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# Overview

## What are learning analytics?

Learning analytics are software algorithms that are used to predict or detect unknown aspects of the learning process, based on historical data and current behavior. There are four main categories of learning analytics:

- descriptive (what happened?)
- predictive (what will happen next?)
- diagnostic (why did it happen?)
- prescriptive (do this to improve)

Most commercial solutions are descriptive only. Those that are predictive or proactive make certain assumptions about learning that don't apply to everyone.

# Analytics vs. reporting

Moodle provides a variety of built-in reports based on log data, but they are primarily descriptive in nature—they tell participants what happened, but not why, and they don't predict outcomes or advise participants how to improve outcomes. Log entries, while very detailed, are not in themselves descriptive of the learning process. They tell us “who,” “what,” and “when,” but not “why” or “how well.” Much more context is needed around each micro-action to develop a pattern of engagement.

Many third-party plugins also exist for Moodle that provide descriptive analytics. There are also integrations with third-party off-site reporting solutions. Again, these primarily provide descriptive analytics that rely on human judgment to interpret reports and generate predictions and prescriptions.

Often in the past, learning analytics systems have attempted to analyze past activities to predict future activities in real time. With Moodle Learning Analytics, we are more ambitious. We believe a full learning analytics solution will help us not only predict events, but change them to be more positive.

# Features

- Two types of models supported:
  - Machine-learning based models, including predictive models
  - "Static" models to detect situations of concern using simple rules
- Three built-in models: "Students at risk of dropping out", "Upcoming activities due" and "No Teaching".
- A set of student engagement indicators based on the Community of Inquiry.
- Built-in tools to evaluate models against your site's data
- Proactive notifications using Events
- A list of suggested Actions is provided with the Insight notifications for each model. For example, in the Students at risk of dropping out model, instructors can easily send messages to students identified by the model, or jump to the Activity report for that student for more detail about student activity within the course

- An API to build indicators and prediction models for third-party Moodle plugins
- Machine learning backend plugin type - supports PHP and Python, and can be extended to implement other ML backends
- The system can be easily extended with new custom models, based on reusable targets, indicators, and other components. For more information, see the Analytics API developer documentation.

# Limitations

- Machine learning models such as Students at risk of dropping out must be trained on a site with data . These models cannot make predictions on a site until this is done.
- Models must be designed and selected to match the educational priorities of the institution.

# Settings

The Moodle learning analytics system requires some initial configuration before use. See Analytics settings for more detail.

# Using analytics

The Moodle Learning Analytics API is an open system that can become the basis for a very wide variety of models. Models can contain indicators (a.k.a. predictors), targets (the outcome we are trying to predict), insights (the predictions themselves), notifications (messages sent as a result of insights), and actions (offered to recipients of messages, which can become indicators in turn).

Most learning analytics models are not enabled by default. Enabling models for use should be done after considering the institutional goals the models are meant to support. See Using analytics for more information.

Analytics models may be restricted to category or course contexts

# Managing models

Once models have been enabled and trained, insights will be generated. Models should also be monitored for performance and accuracy. See Managing analytics for more information.

# See also

- Analytics FAQ

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