Learning Analytics Dashboard on Moodle: An approach for the student in a control perspective

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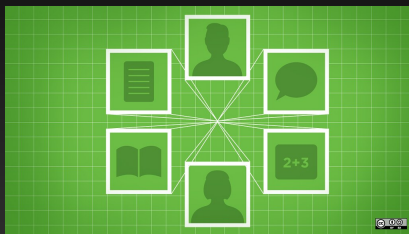University of São Paulo (USP) - Institute of Mathematics and Statistics (IME)

21 June 2024

Third Pitch

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Context

Our aim is to study, scientifically, the construction of Learning Analytics Dashboards and related software engineering issues.

The data regarding the student learning process is dispersed across multiple sources
https://www.flickr.com/photos/opensourceway/8288335386/

It is a Learning Analytics research field [Lang et al., 2017].

Advances since last pitch - July 2023

- **All credits class, in theory and systems, have been completed**

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- I presented my work-in-progress project at **Learning Analytics in Practice 2024**

- I performed a Tertiary Literature Review (will be presented)

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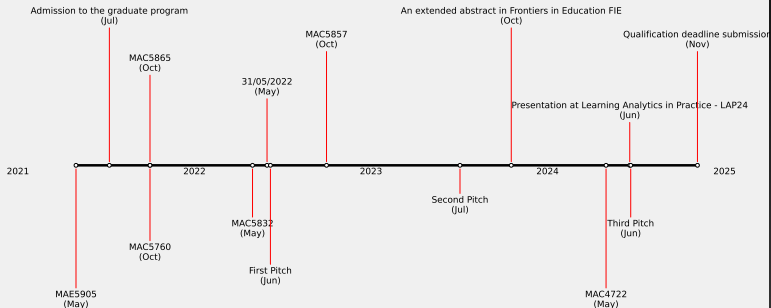
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The journey up to this point

My timeline

Admission to the graduate program (Jul)	
MAC5865 (Oct)	
31/05/2022 (May)	
MAC5857 (Oct)	
An extended abstract in Frontiers in Education FIE (Oct)	
Qualification deadline submission (Nov)	
Presentation at Learning Analytics in Practice - LAP24 (Jun)	

2021 · 2022 · 2023 · 2024 · 2025

MAE5905 (May)
MAC5760 (Oct)
MAC5832 (May)
First Pitch (Jun)
Second Pitch (Jul)
Third Pitch (Jun)
MAC4722 (May)

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Research Questions (temporary yet)

1. **What kind of external data can be usefully and safely integrated with the Moodle (behavioral) data?**

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2. **How this enriched data can be used as features for Statistical and Machine Learning models (to be presented in dashboards) respecting privacy and student autonomy?**

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Our proposal

The traditional approach used to build dashboards (we are currently confirming through a Systematic Literature Review):

	Can choose Features?	Can see Predictions?
Student	No	No
Teacher	No	Yes
Manager	Yes	Yes

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Our proposal: Student <u>in Control</u> Perspective

	Can choose Features?	Can see Predictions?
Student	Yes	Yes
Teacher	No	Maybe (student decides)
Manager	No	Maybe (student decides)

Software Engineering Issues

Some issues this approach brings to software engineering:

- **The Moodle Analytics API is designed primarily for teachers and managers, so a lot of work is needed on plugins to empower students with similar capabilities**

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- **The possibility for each student to choose their own data requires rebuilding the model many times, which can impact performance**

Tertiary Literature Review

We initially conducted a Tertiary Literature Review to identify any existing gaps in the reviews already performed. **Search String:**

"Dashboard" AND "Learning Analytics" AND ("Systematic Literature Review" OR "Systematic Review")

LAD Systemic Review Publications
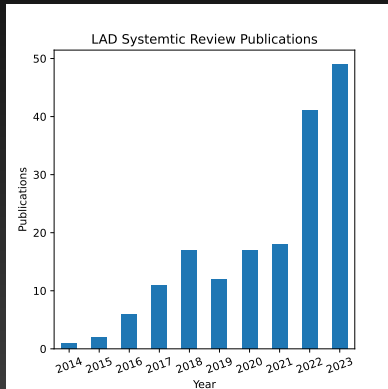
Databases	Publications
acm	64
engineering village	13
ieee	1
science direct	70
scopus	26
web of science	13

Tertiary Literature Review

From the 189 articles found, 15 were selected:

- **6 did not use specific criteria in the review**
- 6 evaluated educational foundations
- 2 was related to evaluating the dashboard
- 1 was about using Machine Learning Models

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Tertiary Literature Review - Results

None of the articles selected in our tertiary review focused on dashboards within the Moodle environment, and more broadly, none considered implementations in open-source code

https://moodle.org

Ongoing and Future Work Plan

Our next step, up to qualification (November 2024), will be to conduct a systematic review focusing on primary articles that have developed dashboards within the Moodle environment, with particular attention to the following aspects:

1. **Use of machine learning in dashboards (and raising software engineering issues related to this)**
2. Whether the code is available or not
3. Considering students as decision-makers in machine learning model creation

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Conclusion

Thank you!
Questions?

Bibliography

Lang, C., Siemens, G., Wise, A., & Gasevic, D. (2017).
Handbook of learning analytics.
SOLAR, Society for Learning Analytics and Research New
York.

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