previous research, he presented the SPARK model for Learning Analytics adoption. Prof. Pardo pointed out the need to construct an intermediate space where the “commons” emerge from the productive tensions. This intermediate space should contain elements such as multidisciplinary teams, boundary objects, a shared sense of ownership and inclusive discussions. The process of adoption should go through the following phases: a very clear definition of the problem, the deployment, assignment of resources and should strive to move from pilots to full-scale adoption. All these ideas were illustrated with three examples from real practice.

The second keynote was given by Michail (Michalis) Giannakos under the title “*Sensing-based Analytics to Support Learning Design*” reported his work at the Norwegian University of Science and Technology (NTNU), Norway, with a holistic

perspective of learning design that includes space and interaction design. He explained the capabilities of SbA (Sensing-based Analytics) for measuring learning-related variables, and how SbA can help teachers in physical, blended and online contexts to amplify their sensing about students' states (confusion, difficulty, engagement, cognitive load) and act upon them. Prof. Giannakos discussed the challenges and opportunities of SbA for learning design, such as continuous monitoring to support different and dynamic learning designs, or the opportunities of rebalancing black-box and white-box approaches with grey-box approaches enriched with features extracted from literature. Its ultimate goal is to build systems aware of learning states, so that they can make interventions and make dynamic learning design a reality.

## 1.2 Paper Sessions

LASI 2020 also included four sessions where the research papers that were accepted from the open call of the conference were presented and the audience could discuss with the authors. These proceedings include the 11 contributions selected after double-blinded peer review. These papers adequately represent the current scope of research in LA in Spain, as represented by a recent review done by the members of SNOLA [2]. The following sections describe them grouped by theme.

**Performance prediction.** A number of papers dealt with the capabilities of LA to make improved predictions about the performance of the students.

The paper “*An Initial Analysis of Prediction Techniques as a Support for the Flipped Classroom*” by Aarón Rubio-Fernández, Pedro Manuel Moreno-Marcos, Pedro José Muñoz-Merino and Carlos Delgado Kloos explores these issues. Prediction techniques that can be used in combination with Learning Analytics (LA) dashboards for the improvement of the flipped classroom model.

Identifying reasons for dropout is one of the main challenges that drive predictive modes in LA. The paper “*Looking for a dropout predictor based on the instructional design of online courses*”, by Salvador Ros and Agustín Caminero, deals with dropout. The authors analyze four data sets with different instructional designs, identifying some elements as risk factors, such as the result of different assessments that were planned in the courses instructional design. Using in-depth analysis of the data, the authors conclude that the dropout-risk group is formed by a large group of students that decided not to take one of the proposed assessments.

The paper entitled “*Combining clustering and sequential pattern mining to detect behavioral differences in log data: conceptualization and case study*” by Juan Antonio Martínez-Carrascal, Elena Valderrama and Teresa Sancho-Vinuesa proposes a method to detect differences in the behavior of the students. They consider the data recorded in an LMS log in the context of a blended learning course. The study shows that the proposed method can generate meaningful sequences to detect differences in behavior between students who passed the course and those who did not.

The last paper related to prediction was inspired by the participation of the authors in the Nation's Report Card Data Mining Competition 2019 (NAEP Competition),

where newcomers (or experts) can train machine learning systems with a given data set offered by the organizers of the competition. This is reported in the paper “*Early prediction of students' efficiency during online assessments using a Long-Short Term Memory architecture*” by Cristina Villa-Torrano, Miguel Bote-Lorenzo, Juan Ignacio Asensio-Pérez and Eduardo Gómez-Sánchez. The proposed classification model is based on the Long-Short Term Memory (LSTM) recurrent neural network architecture, as it is capable of capturing evolutionary patterns over time. Cristina Villa-Torrano shared her thoughts about the benefits and limitations of this kind of competitions for getting to know the field of analytics.

**Visual analytics.** Visual analytics is a striving area of research in Learning Analytic, fostered by the need of helping users make sense of the large and complex data collected by the systems. There were two papers focusing on this topic:

Andrea Vázquez-Ingelmo, Francisco José García Peñalvo, Roberto Theron and Alicia García-Holgado describe in their paper “*Specifying information dashboards' interactive features through meta-model instantiation*” an approach based on meta-models that aims to facilitate the adaptation of dashboards to the needs of different users. This paper focuses on the definition of interaction patterns within the meta-model. Interaction patterns allow the specification of fine-grained specification and configuration of the dashboards, by allowing to customize not only the visual display, but also the methods used to interact with the datasets.

On the other hand, the paper “*A proposal for the Monitoring of the Intervention Strategy on the learning of MOOC learners*” by Ruth Cobos and Juan Soberón describes the development of a system to provide periodically MOOC learners with visual information on a Web-based Learner Dashboard, showing them their progress and engagement in the MOOC. This system aims to address the lack of feedback and interaction among instructors and learners, which affect negatively learner retention and engagement in MOOCs. The system offers MOOC instructors access to a Web-based Instructor Dashboard that shows the interest in this service by the learners.

The short paper entitled “*Conceptual framework for process-oriented feedback through Learning Analytics Dashboards*” by Íñigo Arriarán Olalde and Nagore Ipiña Larrañaga, presents and discusses the design implications for a Learning Analytics Dashboard (LAD) inspired on the principles of self-regulated learning (SRL) processes, thus aiming to provide pedagogically sound support to its users.

**Innovative and active pedagogies.** How to apply LA to support innovative and active pedagogies is an active research topic. Collaborative Learning Flow Patterns (CLFPs) enable the translation of good practices in collaborative learning to scripts that are interpretable by computers. The paper “*Towards rewards-based gamification in Collaborative Learning Flow Patterns based on learning analytics*” by Rene Lobo, Alejandro Ortega-Arranz and Davinia Hernández-Leo describes the first iteration for a model to integrate the use of gamification and Learning Analytics in collaborative learning activities structured following the Jigsaw and Pyramid CLFPs. The overall

goal of the project is to find the ways in which ways LA can support gamification strategies in CLFP activities to foster student collaboration.

The paper “*Visualizing Educational Game Data: A Case Study of Visualizations to Support Teachers*” by Pedro A. Martínez, Manuel J. Gómez, José A. Ruipérez-Valiente, Gregorio Martínez Pérez and Yoon Jeon Kim describes a Learning Analytics dashboard that aims to support teachers in knowing how students are using the game, transforming clickstream data into meaningful metrics and displaying them visually. The ultimate goal is to enable teachers to track the students and evaluate them, or act if needed. The paper presents the work done to this end with Shadowspect, a game-based assessment tool that provides metrics related to geometry among other math-related contents.

Finally, “*Self and Peer Monitoring during Peer Feedback: The Instructor Perspective*” by Erkan Er presents the instructors’ perspectives about self and peer-monitoring enabled by Synergy, a student-oriented dashboard that supports peer reviewing protocols, with implications for Learning Analytics design. The study is based on an open-ended survey. The results suggest that teachers acknowledge the benefits of this approach to enhance self- and co-regulation of learning, and they also pose some challenges related to the extra-effort required. The paper derives implications for the activity design and learning analytics support that could help address these concerns.

**Ethics and data-privacy.** The papers presented at LASI were aligned with the challenges identified by Martínez-Monés et al. [2] for the Learning Analytics field in both the Spanish and international contexts. One of the main challenges was related to the consideration of ethics and data-privacy in the Learning Analytics solutions.

Ethical issues are at the core of the paper entitled “*How are Learning Analytics Considering the Societal Values of Fairness, Accountability, Transparency and Human Well-being? - A Literature Review*” by Eyad Hakami and Davinia Hernandez-Leo. The paper reviews the presence of the four values mentioned in the title in the full series of LAK conferences from 2011 to 2020. The authors conclude that in spite of an increasing concern that is being observed in the LA research community, the societal values of a responsible Artificial Intelligence have been addressed only to a limited extent. They point out at the need of a more holistic perspective that considers not only transparency, but also ways in which LA can contribute to diverse dimensions of human well-being. To this end, there is a need of identifying metrics and techniques to help educators in safeguarding these values in the lifecycle of LA tools and solutions.

Privacy was also a hot topic of discussion in the paper “*Tracking the Students’ Learning Behavior for Cybersecurity Scenarios*” by Antonio Uzal, Llanos Tobarra, Alejandro Utrilla, Antonio Robles-Gómez, Rafael Pastor-Vargas and Roberto Hernández. They presented how they had implemented privacy issues that satisfy Spanish and European standards in a platform, which includes gamification mechanisms in a system oriented to cybersecurity learning that enables monitoring of the players’ performance by the teaching team.

### 1.3 Doctoral Consortium

For the first time in the LASI Spain series of conferences, we had a Doctoral Consortium, where four PhD candidates working on topics related to Learning Analytics presented their PhD projects, and had the opportunity to discuss them with four senior researchers that volunteered to act as mentors and provide feedback. These experts were Teresa Sancho-Vinuesa, Yannis Dimitriadis, Manuel Caeiro, and Pedro Muñoz-Merino, all of whom participated actively in the session, giving the students advice based on their long-lasting experience as mentors within the LA field.

Two of the works presented delved around the idea of self-regulated learning, which is gaining importance as a fundamental skill. The work entitled “*Contributions to real-time monitoring and analysis of heterogeneous learning environments*”, by Lucía Uguina-Gadella proposes a system to detect students at risk on a real-time basis, using for it data from the system logs, enhanced with self-regulation learning information obtained from tests and mid-term exams.

Cristina Villa-Torrano in her PhD project “*Detecting patterns of Socially Shared Regulation of Learning in Smart Learning Environments*”, proposes the extension of the idea of self-regulated learning to the support of collaboration, by detecting patterns of social shared regulation of learning (SSRL) using data from the learning environment.

The session was complemented with two more works, which were presented orally: “*Design of gameful learning activities across social planes using analytics*”, by René Lobo, and “*Assessing wellbeing impacts of Learning Analytics systems*” by Eyad Hakami. The proposal by Lobo is related to the use of learning analytics and gamification to foster collaborative learning activities, while the proposal by Hakami revolves around the work also presented as a paper in the conference, related to the analysis of the treatment of of Fairness, Accountability, Transparency and Well-being in the field of LA.

### 1.4 Panel “Learning analytics in Latin America”

One of the main consequences of the transition to an online event was that LASI Spain 2020 could more easily welcome contributions and participation from the Latin America LA research community. A panel was set up to let prominent researchers in the area share their experiences related to LA adoption in Latin America. This panel nicely closed the conference, with relevant examples of the challenges met in practice when proposing Learning Analytics tools for adoption at different scales.

Ronald Pérez presented the LALA project, and its continuation through the LALA community and SIG; and the Observatory of Learning Analytics initiatives in Latin America. He discussed the boost of research in Latin America in recent years, as described by Cechinel et al. [2]. Finally, as a particular example of research done in Latin America related to LA, he described his work on the NoteMyProgress tool, which supports self-regulation strategies of students in on-line learning settings.

Margarita Ortiz-Rojas, with her talk “*Does one size fit all? The experience of implementing an academic counseling system in system of academic counselling in*

*three Latin American universities*”, presented the experience of adapting a tool, initially developed for KU Leuven, for counselling in three Latin-American universities. Six thousand students and teachers were involved overall in the project. This work is clear example of how the context of each University influenced the adaptation of the dashboard, showing a nice case of how the “commons” mentioned by Abelardo Pardo in his opening keynote can be put into action.

The last intervention was related to the paper entitled “*Design of a tool of learning analytics to support continuous curriculum improvement*” by Isabel Hilliger. She described another project where adoption was a major issue, in the context of continuous curriculum improvement. The work was framed within a grid that conceptualizes the adoption of Learning Analytics with respect to different kinds of leadership (bottom-up and top-downs) and levels of maturity. She described the needs analysis they performed with the involved stakeholders (students, teaching staff, and managers). The study findings highlight areas of interest in LA applied to curriculum improvement, including quality feedback and timely data-driven support for students.

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