

## **Assessing Institutional Needs for Learning Analytics Adoption in Latin American Higher Education**

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**ABSTRACT:** In recent years, Learning Analytics (LA) has captured the attention of higher education managers who saw in this research field a means to optimize the process of teaching and learning on a large scale. So far, most studies in LA have concentrated on the development of tools to address educational challenges in the contexts of Europe, Australia, and U.S. However, tools and adoption frameworks developed in these contexts are not necessarily applicable for higher education institutions in the rest of the world. Given that there is no one-size-fits-all approach, this study aims to assess institutional needs for LA in the Latin American context by collecting and analyzing qualitative information obtained from managers, teaching staff and students at four universities (U1, U2, U3, and U4). Although most participants agreed that LA is a promising means to monitor students' academic progress at a curriculum level, findings show specific needs and considerations that differentiate each university (U1: academic support for subgroups, U2: dropout indicators,

U3: improving existing counseling tools, and U4: satisfaction indicators). Given these differences, iterative process models are required to guide LA adoption in the Latin American context.

**Keywords:** Learning Analytics, Learning Analytics Adoption, Stakeholder Involvement, Higher Education, Latin America

## 1 INTRODUCTION

Learning Analytics (LA) aims to develop different methodologies, techniques and technological tools to optimize learning processes and its environments (Siemens & Gasevic, 2012). By leveraging existing large amounts of data, LA has proved to have great potential for improving teaching, learning, and organizational efficiency and decision-making (Jones, 2015; Zilvinskis, Willis, & Borden, 2017). This explains the rapidly growing interest in LA solutions as a means to address student retention and meet other accountability demands in higher education (Macfadyen, Dawson, Pardo, & Gasevic, 2014).

So far, most studies in LA have concentrated on the development of tools and methods to support small-scale activities for a limited period of time (Ferguson et al., 2016). There is limited evidence validated by research to demonstrate the impact of these tools on informing managerial decision-making processes at an institutional level (Macfadyen et al., 2014), or teaching and learning processes at a classroom level (Ferguson et al., 2016). Moreover, the availability and deployment of LA tools does not guarantee learning benefits if its adoption is not closely integrated with learning design and decision-making across institutional and classroom levels (Gasevic, 2018). Even in regions where researchers have made more progress in the development and validation of LA solutions (i.e. North America, Europe and Australia), only a few universities have started to strategically plan for LA adoption (Colvin, Dawson, & Fisher, 2015). To implement LA at an institutional scale, higher education managers, teaching staff and students will need more guidance (Dawson et al., 2018), so more efforts have to be invested in understanding how these stakeholders could adopt LA tools and methods in their everyday practice (Ferguson et al., 2016).

Along these lines, researchers have highlighted the importance of understanding how higher education stakeholders use LA tools and methods to make successful interventions in real-life settings (Rienties et al., 2016). Researchers have begun to propose theoretical and conceptual frameworks as mechanisms to lead managers, teaching staff and students through LA adoption. Most of these frameworks are based on the idea that these stakeholders and policy makers become more involved in the design and implementation of LA solutions, this will inform stronger research that will eventually lead to a better understanding and implementation of LA (Rienties et al., 2016; Tsai, Moreno-Marcos, Tammets, & Gasevic, 2018). For example, the SHEILA project introduces a policy-development framework for LA adoption based on the perspectives of various stakeholders, including institutional managers, teaching staff, students and LA experts (Tsai et al., 2018). However, there is a paucity of research that evaluates the use of existing frameworks in real-life environments (Dawson et al., 2018). Indeed, as Ifenthaler (2017) contends:

“we need empirical research on the validity of LA frameworks and on expected benefits for learning and instruction to confirm the high hopes this promising emerging technology raises” (Ifenthaler, 2017, p. 37).

To our knowledge, there has been no formal framework based on the needs of LA in Latin America. Our study is set out to bridge this gap by addressing the following research question: **What are the needs and considerations for adopting Learning Analytics tools in Latin America?** To answer this question, we assessed the institutional needs of four Latin American universities affiliated to a large project that aims to build the local capacity to design, implement and use Learning Analytics tools in Latin American Higher Education (LALA project-<https://www.lalaproject.org/>). To date, existing LA initiatives in Latin America have been limited and isolated (Cobo & Aguerrebere, 2017), so we have chosen to carry out the study in the four Latin America universities affiliated to the LALA project to contribute to a better understanding of LA adoption in institutions that share a similar culture and political context.

As the LALA project moves forwards, its participants aim to develop a framework to facilitate LA adoption in Latin America. This framework addresses four fundamental dimensions for LA adoption: (1) the institutional dimension, which considers the institutional needs identified by contrasting the current and desired state in relation to the adoption of LA institution-wide; (2) the methodological dimension, which considers the technical needs for the design and implementation of LA tools; (3) the ethical dimension, which considers a series of guidelines to support the ethical use of the data; and (4) the community dimension, which proposes a series of guidelines to ask for support to conduct research and development in this field. In this context, this paper addresses the institutional dimension of this framework.

## 2 LITERATURE REVIEW

Around the globe, many higher education managers have high hopes that LA tools and methods can help them leverage large academic databases to create supportive and insightful models of teaching and learning processes - even in real time (Rienties et al., 2016). The collection and analysis of such data is a promising approach to provide personalized and scalable support for learners, besides providing information to improve teaching practices, organizational efficiency, and decision-making (Gasevic, 2018; Jones, 2015). However, the availability of analytical tools and methods does not guarantee these improvements; managers, teaching staff and students have to adopt them to make successful interventions in their own practice (Rienties et al., 2016). Considering that the limited number of experienced LA research groups already constitutes an important barrier for LA adoption in Latin America (Cobo & Aguerrebere, 2017), this section briefly reviews the literature regarding the challenges for LA adoption, as well as the models and frameworks proposed to overcome them.

### 2.1 Challenges of Learning Analytics Adoption

In the past few years, a growing number of publications have documented challenges that affect LA design and implementation. One challenge is the lack of case studies that empirically validate technology development on a larger scale for longer period of time (Ferguson et al., 2016; Tsai et al., 2018). Another challenge is the need for policies to address issues of privacy and ethics related to informed consent, data transparency, data ownership, and data access (Gasevic, 2018; Steiner,

Kickmeier-rust, & Albert, 2015). Other prominent challenges are related to the lack of stakeholder involvement (Macfadyen et al., 2014), LA expertise (Ifenthaler, 2017), leadership support (Tsai & Gasevic, 2017), and training opportunities (Tsai & Gasevic, 2017).

To address these challenges, higher education has made great improvements in the technical development of LA tools (Zhong, 2016), as well as in the development of policies to ensure ethical treatment of data (Steiner et al., 2015). However, a major challenge still confronts higher education institutions – stakeholder involvement (Tsai et al., 2018). On the one hand, stakeholders at different levels could have varied data-related experiences and knowledge, leading to discrepancies in the perception of LA benefits and outcomes (Tsai & Gasevic, 2017). On the other hand, some stakeholders might expect that LA per se can enable change, without realizing that their interpretation of educational data is what drives further interventions to improve learning (Zilvinskis et al., 2017).

Therefore, it is important to develop comprehensive institutional policies to encourage positive attitudes towards LA among different stakeholders (Macfadyen et al., 2014). In particular, key leadership is crucial to a clear strategy for successful LA adoption on an institutional scale (Tsai et al., 2018). Along these lines, researchers have documented success stories about stakeholder involvement in North America and Europe (Gasevic, 2018). For example, institutional leaders from Denmark, the Netherlands and Norway have begun to develop national approaches to support and enable learning analytics at a large scale (Ferguson et al., 2016). Conversely, research about LA is still considered emergent in Latin America (Cobo & Aguerrebere, 2017). The study, as part of LALA project, intends to bridge the gap by creating a community to exchange ideas, methodologies and tools to expand LA adoption in Latin American higher education (Lemos dos Santos, Cechinel, Carvalho Nunes, & Ochoa, 2017).

Given the difference in maturity of LA adoption in Latin America compared to Europe, it is necessary to develop guiding frameworks to direct the design and implement LA tools based on stakeholders' needs. To this end, our study used two data gathering techniques to explore stakeholder perceptions of the needs for LA adoption in four Latin American universities in Chile and Ecuador. The main objective is to explore the viewpoints of various stakeholders in order to assess local needs, given that there is no one-size-fits-all policy for learning analytics (Zilvinskis et al., 2017).

## **2.2 Existing Frameworks for Learning Analytics Adoption**

To scale up and sustain LA adoption in higher education, researchers have recently developed an increasing number of frameworks as an attempt to guide the design and implementation of LA solutions at an institutional level. According to Dawson et al. (2018), these frameworks could be classified into input, output and process models. Most of them consist of input models, which define a set of dimensions or properties to assess institutional readiness for LA adoption (Dawson et al., 2018). For example, the Learning Analytics and Readiness Index (LARI) proposed by Arnold and colleagues is used to identify key factors for LA adoption readiness (Arnold, Pistilli, St, & Hall, 2014).

Another type of framework proposed to facilitate LA adoption is the one described as output or outcome-based (Dawson et al., 2018; Jones, 2015). These frameworks represent LA deployment as a linear process that unfolds over time according to different levels of organizational readiness and

maturity (Colvin, Dawson, Wade, & Gasevic, 2017). Along these lines, Dawson and others alluded to the LA sophistication model proposed by Siemens, Dawson, and Lynch (2013), which represents a five-stage process that goes from emergent data to integrated adaptive and personal learning.

Although the input and output LA frameworks provide valuable information to guide LA adoption, most of them describe conceptual dimensions or stages of LA deployment, without addressing the dynamic and unpredictable pressures that currently affect higher education (Dawson et al., 2018; Jones, 2015). In response to the dynamic contexts of higher education, process models have emerged to map alternative approaches for LA adoption regarding the evolving needs and concerns raised by higher education stakeholders (Dawson et al., 2018). Along these lines, Tsai and colleagues proposed the SHEILA policy-development framework (Tsai et al., 2018), which is based on the RAPID Outcome Mapping Approach (ROMA) (Young, J. Mendizabal, 2009). This approach consists of an iterative process to develop evidence-based policy through active engagement with relevant stakeholders.

In this study, we built upon the experience of the SHEILA framework to assess the needs of different higher education stakeholders, using a participatory action research method (see Section 3) (Creswell, 2012). This needs assessment contributed to a framework that we have developed to guide the design, implementation and use of learning analytics tools in higher education institutions in Latin America (LALA framework-<https://www.lalaproject.org/deliverables/>). Thus, this paper presents our effort to assess institutional needs for LA adoption to adapt existing process models to better suit the Latin American context.

### 3 METHODOLOGY

This paper addresses the following research question: **What are the needs and considerations for adopting Learning Analytics tools in Latin America?** To answer this question, we assessed the institutional needs for LA adoption in four Latin American universities that are part of the LALA project. Although the findings of the study are limited to the four chosen cases, it expands on the limited research about LA in the region by providing insights about implications for LA adoption in these and similar institutions. In the following sections, we describe the participants and samples, the data gathering techniques, and the data analysis plan used to identify the needs for LA.

#### 3.1 Participants and Sample

Four Latin American universities participated in this study: two traditional private institutions in Chile (U1 and U2), and two public institutions in Ecuador (U3 and U4). Table 1 shows the samples used to assess the needs for LA adoption in these four universities, and Appendix 1 describes each university briefly (Appendix 1: <http://bit.ly/2OpB2va>).

**Table 1: Sample of Participants per Data Gathering Technique**

	U1	U2	U3	U4
LALA Canvas	5 experts	3 experts	3 experts	5 experts
Interviews with managers	7 managers	11 managers	8 managers	11 managers
FG with students	2 FG (13 students)	1 FG (5 students)	2 FG (3 students)	3 FG (24 students)
FG with teaching staff	1 FG (5 teachers)	2 FG (15 teachers)	2 FG (8 teachers)	3 FG (23 teachers)

FG: Focus groups

Interviews and focus groups were guided by the interview protocol.

### 3.2 Data Gathering Techniques

Two different data gathering techniques were used in this study: the LALA Canvas and a semi-structured interview protocol. The first one was used to define a general overview of the current state of LA adoption at an institutional level, while the second one was used to obtain further insights about the desired state of LA adoption and the needs to adopt LA tools at a large scale.

#### 3.2.1 LALA Canvas

This technique consists of a template that aims to guide a group discussion about the current state of a higher education institution in terms of LA adoption (<http://bit.ly/LALACanvas>). The template was built upon the experience of the SHEILA framework (Tsai et al., 2018), with a further adaptation of the ROMA dimensions (Young, J. Mendízabal, 2009). Along these lines, the dimensions considered in the LALA Canvas were: 1) desired behaviors, 2) strategy for change, 3) internal capacities, 4) political context, 5) key stakeholders, 6) assessment and evaluation plan.

To define the current state of LA adoption, the LALA Canvas was completed in four groups of 3 to 5 experts with varied experiences in LA (e.g. education vs. computer science background, PhD students vs experienced researchers, etc.). Each group analyzed the current state of the university they were affiliated with (see Table 1). The group discussions were held in March 2017, with a moderator guiding the participants to assess their institutional context in relation to the six dimensions in the canvas. This activity lasted an hour approximately.

#### 3.2.2 Interview Protocol

This technique consists of a semi-structured guide to interview managers, teaching staff and students, in order to explore the institutional needs for LA adoption (<http://bit.ly/2OjnwJo>). It was built upon instruments used by the SHEILA project with the objective of collecting information about the desired state of LA adoption at an institutional level. It includes questions about the expected uses of educational data and existing ethical and privacy policies.

To assess the desired state of LA adoption, the interview protocol was used to interview managers, teaching staff and students at U1, U2, U3, and U4 between January and August 2018 (see Table 1). A snowball sampling method was followed to identify suitable managers to be interviewed, while a stratified sampling method was followed to identify teaching staff and students from different

academic units (Creswell, 2012). Managers were interviewed individually in 30-minute sessions (approximately), whereas teaching staff and students were interviewed in separate focus groups, each one lasting an hour.

### **3.3 Data Analysis Plan**

The data analysis plan consisted of three steps:

#### *3.3.1 Defining the Current State of LA Adoption*

In this step, the same experts who worked on the LALA Canvas of each university summarized elements under each dimension, aiming to reach consensus on their observations of the six dimensions in their own institutional context. All of these elements were documented in a Microsoft Word version of the LALA Canvas template.

#### *3.3.2 Defining the Desired State of LA Adoption*

In this step, one expert from each university summarized the results of interviews according to the protocol questions in an Excel spreadsheet. Then, they presented the findings in a report focusing on the desired state of LA adoption in their institution, addressing the needs for LA tools, the considerations for the design and implementation of LA methods, the ethical and privacy elements required, and the sustainability and scalability of LA initiatives in the region.

#### *3.3.3 Assessing Needs and Considerations for LA Adoption*

In this step, experts from each university identified the gaps between the current and the desired state in terms of LA adoption by contrasting the elements listed in the LALA Canvas with the results summarized from the interview protocol. Then, they used this contrast to determine how LA could be used at their universities (i.e. needs), besides anticipating issues for future design of LA tools and methods.

## **4 RESULTS AND DISCUSSION**

This section summarizes the analysis results, focusing on the needs for LA adoption and considerations of ethical aspects in the four Latin American

### **4.1 Needs for Learning Analytics Adoption**

Table 2 presents the needs for LA adoption that were identified in each university. All the universities in this study considered LA tools and methods as a promising means to obtain clear information about students' academic progress at a curriculum level. However, there were specific needs that differentiate each university. For example, U1 makes a specific emphasis on providing academic support for student subgroups, U2 on monitoring high failure rates and dropout risks, U3 on improving existing LA tools for counseling, and U4 on monitoring student satisfaction. Considering that needs vary according to the institutional context (Gasevic, 2018), adoption frameworks based on process models might be more suitable to guide LA adoption in Latin America (Dawson et al., 2018). This finding is consistent with our strategy of building upon the experience of the SHEILA framework to assess institutional needs in Latin American universities (Tsai et al., 2018).

**Table 2: Institutional Needs for Learning Analytics Adoption**

Needs for Learning Analytics Adoption	
U1	<ul style="list-style-type: none"> <li>• Academic support for student subgroups</li> <li>• Timely and personalized feedback to improve the teaching and learning process.</li> <li>• Clear information about students' academic workload.</li> <li>• Clear information about students' academic progress at a curriculum level.</li> </ul>
U2	<ul style="list-style-type: none"> <li>• Indicators for high failure rates and dropout risks.</li> <li>• Timely and personalized monitoring of students' and teaching staff performance.</li> <li>• Clear information about students' academic workload.</li> <li>• Clear information about academic and psycho-socio-emotional profiles of students.</li> <li>• Clear information about students' academic progress at a curriculum level.</li> </ul>
U3	<ul style="list-style-type: none"> <li>• Improvements of existing LA tools for counseling.</li> <li>• Exploitation of educational data collected from both teaching staff and students.</li> <li>• Integrated systems to obtain information about the academic and psycho-socio-emotional profiles of the students.</li> <li>• Clear information about students' academic progress at a curriculum level.</li> </ul>
U4	<ul style="list-style-type: none"> <li>• Clear information about students' satisfaction at a course and program level.</li> <li>• Timely and personalized monitoring of students' and teaching staff performance.</li> <li>• Indicators for high failure rates and dropout risks.</li> <li>• Clear information about academic and psycho-socio-emotional profiles of students.</li> <li>• Clear information about students' academic workload.</li> <li>• Clear information about students' academic progress at curriculum level.</li> </ul>

## 4.2 Ethical Considerations for Learning Analytics Adoption

Table 3 shows the ethical considerations for future designs of LA tools and methods. Most institutions alluded to the need for ethics-related policies to address issues concerning informed consent, data access, and data transparency, which aligns with suggestions in the LA literature (Gasevic, 2018; Steiner et al., 2015). Besides, most institutions emphasized the need for procedures to ensure data transparency, which is an important issue when adopting LA at an institutional level. However, there are certain considerations that were raised by individual cases only, such as the emphasis on informed consent at U1 and the need of training in privacy issues at U2 and U4. Thus, further work is needed to understand what considerations are generalizable for these and other similar institutions to develop privacy and data protection framework as the ones developed for European institutions (Steiner et al., 2015).

**Table 3: Ethical Considerations for Learning Analytics Adoption**

Ethical considerations	
U1	<ul style="list-style-type: none"> <li>• Need for rigorous processes for informed consent.</li> <li>• Need for procedures for data transparency.</li> <li>• Policy-making to sustain ethical-related practices.</li> </ul>
U2	<ul style="list-style-type: none"> <li>• Importance of information security compliance.</li> <li>• Need for staff training in privacy issues.</li> </ul>
U3	<ul style="list-style-type: none"> <li>• Policies concerning data access, data transparency and informed consent.</li> </ul>



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#### Ethical considerations

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- U4
- Need for rigorous processes for informed consent.
  - Need for procedures for data transparency.
  - Policy-making to sustain ethical-related practices.
  - Importance of information security compliance.
  - Need for staff training in privacy issues.
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## 5 CONCLUSIONS AND IMPLICATIONS

This study contributes to the growing research aimed at understanding LA adoption by assessing institutional needs at four universities in Latin America. Although findings show that all stakeholders of these universities considered LA as a promising means to obtain clear information about students' progress at a curriculum level, there were specific institutional needs and ethical considerations that differentiate each university. As it has been sustained by Gasevic (2018), the "one-size-fits-all" approach does not work for data models, and it might not work for models for LA adoption either.

As needs and considerations vary according to the institutional context, there are practical implications for the development of adoption frameworks for Latin America. First, process models might be more suitable to map alternative approaches for LA adoption regarding the evolving needs and concerns raised by stakeholders, including institutional managers, teaching staff, students and LA experts. Second, these process models must be iterative, starting by assessing institutional needs and identifying ethical and privacy considerations for use of academic data. And third, considerations and other lessons learned must be discussed among LA experts in the region in order to identify generalizable knowledge to disseminate for both research and capacity building purposes.

Future work will cross-analyze the findings in more detail to extend the current research on LA adoption in Latin American universities. Findings will inform the development of an adoption framework that will be internally and externally validated as LA tools are designed and implemented in different institutions of the region.

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