

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY



INNO-VA-THON 3.0: BUILD. INNOVATE. COMPETE.

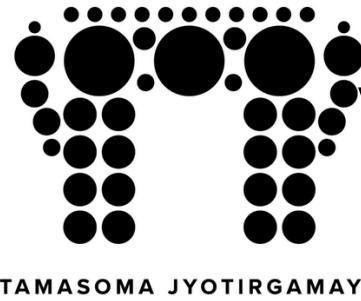
A National-Level Software and Hardware Hackathon

Team Name: Code Spirit

Team Leader: G. Rochita

Problem Statement No: PS-07

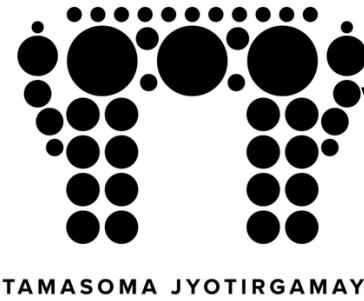
Problem Statement: Student Risk & Dropout Prediction



Team Member Details

Team Size: 4

NAME	ROLE	YEAR	BRANCH	COLLEGE
Ch. Sathwik	Backend Developer	2024-2028	CSE-DS	VNR-VJIET
E. Ashritha	ML Engineer	2024-2028	CSE-DS	VNR-VJIET
G. Rochita	Data Analyst	2024-2028	CSE-DS	VNR-VJIET
K. Srinish	Frontend Developer	2024-2028	CSE-DS	VNR-VJIET



Brief about the Idea

Domain & Problem Understanding

Problem We Are Addressing :

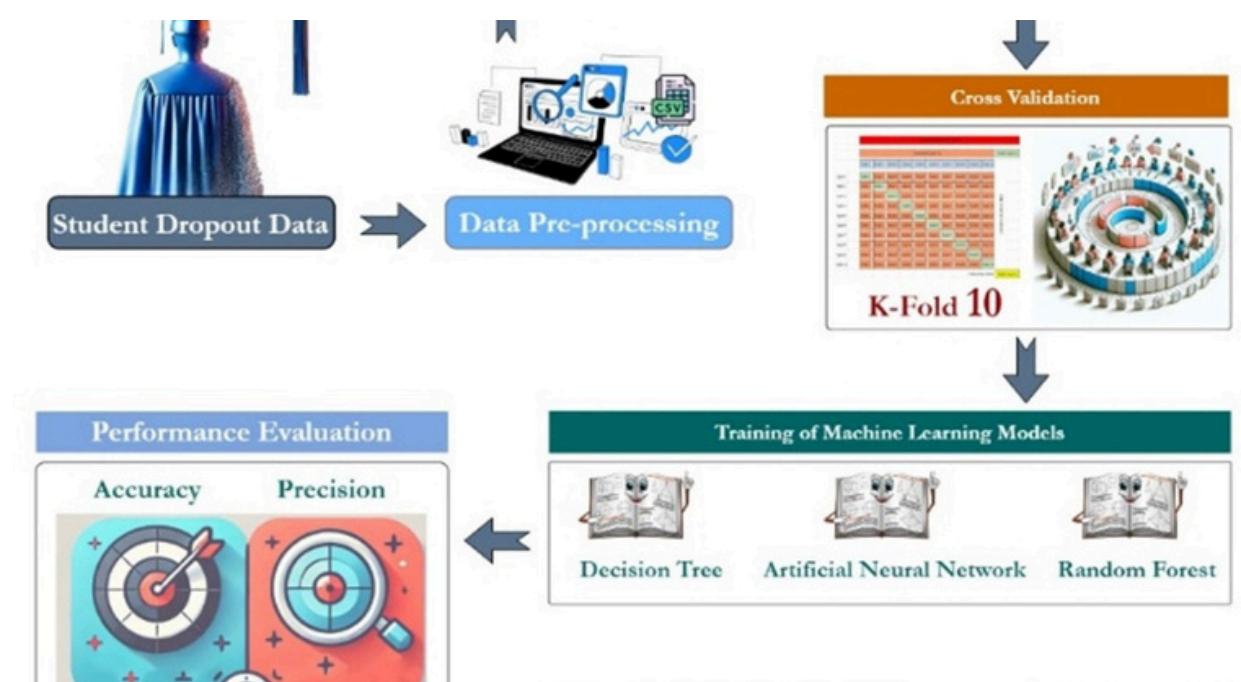
- Student dropouts and academic failures are common in schools and colleges
- Lack of early identification of students at risk of poor performance or disengagement
- Existing monitoring methods are manual, reactive, and often too late to intervene
- Teachers and administrators struggle to predict and support at-risk students proactively
- Leads to low academic achievement, wasted resources, and decreased student morale

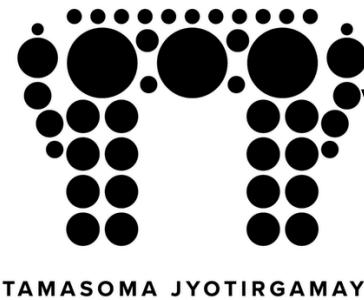
Our Approach :

- Build a **Predictive Student Risk & Dropout Management Platform**
- Make student monitoring simple, data-driven, and actionable
- Combine:
 - Machine learning models to predict dropout risk and academic challenges
 - Early warning dashboards for teachers and counselors
 - Personalized intervention plans and mentorship suggestions
 - Attendance, performance, and engagement tracking tools
 - Goal-setting and progress monitoring systems for students
 - Alerts for potential social, emotional, or financial challenges impacting student retention

Expected Impact :

- Identifies at-risk students early, enabling timely support
- Reduces dropout rates and improves academic outcomes
- Helps educators and administrators make informed decisions
- Supports personalized interventions for student success
- Empowers students to stay engaged, motivated, and achieve long-term educational goals

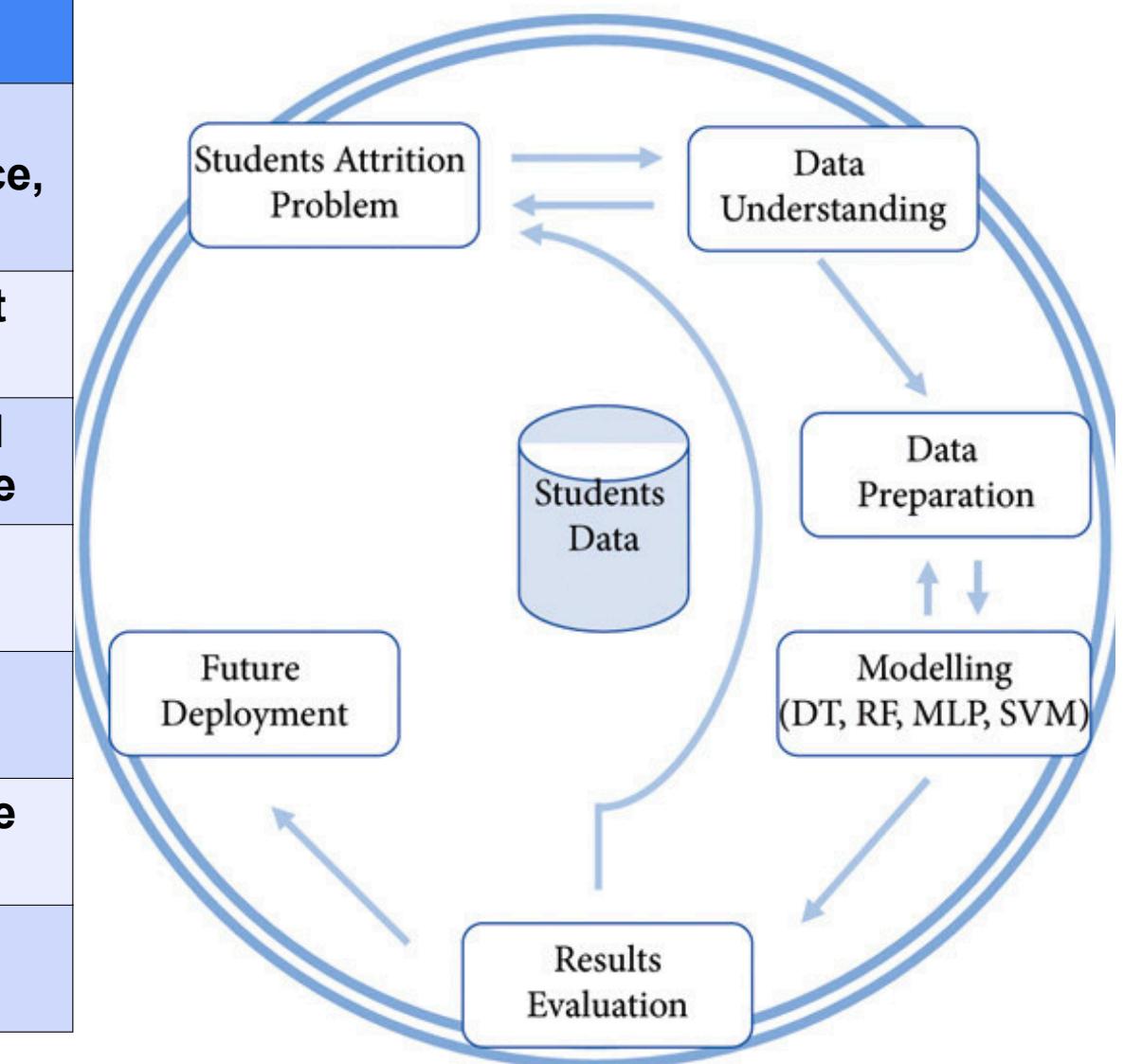


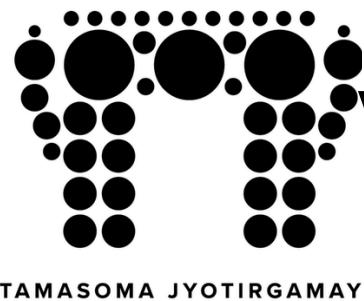


Brief about the Idea

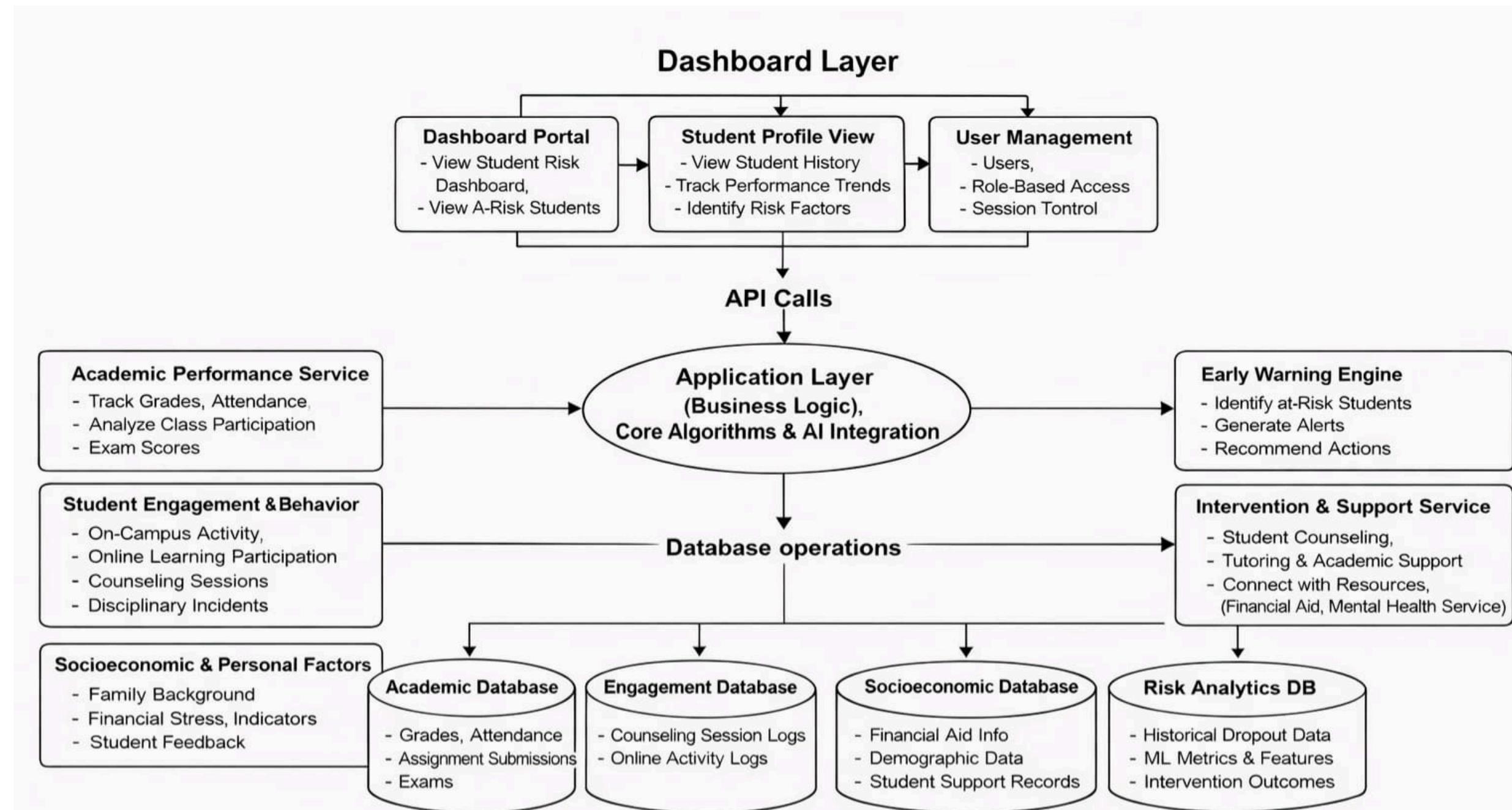
Proposed solution :

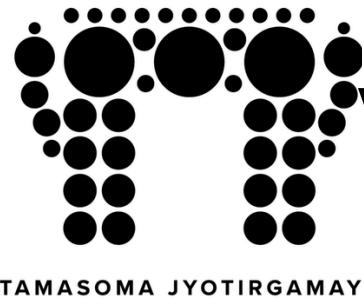
Feature	Purpose
Early Risk Detection Module	Identifies students at risk of poor performance or dropping out based on academic, attendance, and behavioral data.
Predictive Analytics Dashboard	Provides visual insights and trends on student engagements , trades, and risk factors
AI Academic Mentor	Suggests personalised learning strategies and student plans based on individual performance
Attendance & Activity Tracker	Monitors class participation and assignment submission
Intervention Recommendation System	Counselling, tutoring or mentoring to at-risk students
Peer & Group Support Platform	Peer mentoring , group study and collaborative learning
Goal Setting & Progress Tracker	Track progress and set academic goals





Architecture / Methodology Flow diagram

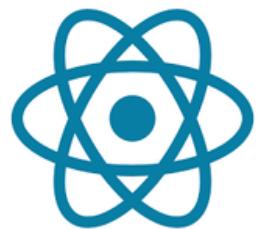




Architecture / Methodology

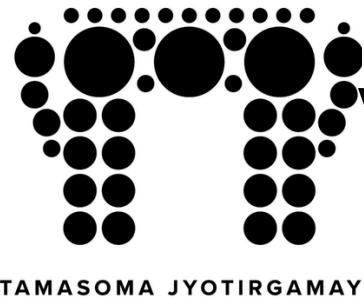
Technical Approach (Tech Stack):

Layer	Tools
Frontend	React / Next.js, Tailwind CSS, Chart.js / Recharts (for performance & risk visualizations)
Backend	Node.js + Express / Django / Fast API
Database	MongoDB / PostgreSQL / Firebase
AI Integration	Scikit-learn / Boost / TensorFlow for prediction, GPT-based NLP for student feedback analysis, Lang Chain
Data Sources	Student academic records, attendance logs, LMS data (assignments, quizzes), behavioral metrics
Analytics & Visualization	Power BI / Matplotlib / Seaborn / Plotly
Additional	Email/SMS alerts for at-risk students, Role-based access (Admin, Teacher, Student)



Power BI





Architecture / Methodology

Feasible to Build

- Uses existing academic data already maintained by institutions
- Relies on proven and widely used technologies (Python, ML libraries, dashboards)
- Can be developed in phases, starting with basic risk prediction
- Easily deployable on cloud platforms for scalability

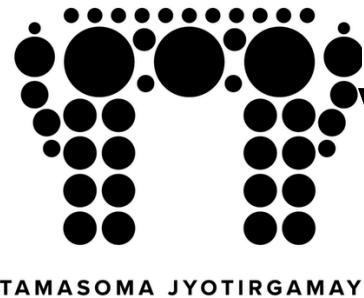
Sustainability

- Institutional subscription-based model
- Analytics & reporting services for academic planning
- Integration with Learning Management Systems
- Long-term value through continuous student performance insights

Market Demand

- Increasing focus on **student retention and academic success**
- Institutions actively seeking **data-driven decision support systems**
- Aligns with **NEP 2020** emphasis on technology in education
- Useful for schools, colleges, universities & ed-tech platforms





Architecture / Methodology

References & Research :

- **Predictive Analytics for Early Student Dropout Detection (2025)**
<https://urr.shodhsagar.com/index.php/j/article/view/1647>
- **Application of Learning Analytics to Identify Students at Risk of**
<https://www.mdpi.com/2076-3417/10/11/3998>
- **Frontiers in Education: Predictive Analytics for Undergraduate Dropout**
<https://www.frontiersin.org/journals/education/articles/10.3389/feduc.2023.1244686/full>
- **Student Dropout Prediction with Machine Learning (PMC Article)**
<https://pmc.ncbi.nlm.nih.gov/articles/PMC7334184/>
- **Nature Scientific Reports: Student Dropout Prediction Using Log Data**
<https://www.nature.com/articles/s41598-025-93918-1>
- **OECD Case: Early Warning System for Dropout using Data**
<https://oecd-opsi.org/innovations/educational-trajectories/>

