

Applications of Learning Analytics in Latin America

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Abstract

Learning analytics (LA) is a key research domain within educational technology. This field harnesses data analysis, unlocking tangible advantages for educators and learners. Despite extensive research, geographical disparities in adoption remain, with certain regions still in developing stages. Within this scenario, Latin America has been adopting LA to address specific educational challenges, including reducing quality disparities and dropout rates. However, the region confronts limitations for adoption, such as infrastructure, a lack of widespread data literacy, and regulatory constraints, all of which impede broader implementation. In this context, this special issue, titled “Applications of Learning Analytics in Latin America,” intends to present a comprehensive perspective on LA’s deployment across the continent, highlighting its current state and potential growth. In this editorial, we curate a selection of relevant papers, each delving into diverse facets of LA’s application within Latin American contexts. These papers exemplify practical implementations and discuss the implications and possible future trajectories for LA research, especially tailored for the Latin American academic community.

Notes for Practice

- This editorial section presents studies on adopting learning analytics (LA) methods and instruments in Latin America.
- This special section presents five papers covering aspects related to LA adoption, including the initial analysis with the stakeholders, the impact of adopting LA tools, and a maturity model to measure institutional competency in adopting LA.
- Practitioners, researchers, and policy-makers could benefit from the papers in this special issue to disseminate and scale the adoption of LA in Latin America.
- This special section introduces new methodologies that could be generalized to other world regions.

Keywords

Latin America, qualitative research, decision-making in higher education, learning analytics tools, maturity model

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1. Introduction

Learning analytics (LA) is perceived to be a promising strategy to tackle persistent educational challenges in Latin America, such as quality disparities and high dropout rates (Hilliger, Ortiz-Rojas, Pesántez-Cabrera, Scheihing, Tsai, Muñoz-Merino, Broos, Whitelock-Wainwright, & Pérez-Sanagustín, 2020). Over the past five years, there have been sustained efforts to build capacities for the adoption of LA, such as the LALA project¹, financed by the European Commission. Although there is a growing understanding of the potential benefits of LA solutions in the region, many barriers still need to be addressed for LA to contribute to educational challenges in the region. Among these barriers, researchers have alluded to the following (Hilliger, Ortiz-Rojas, Pesántez-Cabrera, Scheihing, Tsai, Muñoz-Merino, Broos, Whitelock-Wainwright, Gašević, & Pérez-Sanagustín, 2020):

¹<https://comunidadlala.com/>

Infrastructure: Many Latin American countries still have limitations in terms of access to technology and high-speed internet connectivity. This can affect the ability to implement and use LA systems effectively.

Training: There is a general lack of training and education in the use of LA across the region. This can hinder the adoption and effective use of LA solutions to drive decision-making within educational settings.

Data: The lack of high-quality data and the lack of capacity to collect and analyze learning data can hinder the development and adoption of LA technologies in the region.

Policies and regulations: There is a lack of clear and consistent policies and regulations for the use of LA within Latin American educational settings. This can hinder the adoption and use of these technologies.

Despite these challenges, there is a growing interest in using LA to understand and improve learning environments in Latin America. It is expected that more initiatives and advances in this area will be seen in the future, driven by the need to improve the quality of education and equity in the region (Maldonado-Mahauad et al., 2018).

1.1 Key Concepts and Questions

Previous works have significantly contributed to exemplifying the practical applications of LA in Latin America. For instance, a special issue published in 2020 in the *British Journal of Educational Technology (BJET)* (Pontual Falcão et al., 2020) compiled a range of scholarly papers, each offering insights pertinent to adopting and integrating LA in the region.

One of the notable contributions within this collection is the work of Cechinel and colleagues (2020), who conducted comprehensive research that systematically categorized the maturity level of LA tool adoption across Latin American countries. The findings of this review reveal that there has been significant progress over the past few years, but numerous aspects still need enhancement and refinement before LA can be effectively scaled up in the region.

In this context, this special section moves a step forward toward understanding the complex nature of LA implementation in Latin American educational settings, seeking to expand knowledge about its transfer to practice. We intend to highlight ongoing research and development to address the unique challenges and opportunities that characterize Latin America's educational landscape. As such, the topics included in the call for this special section were as follows:

1. Learning data: Studies about the lack of high-quality data and the ability to collect and analyze learning data in the region.
2. Integration of LA technologies with other educational technologies: Studies focused on understanding how LA technologies can be integrated with other educational technologies to improve the effectiveness and efficiency of learning.
3. Using LA solutions to improve equity and inclusion in education: Work on using LA to identify inequalities and barriers to learning and develop strategies to improve equity and inclusion in education.
4. Adoption and implementation of LA solutions: Studies about the growing interest in understanding how LA technologies can be used in the region to improve education quality and equity.
5. Using LA solutions to improve educational quality: Studies on adopting LA solutions to identify curriculum elements to be improved, such as assessment methods, teaching practices, and learning resources, among others.
6. Policies and regulations for LA solutions: Work addressing the need for clear and consistent policies and regulations for using LA in the region.
7. Training and education in using LA: Studies regarding the lack of training and education in using LA technologies in the region.

2. Overview of the Special Section

This special section on applications of LA in Latin America presents a collection of five studies. Each one explores a particular facet of LA in the region, focusing specifically on the higher education sector. These articles address critical issues such as examining learning data according to student behavioural theory and adopting analytical technologies in educational institutions.

Concerning learning data, the study titled “The Mediating Role of Learning Analytics: Insights into Students’ Approaches to Learning and Academic Achievement in Latin America” presents a quantitative study conducted in two Chilean universities (Villalobos Díaz et al., 2024). The study aims to understand the relationship between students’ approaches to learning (measured through a questionnaire) and academic performance, using student behavioural data within their learning management systems

(LMSs) as mediator indicators. Although most mediator indicators did not exhibit a mediator effect, the study advocates for the collection and analysis of fine-grained learning data from the LMS. It also suggests examining how teaching practices and LMS usage may influence surface or organized learning approaches among higher education students.

Going beyond learning data analysis, the study titled “Supporting Decision-Making for Promoting Teaching and Learning Innovation: A Multiple Case Study” addresses the gap in LA tools for supporting decision-making to foster innovative teaching in higher education (Kotorov et al., 2024). The authors evaluated a dashboard named PROF-XXI through multiple case studies in three distinct universities across Latin America (one in Colombia and two in Guatemala). This dashboard was designed for teaching and learning centres, aiming to support institutional self-assessment of 50 competencies across dimensions such as teacher support, student support, leadership, technology for learning, and evidence-based practices. The findings reveal that the dashboard was perceived as accessible, user-friendly, and effective in facilitating reflection on institutional competencies to enhance teaching quality.

The study titled “Identification of Complex Thinking Related Competencies: The Building Blocks of Reasoning for Complexity” also proposes an LA solution to improve educational quality (Talamás-Carvajal et al., 2024). Specifically, Talamás-Carvajal and colleagues (2024) examine the development of sub-competencies related to complex thinking (i.e., critical, systemic, and scientific thinking) in a challenge-based curriculum implemented at a Mexican university. Using the Cross Industry Standard Process for Data Mining (CRISP-DM) on a database containing information on 33,319 students, the study analyzes 46 variables, uncovering correlations between previous scores on critical thinking and current scores on the other sub-competencies, along with correlations between sub-competencies and various sociodemographic and academic factors. The findings highlight the importance of fostering critical thinking in early semesters and implementing follow-up assessments to measure improvement.

Also conducted in Mexico, the study titled “Perspectives and Opportunities for Learning Analytics Integration: A Qualitative Study in Mexican Universities” focuses on understanding the perceptions of university instructors, students, and high-level authorities regarding the use of educational data and the adoption of LA solutions (Bautista Godínez et al., 2024). The study conducted semi-structured interviews based on qualitative protocols proposed by the LALA project to gather insights across three universities. Findings indicate a growing interest in leveraging the use of data for providing qualitative feedback, analyzing individual and group student profiles, and exploring the interplay between academic performance and student well-being. Key emergent themes such as health, relationships, feedback, and bureaucratic governance suggest that these insights can inform and guide future LA initiatives.

Finally, the study titled “MMALA: Developing and Evaluating a Maturity Model for Adopting Learning Analytics” addresses the scarcity of models to guide the adoption of LA solutions in higher education institutions (HEIs) (Freitas et al., 2024). Through expert opinions, the study evaluates multiple academic aspects proposed in this model, such as technological infrastructure, human resources, ethics, and pedagogy. Findings indicate that most experts view MMALA as comprehensive, consistent, and suitable for supporting HEIs in adopting LA. According to a validation exercise at three Brazilian universities, MMALA could outline essential practices for initiating LA adoption, along with supporting self-assessment to identify areas requiring attention for scaling up the implementation of LA solutions.

Together, these studies enhance the understanding and application of LA solutions in Latin America, offering valuable insights for researchers, educators, and policy-makers who seek significant advancements in data-driven approaches to improve overall educational quality. These studies also highlight areas requiring further exploration and development, motivating further research and development in this region.

3. Discussion

The studies previously described collectively contribute to advancing the application of LA in Latin America. First, they tackle some of the needs for LA adoption that were previously identified by Hilliger, Ortiz-Rojas, Pesántez-Cabrera, Scheihing, Tsai, Muñoz-Merino, Broos, Whitelock-Wainwright, Gašević, and Pérez-Sanagustín (2020), such as students’ need for timely support (Villalobos Díaz et al., 2024), instructors’ need for quality feedback about their teaching practices (Kotorov et al., 2024), and authorities’ need for actionable insights to evaluate curriculum decision-making (Talamás-Carvajal et al., 2024). Second, the insights of these studies shed light on growing interest in scaling adoption at an institutional level, not only offering a snapshot of the current adoption of data-driven strategies at different HEIs (Bautista Godínez et al., 2024), but also providing HEIs with a structured approach to scale up LA initiatives (Freitas et al., 2024).

This collection of studies also represents different perspectives on LA research. Taking into account the perspectives described in the *Journal of Learning Analytics* scope², Villalobos and colleagues (2024) focus on an educational perspective, using LA indicators to test the relationship between student approaches to learning and academic outcomes at a subject level. Then, Talamás-Carvajal and colleagues (2024) concentrate on a computational perspective, using CRISP-DM to assess the

²<https://learning-analytics.info/index.php/JLA/focusandscope>

development of sub-competencies at a curriculum level. Concerning information sense-making, Kotorov and colleagues (2024) evaluate the visualization of institutional competencies from the user perspective, while Bautista-Godínez and colleagues (2024) and Freitas and colleagues (2024) address organizational dynamics and institutional structures affecting LA adoption on a large scale.

The scale is also something worth highlighting about these studies. By scale, we are not necessarily restrictively alluding to the number of participants and the amount of data but referring to the noteworthy commonality of involving multiple universities in each study. This collective representation of different HEIs highlights the growing collaborative spirit characterizing the implementation and study of LA across Latin America (Cechinel et al., 2020), expanding the existing discourse on LA across several of its countries.

Still, some areas require further work, such as the coverage of different educational levels. All studies in this special section focus on the higher education sector, so more research efforts are needed at the primary and secondary levels. Cechinel and colleagues (2020) claim that quality disparities in primary and secondary education are a well-known problem, and recent results of the Programme for International Student Assessment (PISA)³ reveal important socioeconomic and gender gaps in mathematics and reading. In 2021, the *Journal of Learning Analytics* published a special section on LA for primary and secondary schools (Kovanovic et al., 2021), but most studies occurred in the U.S. and Australia. Thus, similar efforts need to be invested in by Latin American researchers to examine how applications of LA can contribute to younger learners.

Further work is also needed to ensure that these and future studies influence ongoing and new discussions in the LA community. According to a critical piece by Motz and colleagues (2023), few LA publications analyze learner data and measure learning outcomes, surfacing a discussion about the definition and expectations of LA research on a global landscape. In this special section, all studies take place in an educational environment, aiming to present or promote the analysis of learner data to inform actionable insights. However, there are limitations to their findings in terms of data availability (e.g., scarce availability of fine-grained data in Villalobos and colleagues (2024)) and causal inferences regarding relationships between different learning variables (e.g., correlations presented by Talamás-Carvajal and colleagues (2024)). Addressing these limitations can strengthen the robustness and applicability of the research findings, providing a more comprehensive understanding of the complex relationship between learner data, educational interventions, and student outcomes.

4. Conclusion

In summary, the studies presented in this special section contribute to advancing the field of LA in Latin American higher education, offering valuable insights into different LA research perspectives. These studies build upon prior LA research in the region and create new opportunities to expand the existing body of knowledge concerning the analysis of learner data and student outcomes.

Out of all the topics of interest proposed by this special section, the authors mainly focused on the adoption and implementation of LA solutions to improve educational quality, along with tackling issues regarding the availability of learner data and the integration of LA solutions with other educational technologies, such as the institutional LMS. This leaves room to continue exploring aspects related to training in the use of LA, the adoption of LA to improve equity and inclusion, and the need for clear and consistent policies for using LA in the region.

Although the studies represent different institutions and countries, there are generalizability issues regarding the socio-cultural context that influence the interpretation of student data, and studies lack a long-term assessment of its implications for teaching and learning practices. While these papers offer valuable stepping stones for implementing LA, future research should address these limitations to ensure the continued growth and applicability of insights in diverse educational contexts. In that sense, this special section is also an invitation to continue expanding LA research in the region regarding topics and study length.

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³<https://blogs.worldbank.org/latinamerica/learning-crisis-latin-america-caribbean-pisa-results>

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