# APPLICATION OF LEARNING ANALYTICS TECHNIQUES ON BLENDED LEARNING ENVIRONMENTS FOR UNIVERSITY STUDENTS

Universida<sub>de</sub>Vigo

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#### Motivation of the work

The emergence of E-Learning platforms is changing not only distance education but also face-to-face education. One of the biggest challenges when talking about educational platforms is the testing and dissemination of knowledge.

Unfortunately, these platforms do not provide specific tools to allow educators to thoroughly track and assess all learners' activities while evaluating the structure and contents of the course and its effectiveness in the learning process [1].

Currently, it is innovating the learning process with various techniques, but has not been able to measure the degree of learning acquisition.

On the other hand, there is a boom in message analysis but these are still far from the educational field, however, these messages could offer us important information about the student.

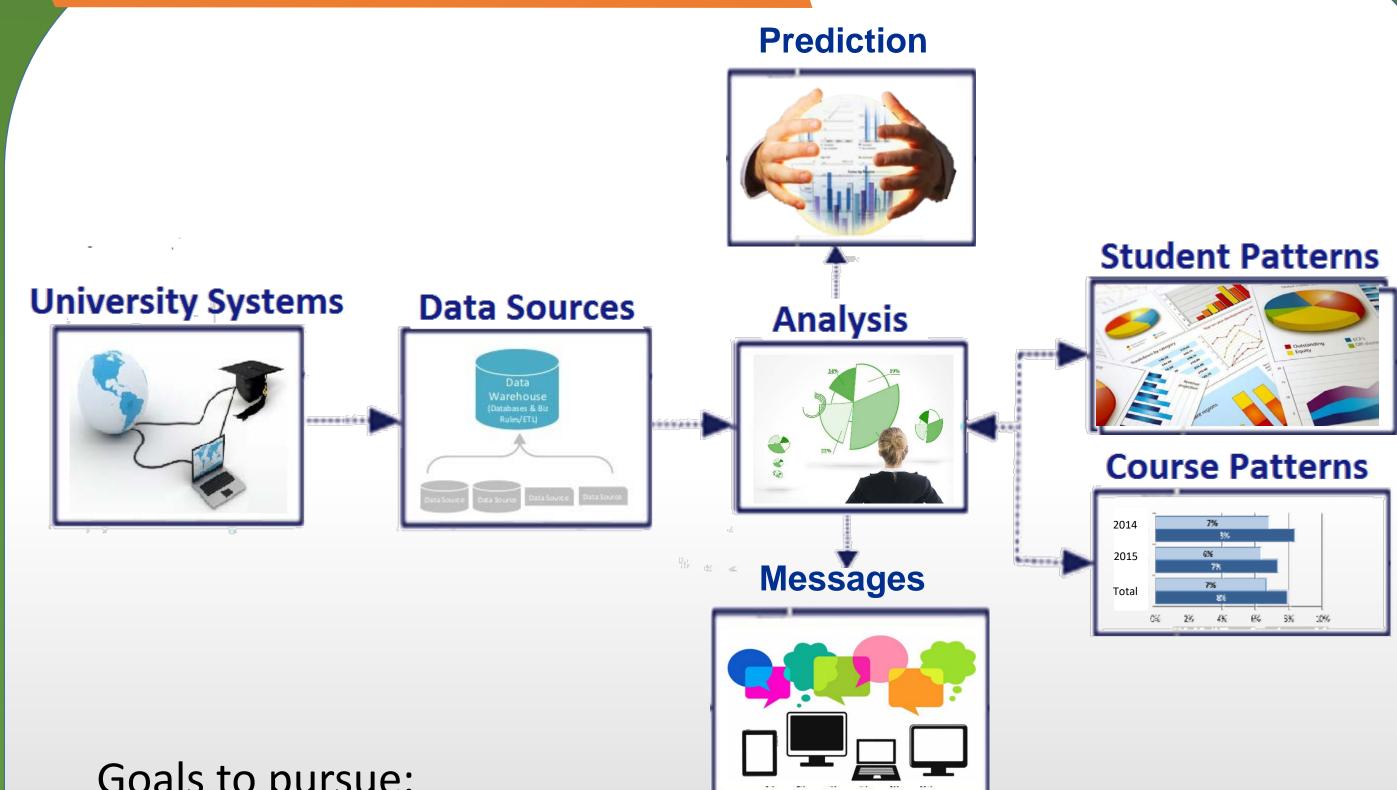
#### Research Plan

- Analyze the state of the art in learning analytics.
- Literature review and knowledge about the environment (Learning Analytics, E-Learning, Educational Data Mining, Learning Process, etc.).
- Exploratory analysis of the data obtained from the E-Learning platform.
- Use "classic" statistical techniques (clustering, time series, etc...) to study the relationships between students' behavior on the platform with their final grade.
- Analyze learning analytics techniques to select the best option. Implement a classification algorithm of students based on the interaction of students with e-learning platforms.
- Apply an experimental methodology that combines learning analytics techniques in the field of data analysis (linear regression, clustering and classification techniques) with technological contributions.
- Improve the classification algorithm of students and subjects in order to predict final grades of students based on their interaction with the platform.
- Propose a new taxonomy to classify students based on two types of interaction (content and social interaction)
- Detect the different types of students by applying clustering methods to improve the design of continuous assessment.
- Validate the previous tecniques with real data from the platform faiTIC of the University of Vigo.
- Look for new alternatives to analyze interpersonal interaction. Analyze the content of the messages sent by students within the platform.
- Qualitative analysis of messages according to the five proposed profiles.
- Dissemination of global results in prestigious international forums in the field.

Develop plugins for the e-learning platform to put into practice the studies and algorithms developed.

- Look for collaborations with Mexican institutions to deeper the research.
- Thesis paper preparation.[80%]

# Objectives

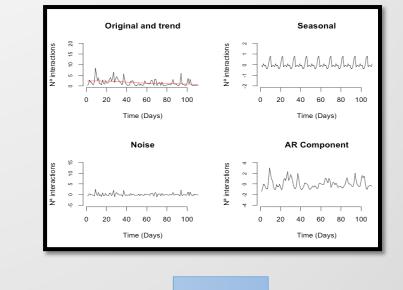


Goals to pursue:

- Analyze the relationship between the frequency of interaction and the acquisition of knowledge reflected in the academic performance of students.
- Detect behavioral patterns of students and design patterns of courses.
- Infer the student's grade based on their interaction with the e-Learning platform.
- Propose a classification of students based on their interaction, behavior and performance.
- Analyze the content of the messages sent by the students.
- Recommendations of design for academic courses

## Preliminary Results

[2], the analysis shows different profiles of interactions student-platform and correlation with grades.

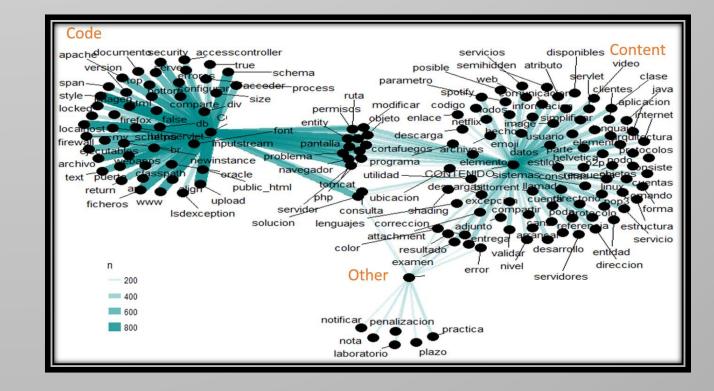


We proposed a new taxonomy (classification) based on types of interaction (content and social), which was based on Bento's taxonomy. [3]

rsonal ction 3H	Quadrant III		Quadrant IV	
	"Social Participants"		"Active Learners"	
Interpersonal Interaction HIGH		Quadrant V "Medium Quadrant"		
nterpersonal Interaction LOW				
erpe ontera LC	Quadrant I			Quadrant II
Int	"Missing in Action"		"Witness Learners"	
	Interaction with Content LOW		Interaction with Content HIGH	

	8 <sup>th</sup> week		
Quadrant	1° approach	2° approach	
Quadrant I	1,43	1,32	
Quadrant II	0,72	0,57	
Quadrant III	1,75	1,58	
Quadrant IV	1,56	1,58	
Quadrant V	1,47	1,42	
average	1,39	1,29	

After classifying, we predict the final grade with a Multiple Linear Method at three control points (8th week, 12<sup>th</sup> week and 14<sup>th</sup> week) [4].



We analyze the content of the messages according to the taxonomy to verify if each profile different kind of participation [5].

### References

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- [1] M. E. Zorrilla, E. Menasalvas, D. Marin, E. Mora, and J. Segovia, Web usage mining project for improving web-based learning sites, In Web Mining Workshop (2005), 1–22.
- [2] C. González, S. Sánchez, R. Díaz, A. Fernández, "Will I pass the course? performance analysis based on time series "(CIINDET 2016).
- [3] S. Sánchez López, R. Díaz Redondo, A. Fernández Vilas, "Is social participation necessary to pass an academic year? ", (TEEM 2016).
- [4] S. Sánchez López, R. Díaz Redondo, A. Fernández Vilas. "Predicting students' grade based on students behavior" (International Journal of Engineering Education (IJEE))
- [5] ] S. Sánchez López, R. Díaz Redondo, A. Fernández Vilas. "Forums: environments to share knowledge?" (under Review ijCSCL)