

Learning Analytics in AI-assisted Software Development Education

Personalized Explainable AI for Tailored Student Support

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Context

- Learning Analytics (LA) arose from the need to analyze vast educational datasets.
- Analysis of data of students identified many variables demonstrating a significant simple correlation with students' final grade.

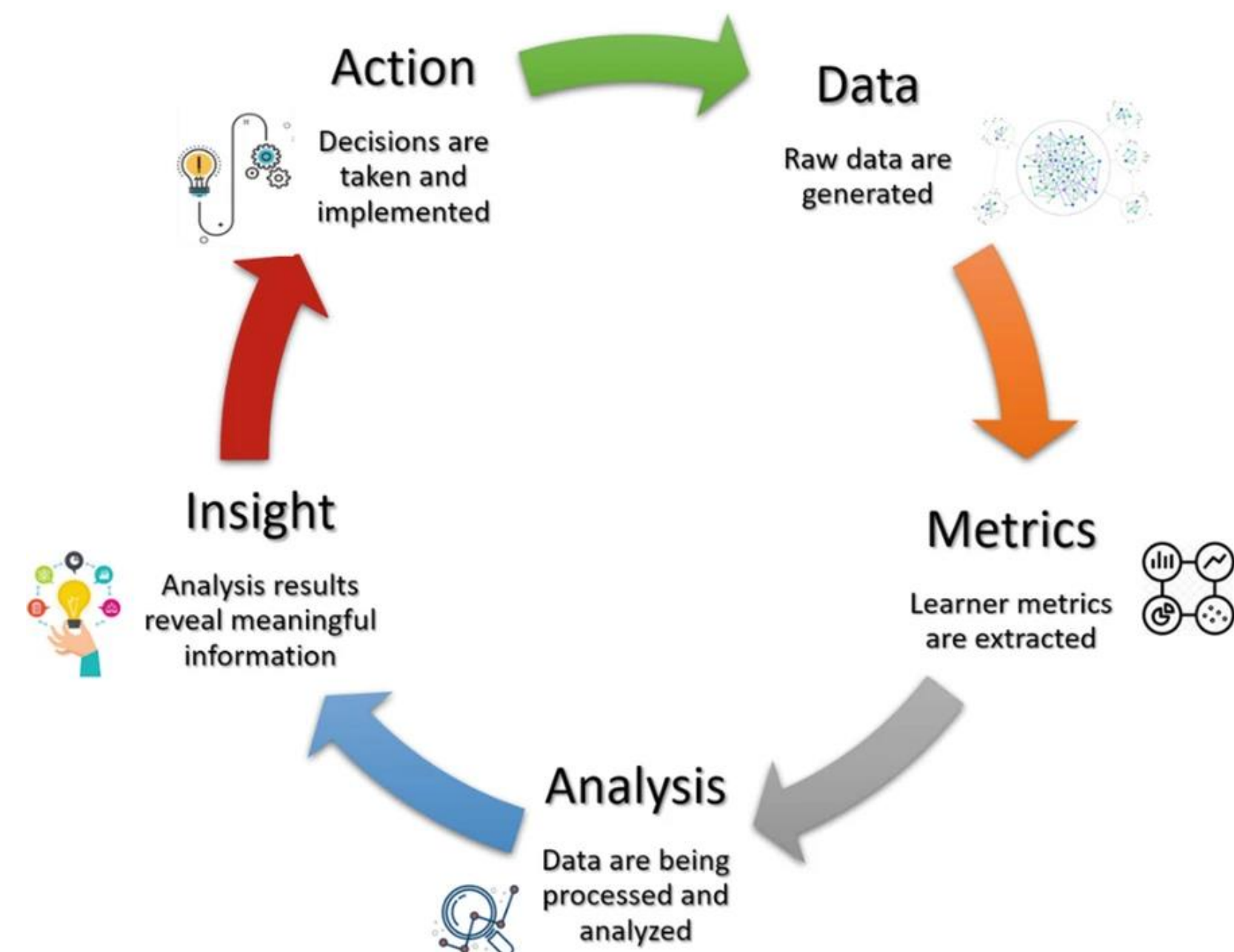


Fig.1: The cyclical process of learning analytics

Problem

- Early learning analytics showed alerts to the students with no explanations or mitigation strategies.
- Such predictions were always conducted by averaging across a sample of students to derive norms and averages of the included students which is inaccurate.

Student support through personalized XAI

- Insights are based on the data of each individual student.
- Explainable insights increase the likelihood of students acting on it.
- Example: Student A might struggle due to gaps in knowledge, while Student B struggles due to test anxiety. After modeling each student, XAI will detect the differences and provide tailored interpretable suggestions.

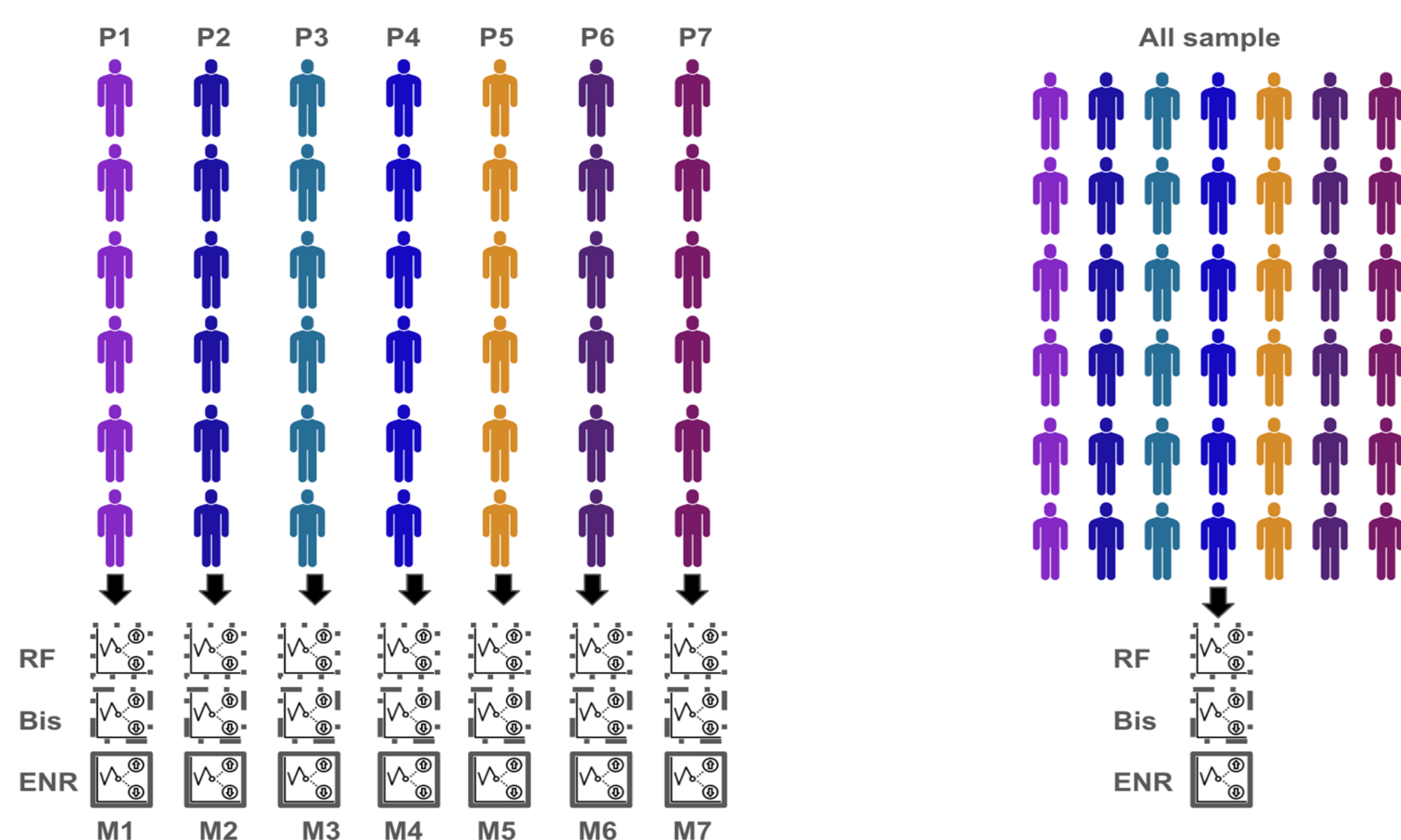


Fig.2: This figure compares personalized ML models (left) that tailor predictions using only the data from each student separately with traditional generalized models (right) that aggregates all students' data.

Objective and RQs

Goal: Develop a mobile application that leverages personalized XAI to deliver tailored educational insights and support to each student.

Rational: Such application would provide precise explainable insights and suggestions for each student, enhancing student motivation and engagement which will reflect on the learning process.

RQ: How does the use of personalized XAI in Learning Analytics Dashboards (LADs) improve individual student engagement and performance compared to traditional methods?

Methodology

Literature review: understand current development of XAI and LADs.

Create an app: develop an MVP.

Study design: comparative design to examine the differences between individuals who utilize the app and those who don't.

Participants: High school or university students.

Data collection: using Ecological Momentary Assessment data (EMA), two times a day, addressing self-regulation, motivation, emotions using single item questionnaire.

Data Analysis: use different statistical methods to interpret the effectiveness of personalized support on student outcomes.

Outcome

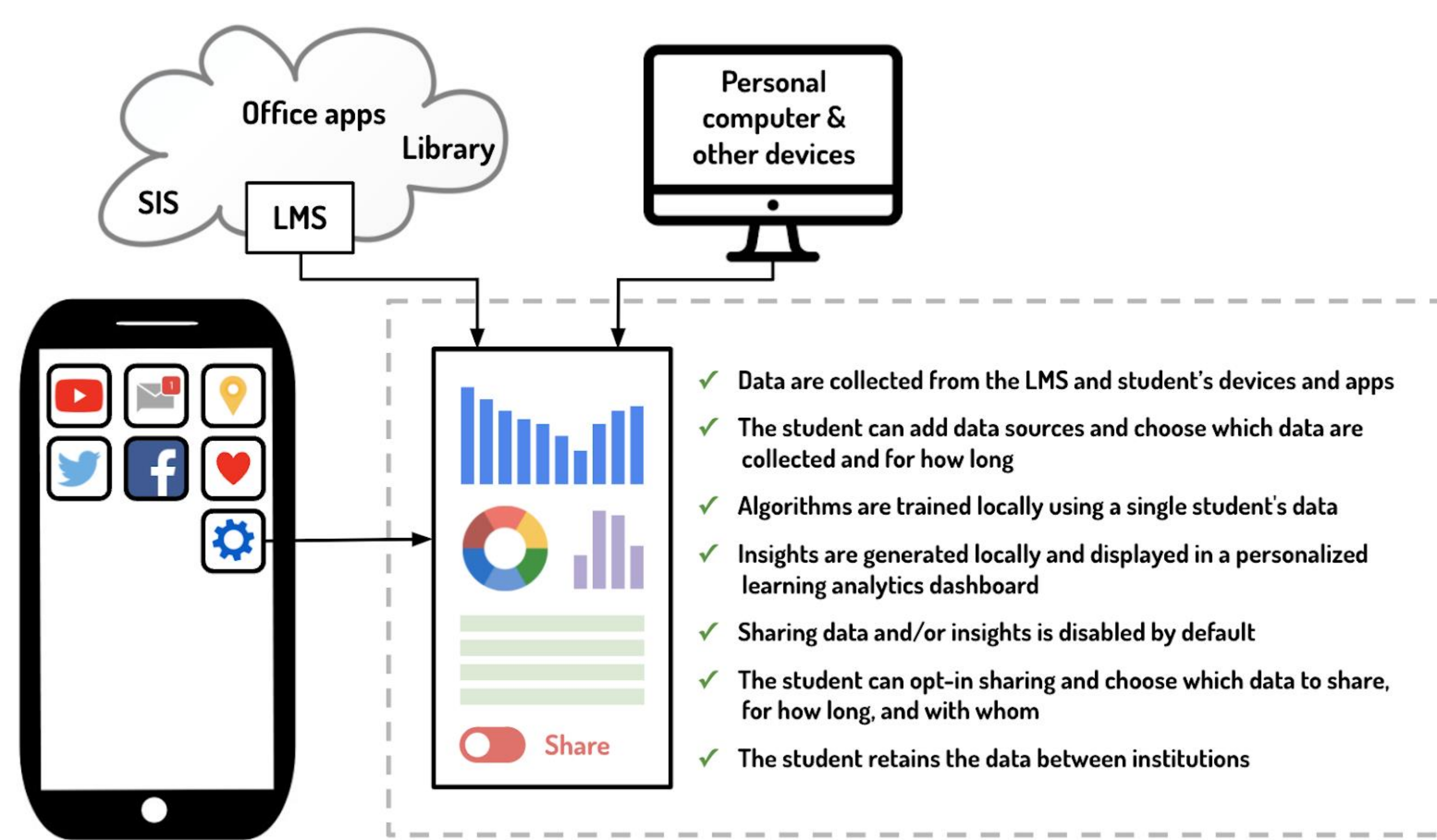


Fig.3: Proposed personal learning analytics model

Sources

Fig.1: Mougakou, S., Vinatsella, D., Sampson, D., Papamitsiou, Z., Giannakos, M., Iffenthaler, D. (2023). Learning Analytics. In: Educational Data Analytics for Teachers and School Leaders. Advances in Analytics for Learning and Teaching. Springer, Cham. <https://doi.org/10.1007/978-3-031-15466-5>.

Fig.2: Mohammed Saqr, Rongxin Cheng, Sonsoles López-Pernas, Emorie D Beck. Idiographic artificial intelligence to explain students' self-regulation: Toward precision education, Learning and Individual Differences, Volume 114, 2024.

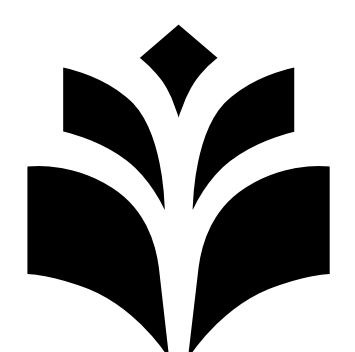
Fig.3: <https://blogs.uef.fi/oaht/2021/11/12/oaht-blog-4-2021-learning-analytics-from-general-insights-to-personal-control/>

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