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MathMentor

Intelligent Support System for Personalized and Automated Mathematics Assessment

A scalable, original, Moodle-based platform integrating symbolic computation and adaptive feedback for equitable and efficient learning

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GOAL OF THE STUDY

This project presents a fully operational **Intelligent Support System (ISS)** designed to enhance mathematics education in Romanian lower-secondary schools by integrating **open-source technologies, symbolic grading, and automated feedback**, all accessible via the educational platform MathMentor.ro.

SOLUTION PROPOSED

The ISS (mathmentor.ro) was built around five core components:
Moodle 4.x – as the primary LMS for course management, assessments, and reporting
STACK + Maxima – for symbolic validation, partial grading, and feedback based on computer algebra
GIFT/XML – to ensure reusable, structured question bank formats
Custom backend configuration – for efficient server operation and secure content management
Real-time analytics – using Moodle logs and gradebooks to generate actionable pedagogical insights
All administrator rights are held by the author, who ensures continuous system maintenance and has the option to scale access or monetization in the future.

RESEARCH CONTEXT & CHALLENGE

Although Moodle is used in several major Romanian universities, it is **not currently implemented in public pre-university education**. Teachers lack access to robust tools for automated symbolic assessment and scalable digital infrastructure.
The challenge was to **develop from scratch a functional, standards-aligned, low-cost Moodle system**, hosted in Romania, which integrates advanced plugins and can be used freely by any school, without institutional dependencies or expensive software licenses.

MAIN RESULTS FROM THE STUDY

Successfully piloted with **over 100 lower-secondary students** in a Romanian public school
Provided **unique, auto-generated exercises** with contextualized feedback
Enabled teachers to **save time** through automatic grading and data analysis
Measurable improvement in **student autonomy, symbolic reasoning, and motivation**
Operational cost under €1000/year, including domain, hosting, and updates
Freely available and **replicable by other schools** without institutional IT infrastructure
Reduces disparities between **urban and rural educational environments**

STACK-Based Digital Assessment Workflow

1. Student Input (via Moodle)	+25.6% Learning Gain
2. Symbolic Processing (Maxima CAS)	-75% Teacher Workload
3. Conditional Evaluation (STACK /PBT)	✓ Adaptive Feedback
4. Stepwise Feedback & Grading	
5. Error Analysis & Score Generation	
6. Learning Analytics Dashboard	

CONCLUSIONS

- **MathMentor.ro** functions as a fully realized **Intelligent Support System** dedicated to mathematics education at the secondary level.
- It bridges technological and pedagogical gaps with a **low-cost, high-impact approach**, combining open technologies with modern didactic tools.
- The project stands as a **national first in Moodle deployment** for public school mathematics instruction in Romania.
- It offers a **replicable model** for equitable, adaptive, and competency-based digital education, setting the foundation for future integration of AI-enhanced learning environments.

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