

Case Study: Using Moodle Analytics to Support Learning at the Cambodia Academy of Digital Technology

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1. Background

The Cambodia Academy of Digital Technology (CADT) faced a challenge common to many universities: how to support students before they fail rather than after final grades are published. Faculty members had access to Moodle, which recorded every student interaction—logins, submissions, quiz attempts, and time spent on course materials—but these data were rarely used systematically to guide teaching or student support. Recognizing this gap, CADT's research team designed a study to explore whether learning analytics could provide actionable insights for improving academic performance. The project sought to show that by analyzing ordinary Moodle data, institutions could detect early signs of disengagement and intervene before students fell behind.

The initiative's motivation was simple: instructors often sense when students are struggling but lack evidence-based confirmation. Moodle already captured rich information, yet most faculty used it only for uploading resources or grading assignments. By transforming this untapped data into meaningful patterns, CADT hoped to bridge the divide between teaching intuition and empirical evidence, empowering faculty to make timely, informed pedagogical decisions.

2. Research Design

The study collected data from 160 first-year students enrolled in multiple programs, including computer science, mathematics, and communication skills. From Moodle, the researchers extracted several variables: attendance (measured by course module completion and log-ins), the number of interactions and activities completed, the frequency of quiz and assignment submissions, and the total time spent online. Final course grades stored in institutional systems were then merged with this activity data. The analysis compared several machine-learning techniques to determine which model best predicted student performance. While multiple algorithms were tested, the Random Forest classifier produced the most accurate results, predicting student outcomes with approximately 89 percent accuracy.

However, the primary value of this work was not the technical precision of the model but its practical utility for faculty. Rather than creating a black-box algorithm, the team designed a simple, interpretable system that could alert instructors when a student's activity patterns resembled those of previously underperforming peers. This design choice reflected CADT's commitment to enhancing teaching rather than automating evaluation.

3. Key Findings

The analysis confirmed what many educators suspect: attendance and engagement are the most reliable predictors of success. Students who consistently accessed Moodle, participated in online

discussions, and spent more time completing activities tended to achieve higher grades. The data also revealed that frequent interaction—submitting quizzes and assignments on time—strongly correlated with better performance. These results validated three hypotheses: attendance, interaction frequency, and time spent on the LMS each have a statistically significant positive effect on academic outcomes.

Yet, the power of analytics lies in quantifying what teachers already know. By translating engagement into measurable indicators, CADT gave instructors concrete evidence to support early interventions. For example, a student who had not logged into Moodle for two weeks or who consistently skipped online quizzes could be identified early, allowing the instructor to check in before midterm exams rather than after. The system thus transformed the LMS from a passive repository into an active feedback mechanism linking learning behavior to academic support.

Students themselves acknowledged the accuracy of these insights. A follow-up survey found that over three-quarters of respondents viewed attendance and regular Moodle interaction as critical to their performance, while more than 80 percent agreed that quiz completion and task submissions were strong indicators of success. This alignment between analytics outputs and student perceptions built trust in the system, reinforcing its credibility across the institution.

4. Analytics in Action: Faculty Use and Institutional Impact

One of the most meaningful outcomes of the CADT project was how analytics changed faculty practice. The predictive dashboards generated from Moodle data gave instructors the ability to monitor engagement patterns in real time. Instructors could see which students were falling below the average number of interactions or were spending less time in key course modules. When alerts appeared, teachers could follow up with messages, offer tutoring sessions, or adapt course design to re-engage those students. This shift marked a transition from reactive grading to proactive guidance.

Beyond individual interventions, analytics also became a reflective tool for course improvement. When faculty noticed courses with high engagement but poor results, they examined whether the workload was excessive or assessments were misaligned with learning outcomes. Conversely, courses with low engagement but high grades raised questions about assessment rigor. Over time, such analyses encouraged departments to review how course design, pacing, and workload affected student participation. The process cultivated a culture of data-informed reflection rather than blame.

At the institutional level, CADT's Quality Assurance Directorate began aggregating engagement data to inform program reviews. By identifying departments with consistently low Moodle activity or weak participation, the university could target professional development where it was most needed. Data dashboards also supported discussions about digital resource allocation, helping administrators decide where to invest in new training, hardware, or pedagogical innovation.

5. Lessons Learned

Several lessons emerged from the project. The first was that data literacy among faculty is essential. While instructors found the visual dashboards helpful, they initially required guidance on interpreting patterns correctly. CADT responded by hosting workshops on reading analytics reports and translating them into teaching strategies. Second, simplicity proved more effective than complexity. The project succeeded by focusing on three key variables—attendance, interaction, and

time-on-task—rather than dozens of indicators that could overwhelm users. Faculty were more likely to act on clear, comprehensible metrics.

Another lesson concerned ethics and privacy. All data were handled under GDPR-aligned protocols, with student IDs anonymized and consent obtained before analysis. Access to raw data was limited to authorized staff, reinforcing institutional accountability. This emphasis on ethical practice reassured both students and faculty that analytics were being used to support learning, not surveillance.

Finally, the study underscored the importance of collaboration between data scientists and educators. Faculty involvement in designing the dashboard ensured that the outputs matched their real teaching needs rather than abstract technical priorities. This co-design approach fostered ownership and sustained use. Today, the analytics tool has been integrated into CADT's early-warning system for student retention and forms part of its annual teaching quality audits.

6. Implications for Faculty and Administrators

For faculty, the CADT experience demonstrates how learning analytics can function as a form of formative assessment throughout the semester. Rather than waiting for final exams, instructors can track progress continuously and make timely pedagogical adjustments. The evidence that attendance and engagement drive achievement encourages instructors to emphasize participation not as a grading requirement but as a developmental habit.

For administrators, the case shows that integrating LMS analytics into institutional systems like HEMIS can create powerful synergies between academic data and quality assurance. Predictive insights can inform decisions about curriculum design, identify structural issues across departments, and allocate resources more strategically. Importantly, the success of such systems depends not on complex algorithms but on organizational commitment to ethical, transparent, and supportive data use.

7. Conclusion

The CADT study illustrates that meaningful educational analytics begins with ordinary data used thoughtfully. By analyzing routine Moodle activity logs, the university transformed engagement information into actionable knowledge for teachers and administrators. The project's success stemmed from its human-centered approach—using technology to empower educators rather than replace them.

For universities worldwide, this case affirms that the real value of analytics lies not in technical sophistication but in its capacity to enhance teaching, guide learning, and strengthen the bond between data and pedagogy. CADT's experience stands as a model of how institutions can transform their Learning Management Systems into instruments of continuous improvement and student success.