Adaptation and evaluation of a learning analytics dashboard to improve academic support at three Latin American universities

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Abstract

Despite the success of academic advising dashboards in several higher educational institutions (HEI), these dashboards are still under-explored in Latin American HEI's. To close this gap, three different Latin American universities adapted an existing advising dashboard, originally deployed at the KU Leuven to their own context. In all three cases, the context was the main ruling factor to these adaptations. In this paper, we describe these adaptions using a framework that focuses on four different elements of the context: Objectives, Stakeholders, Key moment and Interactions. Evaluation of the adapted dashboards in the three different Latin American universities are conducted through pilots. This evaluation shows the value of the dashboard approach in different contexts in terms of satisfaction, usefulness and impact in academic decision-making and advising tasks. The main contribution of this paper is the systematic reporting of the adaptations to an academic advising dashboard and showing the value of an academic advising dashboard on academic decision-making and advising tasks.

Keywords: learning analytics, learning dashboard, academic advising,

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case study, information visualization, learning technologies

Structured practitioner notes

What is already known about this topic

- Learning analytic dashboards for academic advising support student-advisor dialogs and academic decision making.
- Academic advising dashboards are under-explored, and there is no report in the learning analytic community about cases in Latin America.

What this paper adds

- Three Latin American cases adapt and pilot dashboards for academic advising, covering a broad range of different institutional and academic advising contexts.
- Context can be dissected and analysed by focusing on objectives, stakeholders, key moments, and interactions.

Implications for practice and/or policy

- To adopt learning analytics consider adapting tools for existing data and for already established processes.
- Adaptations of academic advising dashboards need to look at when the advising happens, with which goal, and how it happens in terms of the interaction of advisors and students.

Biography

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1. Introduction

Academic advising dashboards use academic data, such as courses passed and failed, grades, to support decisions such as course registration. Charleer et al. (2018) and Millecamp et al. (2018) show how a well-designed dashboard triggers conversation, motivates the student and supports insights in face to face advisor-student sessions. However, dashboards for academic advising are under-explored in Latin American (LA) higher education institutions (HEI). In addition, although several interesting learning analytics solutions have been elaborated in recent years, there are currently not many reports of deployment at institution-wide scale (Ferguson et al., 2014; Dawson et al., 2019). Broader institutional implementation introduces new challenges related to resistance to change (Ferguson et al., 2014).

To overcome these challenges, the LALA Project (*Learning Analytics in Latin America*), an Erasmus+ project to build capacity for learning analytics in Latin American (LA) HEI, elaborated a framework that enables the development and deployment of learning analytics (Maldonado-Mahauad et al., 2018). Four LA institutions collaborated with three European institutions to diagnose needs, adapt tools, and pilot learning analytic experiences. Interviews and focus groups performed during the diagnosis phase of the LALA Framework (Hilliger

et al., 2019) revealed that academic advising was a recurrent need for which data was available (Sanagustín et al., 2019). Thus, three LA partners selected academic advising as the main focus of effort. The University of Leuven, a European LALA partner, provided LISSA (Charleer et al., 2018) as a baseline dashboard to initiate adaptations. In this scenario, efforts were put in adapting the original tool to the different contexts. The work attempts to answer the following research questions:

- [**RQ1**] How does the context of Latin American HEIs influence the adaptation of an advising dashboard designed in a European University?
- [**RQ2**] How do the adapted dashboards support advising processes in the LA institutions?

We present cases of the three LA Institutions adapting and piloting an academic advising dashboard. Section 3 presents methods used to analyse and present adaptations in light of the different contexts, and the methods behind the pilots and evaluations of the dashboards. Specific details of each case and their contexts are introduced in section 4, and details of dashboards and their adaptations are given in section 5. Section 6 presents results of the pilots. Section discusses the results, and section 8 summarises conclusions.

2. Related work

Universities are collecting vast data that provide rich opportunities to provide better advising support for students, such as predicting student performance and retention (Papamitsiou & Economides, 2014). A key focus in learning analytics is to put this information in the hands of human experts to support decision-making (Lonn et al., 2012). The objective is to inform and to empower academic advisers, instructors and students of issues that are identified by data mining techniques and to leverage human judgement (Siemens, 2012). Most

learning analytics tools either support teachers or students, or a combination of both (Verbert et al., 2014).

While academic advisers are key-stakeholders (Drake, 2011), little research has been done so far to use dashboards to support academic advising (Gutiérrez et al., 2018). A notable exception is the LISSA dashboard that supports the adviser-student dialogue, motivated students positively and triggered conversations and personalisation during the advising session (Charleer et al., 2018). *EAdvisor* is a combination of both a student and a staff-facing tool developed by the Arizona state university to support the choosing of a major and courses (Phillips, 2013). Aguilar et al. (2014) designed *Bridge*, an adviser-facing tool intended to provide academic advisers with access to the achievement and engagement data of students. Fritz (2011) discussed the development and deployment at the University of Maryland-Baltimore of the *Check My Activity dashboard* that supports students' awareness of how their use of the learning management system and their current grades compares to that of their peers.

Although these examples are promising for academic advising, there are currently not many reports of deployment at institution-wide scale (Ferguson et al., 2014; Dawson et al., 2019). Broader implementation introduces new challenges related to resistance to change (Ferguson et al., 2014). Dawson et al. (2019) indicate that many research efforts are "small-scale techno-centric exploratory studies" and that the field must move to "more holistic and integrative systems-level research". There is a need to better document case studies that supported educational institutions in deploying learning analytics (Ferguson et al., 2014). In this paper, we present three case studies that adapted the LISSA dashboard for academic advising to the needs of Latin American institutions. The case studies shed light on how an existing dashboard can be reshaped to address the contextual needs of different institutions.

3. Methods

The work is two-fold: to analyse adaptations performed and the relations to the different cases' contexts (RQ1), we use the framework COALA. To evaluate the support provided by the adapted dashboards (RQ2), we perform pilots following the directions of the LALA project.

3.1. The COALA framework

The Context Adaptation for Learning Analytics (COALA) framework constitutes four contextual dimensions for the adaptation of tools from different perspectives:

- **Objectives** of using the dashboard, for example "to identify subjects where a student has low or high performance".
- **Stakeholders** that are involved in using directly or indirectly the dashboard, such as advisors, teachers, students, administrative staff.
- **Key moments** in which the use takes place, such as at the beginning of the academic term when registering courses, or when students receive grades.
- **Interactions** between stakeholders, such as advisor-students face to face sessions.

These perspectives allow to systematise, organise, and cross reference the information revealing the importance of the context. COALA was first presented, although without this name, in the work of Millecamp et al. (2019), borrows *Objectives* and *Stakeholders* of the learning analytics framework of Drachsler & Greller (2012) and adds *key moments* and *interactions* after an experience in an Ecuadorian university in which teachers were asked to identify the context for a learning analytics dashboard tool (Millecamp et al., 2019).

Section 5 presents the original (LISSA) the application of COALA and the adapted dashboards.

3.2. LALA Project and pilots

The cases presented in this work are coordinated by the LALA Project (Maldonado-Mahauad et al., 2018) with support of European partner institutions. The project deployed diagnostic activities to determine learning analytics niches and opportunities within the context of Latin American (LA) partner institutions (Sanagustín et al., 2019). Three partners focus on support of the advising process with a dashboard using academic records data. These are University of Cuenca, Ecuador (Cuenca), Universidad Austral de Chile (UACh), and Escuela Superior Politécnica del Litoral, Ecuador (ESPOL). Tools were developed and further piloted adapting ideas from LISSA (Charleer et al., 2018), a baseline dashboard tool provided by one of the European partners. The work on the three cases was not performed in isolation, but in collaboration through several meetings and coordinated activities.

To evaluate the dashboards, each institution conducted pilots with real users. Pilots were organised in the following phases:

- **Preparation**: involved coordination of the different institutions though the LALA project to define dates, target participants, evaluation methods and instruments (e.g. surveys).

- **Agreement**: performs participant recruitment, collects consent forms, and users perceptions on advising work that would serve as a baseline. UACh applies a likert scale survey with questions about perception on the amount of work involved in special course registration requests and the perception of the current support received from the university. Cuenca uses a similar survey with small adaptations. Since ESPOL's pilot targeted the whole institution, the baseline questionnaire was simplified to include only one question: "The information (e.g. tables, graphs) currently provided by the counseling system is sufficient to make sound decisions to guide the student", plus open text comments to collect details.

- **Training**: the dashboard is introduced and participants are trained. Participants are exposed to real data of students of their schools. Short evalu-

ations are performed to ensure the success of the training. ESPOL applies at this moment the System Usability Scale (SUS).

- **Use**: participants use the dashboard during the academic year (2019), and log data is collected. At ESPOL and Cuenca, advisors were told to inspect student situations and make appointments with students they consider necessary to meet. Cuenca also surveys students who attended advising sessions on their perception of the support while using the dashboard with the advisor. At UACh, advisors use the dashboard to inspect academic situations and decide on special course registration requests. An extra session one month after training is performed at UACh to collect feedback on utility and impact of the dashboard.

- **Improvement** (or closing) to finalise the pilot, post questionnaires evaluate the perception of participants of the general support gained with the dashboard. ESPOL applies the one question survey mentioned above in the *Agreement* phase. UACh and Cuenca apply a more extended survey (likert scale) that includes items about decision support, efficiency, effectiveness and reflection about the work and the academic situation of students.

All cases performed sessions in groups with participants to stimulate conversation and interchange of information. While the overall methodology is similar, it is important to note that the different context of the pilots demanded that different surveys were used. Surveys are presented with results in Section 6.

4. Cases

4.1. Case A: University of Cuenca

Universidad de Cuenca is a public institution located in Ecuador. Initial elicitation of learning analytics needs highlighted the importance of initiate advising processes, but also identified resistance due to the additional workload required and the lack of policies allowing to assign work hours to it.

Academic information includes academic records (courses passed, failed, and dropped, grades) and study program structures (careers) with prerequisite relations between courses. Students register courses using an online application and often meet career directors when not meeting all course requirements. To support advising, the LALA team proposed to deploy systematic advising involving teachers assigned to students. Advising sessions take place during midterm and before the beginning of the term to advise students about the future path. There were no learning analytics initiatives implemented, and career directors have to consult different academic reports to inspect academic situation of students.

4.2. Case B: Austral University of Chile (UACh)

At UACh, as in most of Chilean universities, curricular plans have a fixed structure in which the study sequence is predefined with a strong course prerequisite structure. Higher fail rates delay students in their academic plan early on and high cost of study pushes students to try to catch up as much as possible, resulting in a considerable number of special requests for registering courses for which students don't have all prerequisites. Starting each term, program directors have to decide on hundreds of special course registration requests, which require to inspect academic situation taken snippets of information form different parts of the current system. Thus, program directors perform advising tasks in many cases. A dashboard for academic information could support their work.

4.3. Case C: ESPOL

Since 2013, ESPOL in Ecuador has implemented systematic advising to help students detecting their strengths and needs. Teachers are assigned students based on their current administrative workload (the less workload, the more advising work assigned, in average 20). The advising sessions are held twice every semester: before student registration, and mandatory during midterm for students with low achievement (GPA below 7) or retaking a subject. Freshmen do not attend advising sessions because courses are automatically registered.

Advising meetings can last 15 minutes or more. Students have to fill out a survey assessing the advising session afterwards, and it is a condition to enable course registration for the upcoming semester. The advising process is explained to new teachers and students before entering ESPOL.

An information system support the advising tasks and shows different panels about personal data (e.g name, ID number) and academic data (e.g academic history, progress, credits passed, etc). The term by term information is shown on different pages, thus if a teacher wanted to look for older records, he/she should click on "next", losing the view of the previous page. In this context, LALA proposed to enhance the current system adding learning analytic visualisations.

5. Dashboards

5.1. LISSA dashboard

LISSA (Figure 1) is a dashboard at KU Leuven supporting the adviser-student dialogue by empowering advisers with visualisations of data underlying the student's career path and the study program (Charleer et al. (2018); Millecamp et al. (2018)). Advisers are responsible for the study advice and content-related support for first-year students. They are experts in both the content of the first-year courses, the organisation of the program, and the program-specific and university-wide regulations.

LISSA provides an overview of first-year students' key moments in chronological order: the grades of the positioning test (entry-exam without consequence), mid-term tests, January exams, and June exams. A general trend of performance at the top shows the position of the student among their peers per key moment. Every course taken is tiled, showing name and obtained grade (out of 20). A green, orange, and red colour coding represents successful exams, tolerable grades (students can request to pass a limited number of 8–9/20 grades), and failed courses. Clicking on a tile displays a histogram of performance of peers and the position of the student among them.

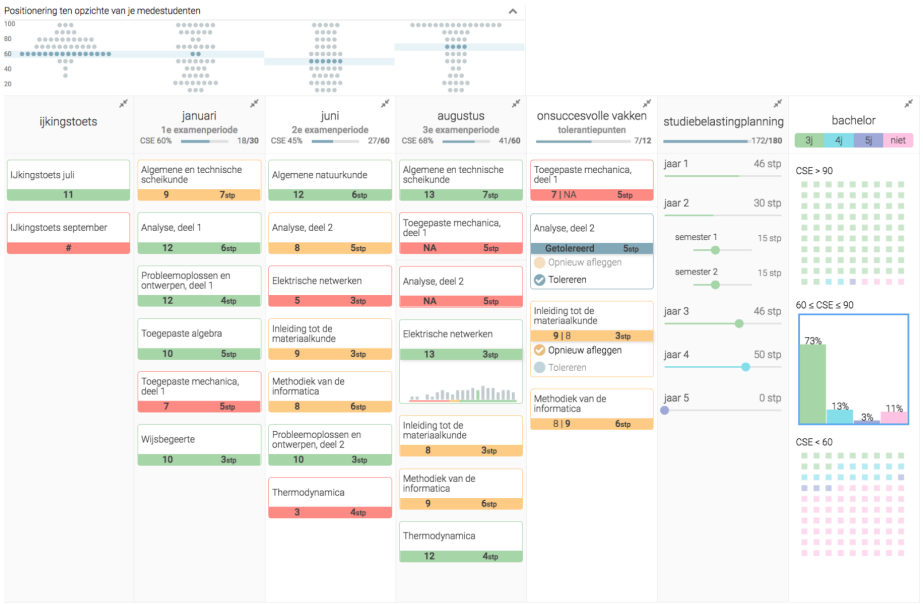

Figure 1: LISSA dashboard for academic advising (Charleer et al. (2018); Millecamp et al. (2018))

Unit charts provide historical data of students for three student profiles (defined based on the number of obtained credits) with their time-to-graduation distribution shown when hovering the chart.

Other modules depend on the time of advising. One module supports the planning of re-sits in summer by allowing to select courses and representing (visually) the percentage of students that passes the same number of re-sits in the past.

LISSA was deployed in 26 programs at KU Leuven, hereby supporting more than 110 academic advisers. LISSA is currently being integrated in the university, and hereby expected to be scaled-up in the academic year 2020-2021.

5.2. Dashboard adaptations and contexts

A summary of contextual reasons for adaptations framed by the COALA framework is presented in tables 1, 2, 3, 4, 5 and 6. The first columns list common objectives, stakeholders, key moments and interactions with the dashboards. Differences and similarities with the baseline dashboard LISSA and

between the cases are represented in the second and third column, respectively. From these tables, important issues are revealed and bullet-pointed here.

- The three cases agreed on the importance of combining curricular structure information and academic records to *see* student's progress in long careers programs (5 years, more than 50 courses). While Cuenca and UACh opted to present this information together in an overlaid layout, ESPOL, already having a curricular structure tab in the system, added a visualisation of the academic history similar to LISSA. The overlaid layout is a major change with respect to LISSA and breaks the original layout in two: the term by term structure and the term by term student history.

- All cases include features that compare a student with peers. While in LISSA this comparison is to the same cohort peers (because it serves first year students only), in Latin American cases comparisons range from classmates to all students in the same term, all students in the same program, all historic data, etc.

- Advising approaches are very different when we look at the interactions and key moments: face to face (LISSA, ESPOL, Cuenca) or not (UACh), to plan the next term (Cuenca, ESPOL), or to reflect about performance at exams (LISSA) or midterms (Cuenca, ESPOL), or for advisors to make decisions (UACh). Since Cuenca and ESPOL use the dashboard for face to face student-advisor sessions at the time of course registration, the tool needs to provide features to plan the next term with supporting information about aggregated workload and difficulty.

Table 1: Objectives of dashboards, adaptations and context (part 1)

Objective	Context and features in LISSA	Context at LA	Adaptation in dashboard	A Cuenca	B UACh	C ESPOL
Grasp the current academic progress of a given student	Progress is understood as credits passed in the first year exams which are colorcoded to reflect performance	A, B, C : progress is understood as the courses passed with respect to the whole curricular structure of the program.	overlaid academic history on top of the curricular structure	X	X	
			separate curricular structure and visualization of academic history term by term			X
Identify courses passed, failed, dropped, delayed, and repeated	Credits obtained determine if each exam is passed or failed with a range of uncertainty in between (orange zone).	A, B, C: final grades of courses determine if students passed or failed A, B, C: dropped, delayed and repeated courses help understand academic history	passed and failed courses are colorcoded, no "orange zone"	X	X	X
			each course is shown once (overlaid layout) and repetitions are marked with extra visual features	X	X	
			courses are shown each time taken (academic history)			X
			associate courses to areas (general, speciality, etc)	X		X
			overlaid layout allows to easily identify delayed courses	X	X	
			dropped courses are explicitly marked	X	X	
Grasp evolution through terms of the academic life	Summary of performance by exam date is plotted to be able to identify trends on performance during the first year	A, B, C: summarized display of term by term information needs to combine performance and course load	show term by term plot of GPA	X	X	X
			show term by term course load	X		X
			linking term by term plots with overlaid layout	X	X	

Table 2: Objectives of dashboards, adaptations and context (part 2)

Objective	Context and features in LISSA	Context at LA	Adaptation in dashboard	A Cuenca	B UACh	C ESPOL
Identify prerequisites met for a given course	Prerequisite relationships between exam subjects exist, but for the first year this information is not critical in the dashboard	A, B, C: prerequisite relations constraint courses to take A, B: prerequisite relations on a 10 semester (more than 50 courses) program may clutter	prerequisite relations shown backward and forward in the curricular structure	X	X	X
			show prerequisite relations only on demand (for a given course)	X	X	
Compare student performance to peers	Comparing student's performance to group motivates reflection and it is valuable for advising. It is sensible information, thus the advisor decides if showing the histograms of grades in advising sessions	A, B, C: comparisons are needed at different scopes (same cohort, same term, same parallel group) A, B, C: comparisons in term by term summary and at course level A, B : concerns exist in showing comparison information	comparing grade distributions on the same class (same term and same parallel group)	X		X
			comparing grade distributions on the same term		X	X
			comparing historic grade distribution		X	
			comparison features at course level are shown on demand	X	X	
			comparison features of term by term performance shown on demand	X		
			term by term summary compared to program averages		X	X
			term by term summary compared to same cohort averages			X
			term by term summary compared to same class averages	X		

Table 3: Objectives of dashboards, adaptations and context (part 3)

Objective	Context and features in LISSA	Context at LA	Adaptation in dashboard	A Cuenca	B UACh	C ESPOL
Plan course registration for the next term	Exams plan is a common task in advising sessions where implications on academic load and risk of failing is judged given the performance in the past and historic information.	A, C: course planning is a central task in advising sessions and needs information of course load and difficulty C: course planning module already existed lacking display of course load; advisors need to assess their past planning recommendations B: not implemented because of focus on special requests rather than face to face advising	display accumulated load on planned courses distinguishing theoretical, practical and autonomous hours	X		X
			on available courses display past performance indicators and associated load	X		
			planned courses can be compared with previous term loads taken by the student	X		X
			recommend courses for which prerequisites are met	X		X
			allow advisors to see past planned and taken courses			X

Table 4: Stakeholders of dashboards, adaptations and context

Stakeholder	Context and features in LISSA	Context at LA	Adaptation in dashboard	A Cuenca	B UACh	C ESPOL
Advisors	Advisors are professionals with training in academic advising whose main task is to perform advising sessions	A, C: advisors are teachers assigned to a number of students according to their current work load B: advisors are program directors, each can serve hundreds of students A, B, C: special access is given to super users or welfare department who need to inspect academic information on special cases	advisor role can access certain assigned students			X
			adivisor user can access all students in a specific program	X	X	
			special roles enabled to access all students in the institution	X	X	X
Students	It is important to deploy advising platform for the first year students given that access to the university does not have selection process at KU Leuven. Students do not access the dashboard by themselves.	A, B, C: adivising tasks are supporting all year students in programs that last for 4 or 5 years and that have different schemas and characteristics (specializatons, internships, different grading schemas, etc) A, C: not used by students alone B: student access is possible and recommended by advisors	support for specialization curricular branches and optative courses	X	X	X
			support for different grade schemas		X	
			support for programs that combine anual, semestral and/or summer courses		X	X
			comparison features can be hidden when students are present	X		
			student user can access to her own data		X	
			add information of extracurricular activities			X

Table 5: Key moments of dashboards, adaptations and context

Key moments	Context and features in LISSA	Context at LA	Adaptation in dashboard	A Cuenca	B UACh	C ESPOL
At course registration period	only limited advising is done at the beginning of the first year	A, C: advising sessions occur at the beginning of the term to helps students plan courses to take B: advisors decide on special course registration requests	special module to recommend courses for the next term	X		X
Within the semester	Advising sessions occur after evaluations, when students receive grades	A, C: midterm advising sessions are supported by showing partial grades B: advisors decide on course dropping requests; advisors meet students anecdotally on their request and may use the dashboard	show partial grades (midterms)	X		X
			show current term registered courses	X	X	X
			allow advisors to report to welfare department			X
			display student wellfare information			X

Table 6: Interactions of dashboards, adaptations and context

Interactions	Context and features in LISSA	Context at LA	Adaptation in dashboard	A Cuenca	B UACh	C ESPOL
Face to face student-advisor	LISSA is used exclusively for face to face student-advisor sessions and privacy policies requires explicit authorization from the student.	A, B, C: No special feature is needed to ensure authorization for accessing academic information other than authentication and role. A, C: face to face sessions are systematized as short meetings which stress the need to present relevant information condensed; some advising sessions has the goal of planning next term coursesC: advisors only have access to the system during face to face sessions	support schedule and notification for advising sessions			X
			allow advisors to record general observations	X		X
			module to plan next term courses	X		X
			display past advising sessions information			X
			system open and closes on specific time (only for sessions)			X
Advisors alone	Advisors can access the system for students he/she is advising	A, B: advisors can access academic information at any timeB: advisors decide on special course registration and dropping requests	allow advisors to record general observations	X		
			System can be used at any time by the advisor	X	X	

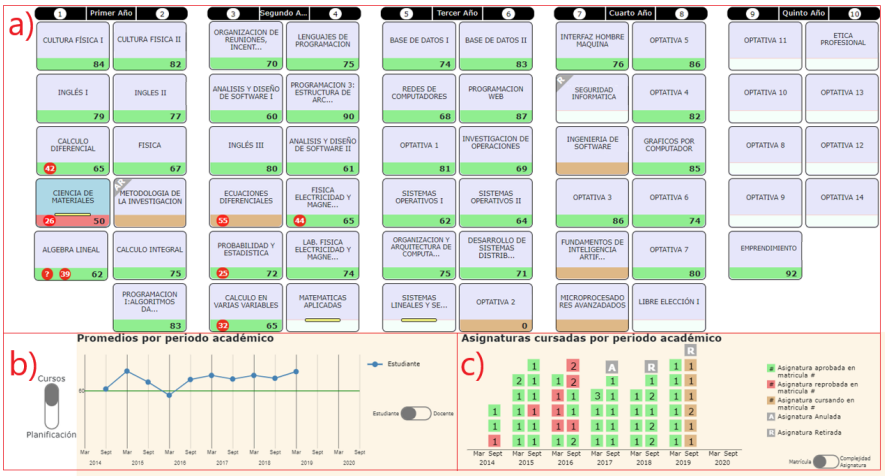

Figure 2: Academic advising dashboard in Cuenca

5.3. Case A: advising dashboard at Cuenca

AvAc (from spanish "Avance Académico") inspired by the other cases and the baseline dashboard LISSA, was built by applying a user-centered design through interviews and focus groups (Figure 2). The main window is divided into three linked visualisations summarising study progress and performance. Curricular structure visualisation (see Figure 2 - a) shows courses and the corresponding grades. Colours and other visual elements represent academic records (courses passed, failed, repeated, dropped, canceled, delayed and registered). By clicking on a course, *pre-requisites* and *post-requisites* are highlighted, and details of the course clicked are displayed. Historic performance visualisation (see Figure 2 - b) shows the term by term plot of student's average performance and, on demand, comparison with the performance of students in the same class. A historic course workload visualisation (see Figure 2 - c) shows term by term course load, the performance on these courses (pass/failed/dropped), and course difficulty which is represented by aggregated academic records of the course (fail rates) and the number repetitions.

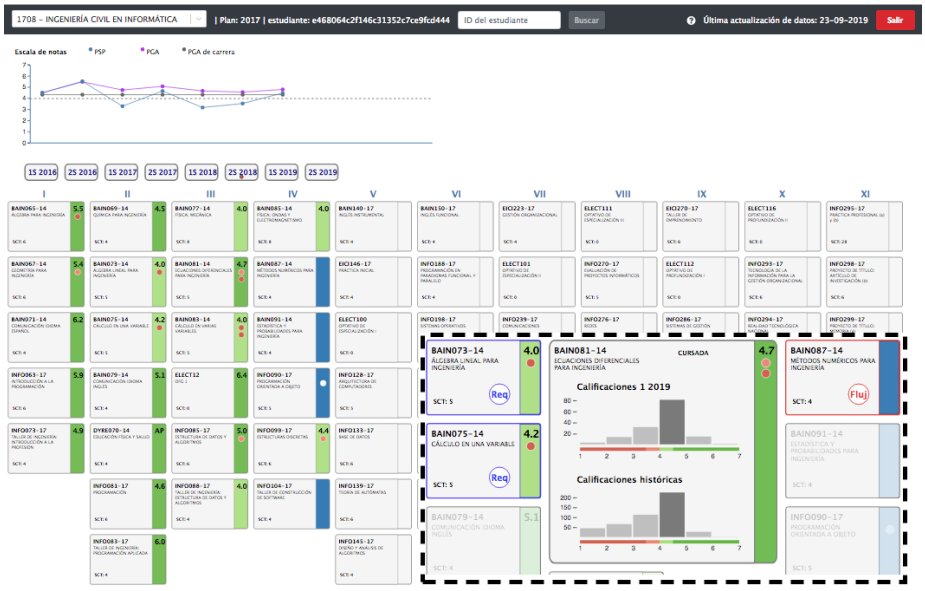

Figure 3: TrAC dashboard. The segmented border box in the bottom right is added to show when a course is clicked.

5.4. Case B: advising dashboard at UACh

Case B (UACh) developed TrAC (from spanish "Trayectoria Académica y Curricular") shown in Figure 3. Details of the participatory development of TrAC and its functionalities are described in Guerra et al. (2019); Chevreux et al. (2019). Similar to Cuenca's dashboard, TrAC overlays academic records on top of the curricular structure, as this is the "natural" form in which academic progress is understood at the institution. Clicking a course shows details and two histograms of grades (1.0 to 7.0, passing grade is 4.0), one for all past academic records, and another only considering classmates. Clicking a course also highlights pre- and post-requisites of the course (see the segmented box). The chart at the top of Figure 3 displays the student term by term averages performance. By clicking on the buttons on the x-axis (which are the student's terms), courses taken that term are highlighted in the main area with their corresponding status (grade, pass, failed, dropped) on that term. In this way, advisors can navigate the student academic history "back in time".

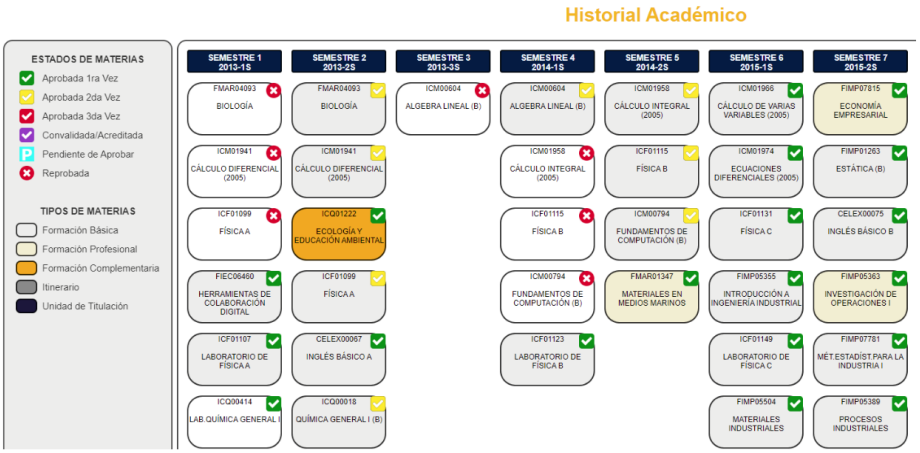

Figure 4: Academic history visualization in ESPOL dashboard

5.5. Case C: new visualizations for dashboard at ESPOL

At ESPOL, the existing information system used in advising was improved with three visualisations. Figure 4 shows a term by term layout arranged similar than the baseline dashboard LISSA, showing courses taken each term with grades, number of times taken, status (e.g failed, passed) and who the teacher was. Clicking a course displays details of average grades and peers comparison.

A second visualisation complemented the course planning module (Figure 5) displaying weekly workload (hours) and difficulty of the courses added to the plan. This provides enough data to advisors to make sound decisions instead of relying only on their previous experience.

The third component adds a new window to inspect the academic history of the student, term by term, and includes performance summary and comparison to peers, summary of courses taken versus courses suggested by advisors, and information provided from advisor to the Welfare Department (Figure 6).

6. Pilot and results

6.1. Case A - Cuenca

Cuenca faces the challenge of adopting both a tool and a process with no academic advising experience available. Therefore, the pilot started with se-

Figure 5: Course planning module with visualizations of course load in ESPOL dashboard

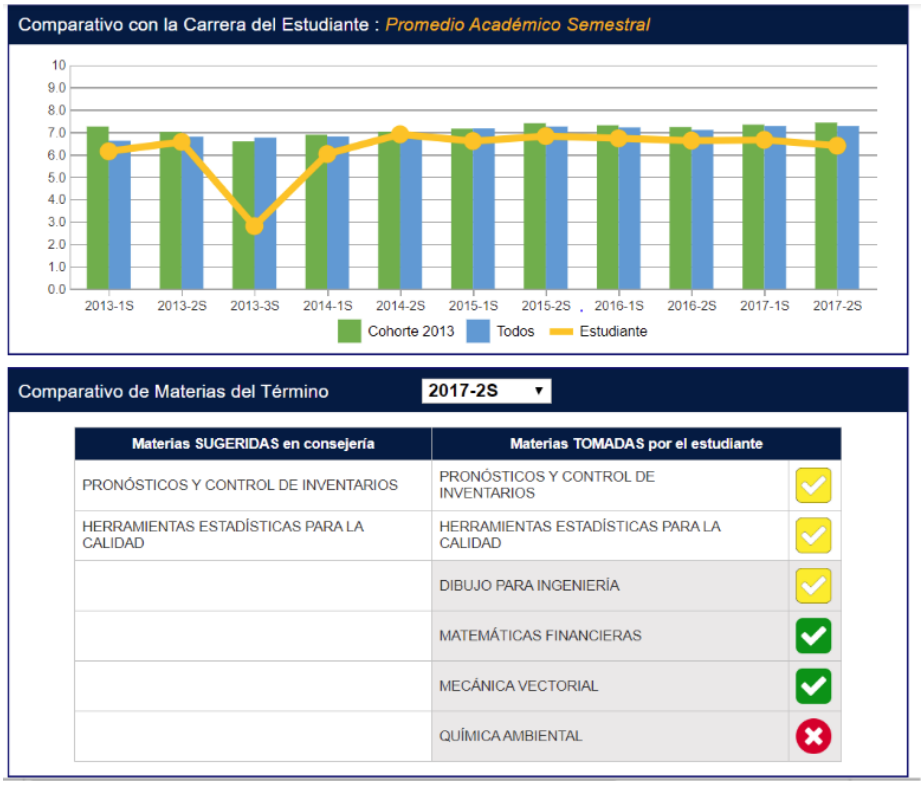

Figure 6: Term by term academic summary, ESPOL dashboard

lecting enthusiastic teachers. The *Agreement* phase recruited 75 teachers and staff of eleven programs belonging to Engineering, Economic and Administrative Sciences, Chemical Sciences, and Hospitality schools (close to 50% of the university schools).

Training was implemented in four sessions and results of the baseline survey are summarised in figures 7 and 8 and revealed that it is important that the university offers students a face-to-face support service during the request process, and improves the support for enrollment and cancellation requests. The number of special course registration requests are 50 or more per school and each request takes between 2 and 5 minutes (figure 7). Participants agree on displaying the academic information as a dashboard, which will be much better that navigating different reports. However, some participants were worried about having extra workload because of the need to adopt both a tool and an advising process.

Four additional training sessions, one per school, took place after introducing some improvements (e.g. show cancellation of subjects per term, allow to analyse historic program structures). At this time, deans assigned program heads and members of the Academic Committee of the programs as advisors.

The *Use* phase had (at the moment of writing this paper Cuenca has not closed the pilot) 31 advisors actively using the tool. Log data reveals that 522 students have been inspected and 178 attended advising session by invitation, plus 6 attending by their own interest. Only 25 of them answered the survey and results are shown in Figure 9 and are, in general, positive. Students think the dashboard improves the advising session, and made them think more about their academic situation. However, it seems that it is not that easy for students to recognise their own academic situation, which is not critical due to the fact that dashboard is accessed in advising sessions with an advisor present.

6.2. Case B - UACh

TrAC's pilot started early 2019 with 14 program directors from different programs and three different campuses, covering around 20% of all programs

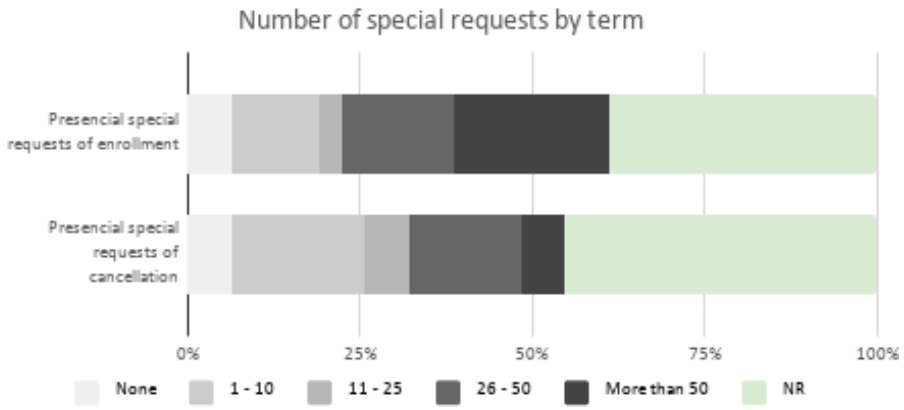

Figure 7: Number of special requests by term (Cuenca, Agreement phase)

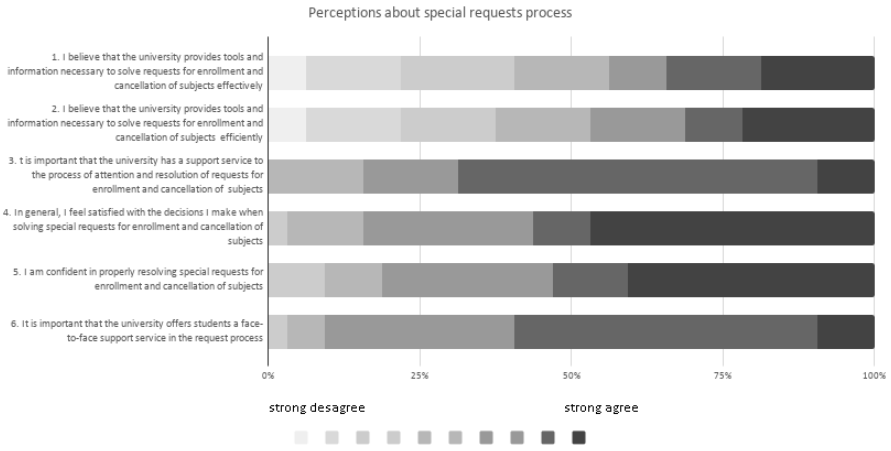

Figure 8: Perception about special requests process (Cuenca, Agreement phase)

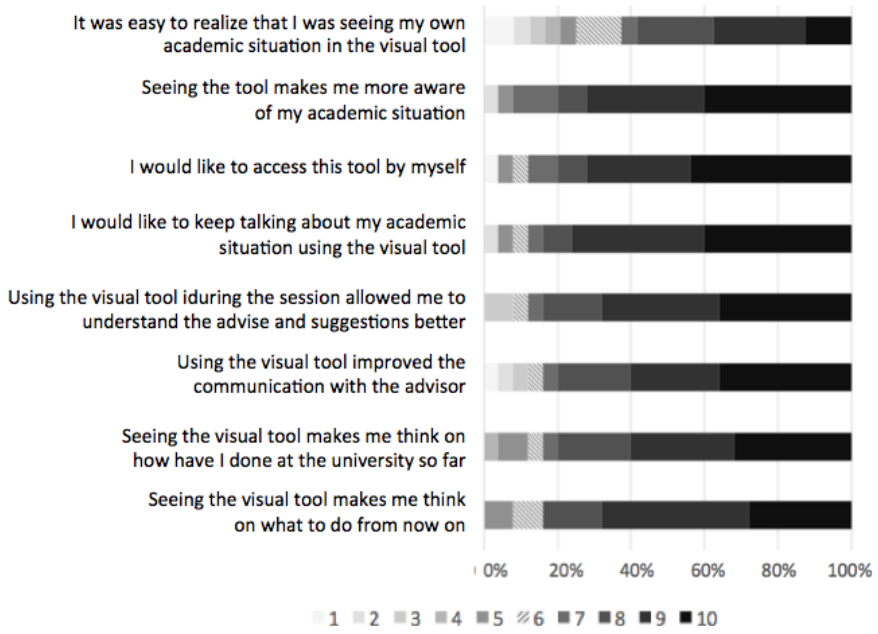

Figure 9: Students' perceptions about the dashboard (Cuenca, Use phase)

offered at UACh. Not all advisors participated in all sessions. Results of *Agreement* phase surveys are summarised in figures 10 and 11. Results reveal that the number of special course registration requests to be solved are considerable (from 50 to 300) and take considerable time (each request more than 5 minutes). Discussion and comments during the *Agreement* session revealed that directors welcomed the idea of a tool that could make this process easier. They stressed the issue of having to access information from different parts of the current system which translates in time, confusion and potential mistakes while deciding.

The *Training* phase had to be delayed to the last days of the period in which the advisors decide on special course registration, thus some participants already had that work finished or were well advanced.

During the *Use* phase, 11 participants provided feedback on usefulness and impact. In this session, some improvements on the dashboard were also introduced (e.g. show currently registered courses). Results, reported in figures 12 and 13, show that TrAC allows them to make better decisions, to better explain

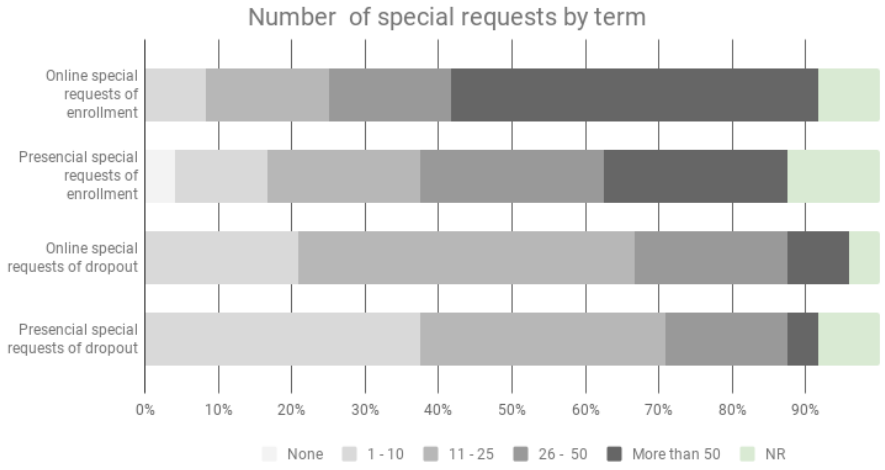

Figure 10: Number of special requests by term (UACh, Agreement phase)

these decisions and potentially reduce errors. They would like to keep using the tool. Interestingly, the survey also revealed that TrAC has not necessarily changed the process they follow to solve the requests, nor provided new or more information. The group discussion identified reasons: TrAC provides the same information already available, but joined in an easy to use display, avoiding the need to go back and forth between parts of the current system and saving time. However, advisors still have to use the current system to submit request decisions. Additionally, directors agreed that TrAC is very useful, even though the tool was released just before the period to solve requests ended. Directors reported using the tool to verify requests and inspect some student cases. At least two participants quickly spotted problems in the (pre) requisite structure not noticed before in the current system, which caused increasing number of special requests.

Also in the *Use* phase, log data collected by the system shows different levels of usage. All users inspected a total of 141 student situations (avg 8.8), and performed more than 2000 actions (avg 137.6). Nine users performed more than 100 actions (max 481). We think that this data is encouraging considering that the pilot started late in the academic term.

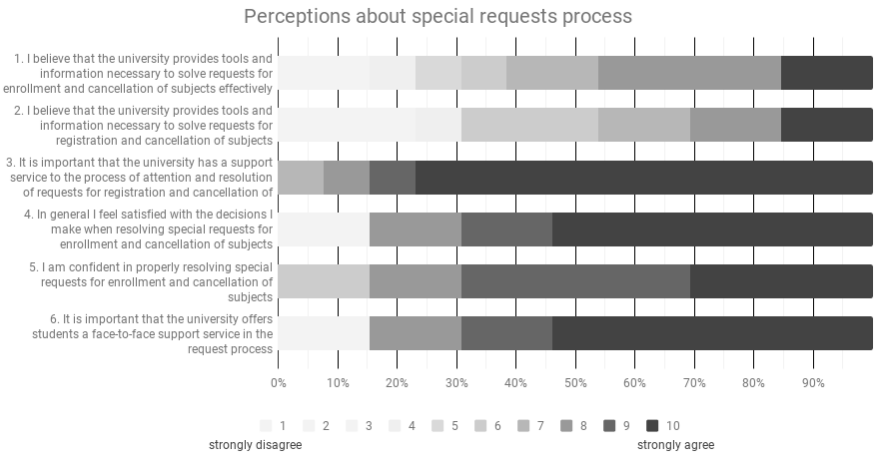

Figure 11: Perception about special requests process (UACh, Agreement phase)

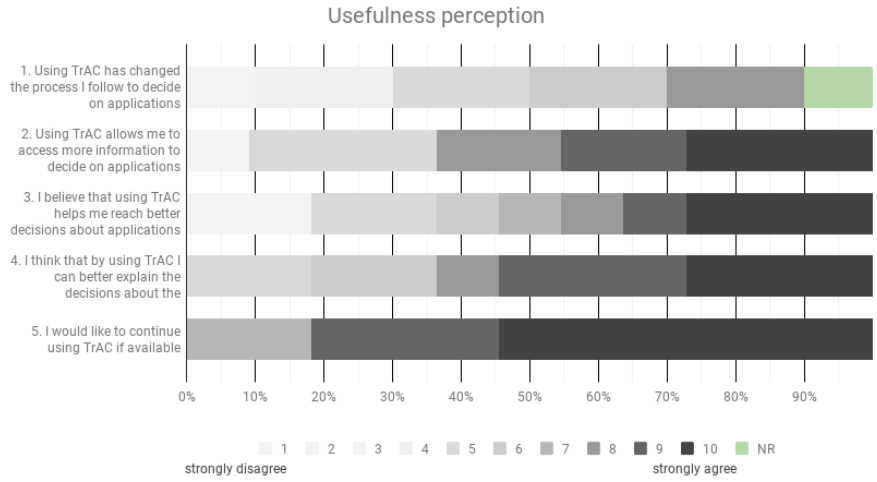

Figure 12: Perceived usefulness of TrAC (UACh)

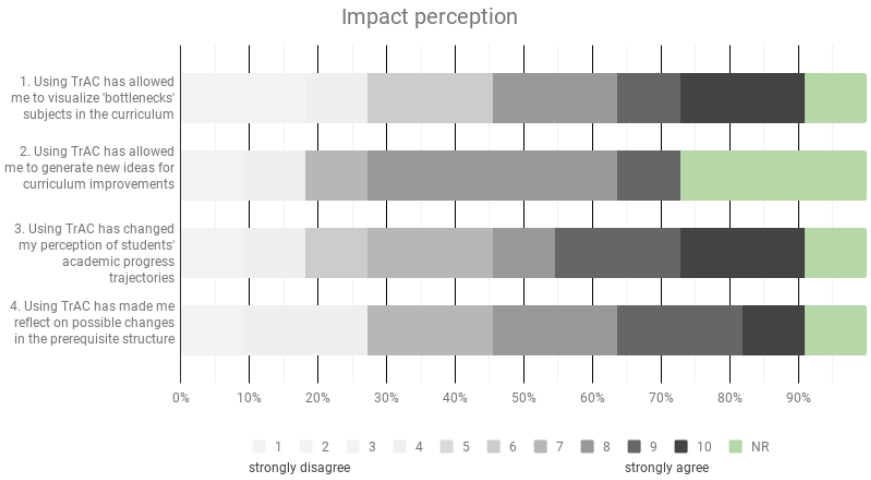

Figure 13: Perceived potential impact of TrAC (UACh, Use phase)

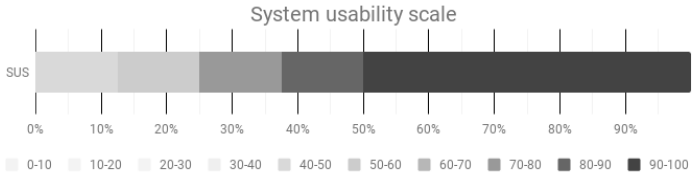

Figure 14: Distribution of SUS score for TrAC (UACh, Improvement phase)

Eight users participated in the *Improvement* phase. The System Usability Scale (SUS) results averaged 76.9, which is considered good. The distribution of the score is shown in figure 14. Results on the impact and utility of the dashboard are shown in figure 15. Results showed positive evaluation of the dashboard especially in making the work more efficient and effective, and providing means for explaining decisions better.

6.3. Case C - ESPOL

At ESPOL, the new visualisations and information displayed were piloted in regular advising sessions at the whole institution during 2 semesters in 2019. Out of 341 advisors at ESPOL, 187 were engaged (*Agreement* phase) and attended the training sessions, and 117 answered the pre/post questionnaire. The

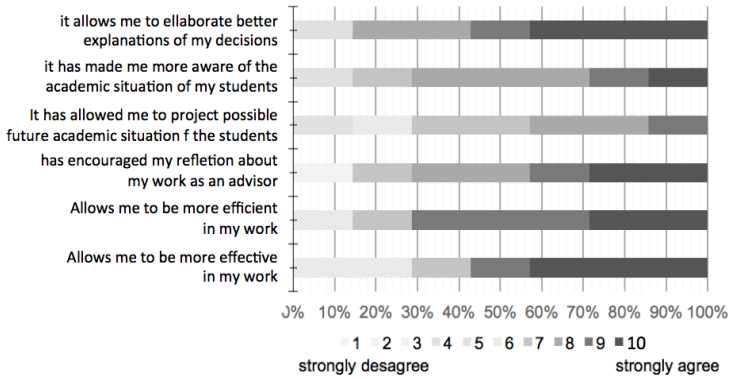

Figure 15: Survey on impact and utility of the dashboard (UACh, Improvement phase)

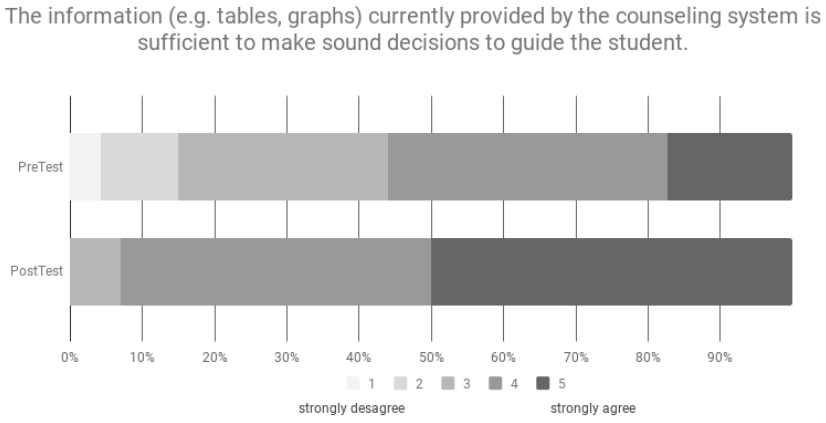

Figure 16: Pre and post-tests for new visualisation in counselling tool (ESPOL, Agreement and Improvement phases)

responses are distributed as shown in Figure 16. Higher rates of higher agreement is clear evidence of the utility of the new visualisations.

Free text comments complemented assessment referring to the complexity of the data "It is difficult to interpret and relate to the data presented by the student and the information available in the platform"; to the current display features "table are not so friendly. You cannot quickly observe subjects approved in previous years and grades, but you have to enter another section of the system"; to the availability of information "there is a lot of information that should be accessible from the same counseling [advising] page, an that is

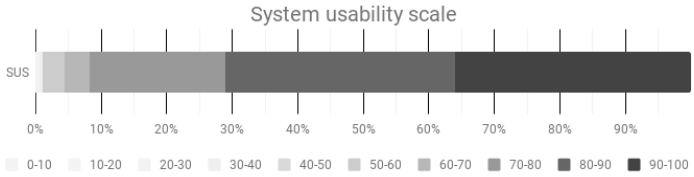

Figure 17: Distribution of SUS score for counselling tool (ESPOL)

important information for the student (study and food scholarships , exchanges, financial aids) and that many time we don't have at hand".

Similar comments collected in the *Improvement* phase (post-questionnaire) revealed positive perception of the new features: "The information to advise students is clearer and more accessible, which allows you to see in a faster and easier way what has happened during the student's career, to know what is the possibility that he or she will lose the race and give a more adjusted way to the student reality recommendations"; "The new features are very useful to properly guide the student".

During the *Training* phase, 183 advisors answered the SUS (System Usability Scale) questionnaire where an aggregate score of 83.6 was obtained which is considered excellent. The distribution of the score is shown in figure 17. Log data of the *Use* phase, captured during the two semesters in 2019, is summarised in Table 7.

7. Discussion

RQ 1 "How does the context of Latin American HEIs influence the adaptation of an advising dashboard designed in a European University?" is addressed by presenting the experience of three cases of Latin American Universities, contrasting between them and the original LISSA dashboard. The COALA framework helped us reflect on how our contexts, our needs, influence the technical decisions to design the system. Even when the objectives are the same (e.g "Grasp the current academic progress of a given student"), differences aroused when considering stakeholders, key moments and interactions (e.g. advising is

Table 7: Logs of use of Visualizations (ESPOL, Use phase)

Term		Number of Teachers	Number of Students	Percent of Students
First semester 2019	Stakeholder involved in counselling	317	7714	
	Using three visualizations	177	1035	13.41%
	Using two visualizations	250	2221	28.53%
	Using one visualization	287	3655	47.38%
	Using none visualizations	12	823	10.66%
Second semester 2019	Stakeholder involved in counselling	322	4850	
	Using three visualizations	91	227	4.68%
	Using two visualizations	132	416	8.57%
	Using one visualization	151	532	10.86%
	Using none visualizations	61	3675	75.77%

implemented online, or through face to face sessions). Main contextual aspects revealed are:

- In all Latin American (LA) cases, the academic information needs explicit display of curricular structure. Academic progress is understood as an overlay of the courses passed on top of the program structure. This is a clear difference with the context of LISSA. Both Cuenca and UACh opted to incorporate both aspects to the main display of the dashboard, while ESPOL, already having a dashboard running with a view of the curricular structure, opted to follow LISSA's approach.

- There are different levels of systematisation and different approaches regarding advising procedures in the LA institutions. ESPOL already having advising processes running opted to complement the existing dashboard with visualisations designed to facilitate academic inspection and further face to face advising sessions. Cuenca, starting a new advising procedure,

seeks to adopt a similar procedure, targeting advisor-students face to face sessions. In these both cases, the dashboard includes a course planing tool, as a mean to support face to face sessions.

- While LISSA is used to advise first year students, the adapted dashboards will be used with all students of long study programs, which demands more information to be displayed including pre-requisite structure, and term by term student trajectories. More information displayed also allow LA dashboards to set different peer-comparison scopes (same cohorts, same term, all past students).

Commonalities and differences open opportunities for research. For example, research could shed light into concerns regarding comparison to peers and give recommendations of how to frame and show comparisons minimising potential negative effects.

We applied the COALA framework *post-facto* with the intention of organising and presenting information on the experiences on these 2 years of the LALA project. However, we think that using this framework could bring the attention to relevant aspects that may be hidden when starting adaptation of learning analytic tools, and help institution to progress along this line even if they don't count on the support and funds of a project such as LALA.

Pilots provided evidence of the perceived positive effects, in terms of satisfaction, utility and potential impact of the dashboard implementations, addressing RQ 2 "How do the adapted dashboards support advising processes in the LA institutions?" Advising tasks, even when not officially implemented, consume considerable amount of effort as evidence by the baseline collected by UACh and Cuenca, and the dashboards contributes to facilitates these tasks. Again, differences in the prior state of advising procedures shape pilots and dashboards' contributions. At ESPOL -new features in an existing dashboard- advisors positively evaluate new features in supporting decision making during advisor-student sessions. At UACh -new tool to support special request for course registration and dropout-, users indicated that the dashboard facilitates

their work, reduces time and allows them to better support their decisions. The case at Cuenca -new tool and a new advising process- started with academic-advising enthusiastic teachers and only has preliminary results which, similarly than at UACh, are steps forward to implement and systematise advising and scale up adoption.

8. Conclusions

This paper presented adaptation and pilot cases of advising dashboards in three Latin American universities which diagnosed academic advising as a key need. Adaptations started from LISSA, an academic-advising dashboard from KU Leuven, and resulted in different implementations to fit contextual requirements of the cases, spanning from having no experience nor tools (U. Cuenca), to already institutionalised and systematic advising procedures (ESPOL). To present details of adaptations rationale and contextual reasons we used COALA, a framework proposing four perspectives: objectives, stakeholders, key moments, and interactions. Using COALA, important differences arose when trying to justify the observed adaptations. For example, displaying comparison features respond to different concerns (showing/hiding), and different comparison targets (comparing to class peers, same cohort, all students in the same term, all historic data.)

Pilots were designed and implemented coordinately through the LALA project. Pilots provided evidence of the positive effects, in terms of satisfaction, usefulness and impact of the dashboard implementations. Pilots were different mainly because of the different level systematisation of the advising procedures at the Latin American (LA) institutions. ESPOL deployed new learning analytics in an already existing tool used in institutionalised advising process at the whole university scale. In this context advisors positively evaluate new features in supporting decision making during advisor-student sessions. UACh deployed a new tool, separated from existing academic information system, to be used originally by advisors alone when deciding on special request for course registration

and dropout. Advisors at UACh indicated that the dashboard facilitates their work, reduces time and allows them to better support their decisions. Cuenca deployed a new tool and a new advising process, and started with academic-advising enthusiastic teachers. Preliminary results allow UACh and Cuenca teams to validate the tool and to generate supporting material to implement advising and scale up adoption.

There are no general truths in adopting learning analytics, because adaptations need to fit the context. However, the three cases represent a broad spectrum of different realities regarding advising processes and tools in Latin America and we expect the information presented here can help other initiatives in advancing towards successful adoption. Combined experience informs us of the importance of starting to deploy learning analytics with existing data (for example academic records) and in existing processes. Moreover, at the moment of writing this paper, four other LA institutions are starting to adapt the dashboards presented in this paper with the support of LALA Project partners.

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Statements on open data, ethics and conflict of interest

Details of the adaptation process, code and piloting can be accessed through the LALA Project website https://www.lalaproject.org/deliverables/

Permission was asked from the university authorities and people involved (teachers, students) to carry out this research. All analyses were performed on anonymized data from advisors and students. Signed consent were collected from surveyed users.

All authors confirm they do not have any potential conflict of interest in the work reported.

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