

A LEARNING ANALYTICS FRAMEWORK FOR PRACTICE-BASED LEARNING

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The role of the PELARS Learning Analytics System (LAS) system is to collect information from students performing projectbased tasks, reason on such information and provide visualization to teachers and students, that is usable for understanding the learning process.

SYSTEM ARCHITECTURE

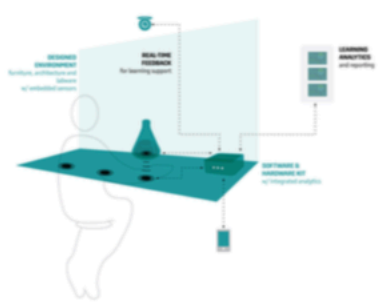


Figure 1. Pelars Learning Analytics System (LAS)

- **The Programming IDE** is the tool used by the students for interfacing with the code and developing the projects.
- **A Vision Sensor** is intended as a RGB-D camera, which is able to capture a 3D image of the environment.
- **A set of RFID sensors** and tags to enhance the information gathered by the vision system, looking at student presence and object motion.
- **The Collector** as a piece of software responsible of acquiring the information produced by the different sensors and of elaborating the data in order to extract the Learning Metrics.
- **The Server** will be a dedicated machine providing a Web Server, a database and data analysis capabilities.
- **The Web Server** will export a web interface, accessible from any computer, for Teachers to elaborate and visualize the data.

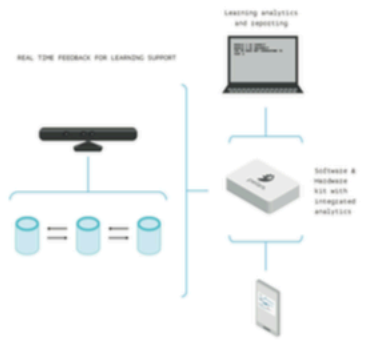


Figure 2. Simplified LAS Architecture

The digital representation for the learning metrics will be produced partially by the Collector and mainly by the PELARS LAS Core running on the Server. The DB will contain all the information sent from the Collector such as:

- Number of active hands in the Learning Environment.
- IDE code snapshots and events.
- Objects in the scene with additional data.
- Number of students gazing at the IDE/table/around.

SOFTWARE FRAMEWORK REQUIREMENTS

- **Integration** of different sensors in the Learning Environment (LE) to acquire information about the ongoing learning process.
- **Support** of flexible curricula and configurations.
- **Collection** of data from multiple sites at once.
- **Extensibility** for supporting new components that extract learning traces and performance indicators.
- **Visualization** for the students and the teachers.

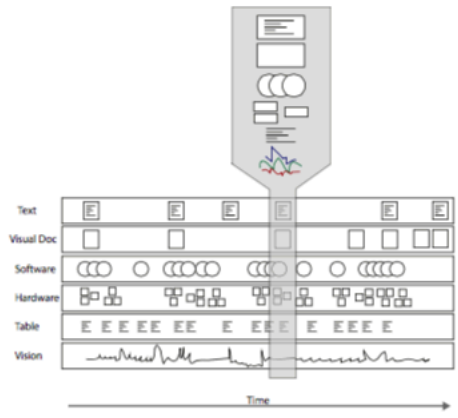


Figure 3. Conceptual visualization

CONCLUSION

It is important to notice that the Learning Analytics Framework is in a preliminary stage and needs further development based on the Learning Analytics Metrics, which are currently researched. The structure has been developed trying to maintain it modular and expandable, but also able to scale well with the possible increase of concurrent LEs and new Learning Analytics Experiment Kits. How to evaluate the results of the test is still in development topic and will be researched during the development of the framework.

Christodoulopoulos, C. E., & Papanikolaou, K. A. (2007, October). A group formation tool in an elearning context. In Tools with Artificial Intelligence, 2007. ICTAI 2007. 19th IEEE International Conference on (Vol. 2, pp. 117-123). IEEE.
 Bienkowski, M., Feng, M., & Means, B. (2012). Enhancing teaching and learning through educational data mining and learning analytics: An issue brief. US Department of Education, Office of Educational Technology, 1-57.