The Science of Predictive Modeling

Understand what predictive models estimate, what shapes their results, and how to use those results responsibly in enrollment work.

What predictive modeling is

Predictive modeling estimates the likelihood of a defined outcome. It answers how likely an outcome may be, not what will certainly happen.

Models can help teams plan, prioritize, and prepare when resources are limited. They do not replace professional judgment or determine a student's future.

Outcomes over opinions

Models learn from historical examples with known outcomes, such as whether a student applied, enrolled, or persisted. Define the outcome before deciding which data to use.

Engagement scoring summarizes selected behaviors. Predictive modeling estimates relationships between available inputs and an outcome. Those relationships do not by themselves establish cause and effect.

Probabilities not promises

A result such as 60%, 25%, or 82% represents an estimated likelihood. These numbers are examples, not measured performance claims.

Use probabilities to compare risk and opportunity and support priorities. Avoid treating them as guarantees about individuals. Clear explanation of uncertainty helps preserve trust.

How models work

Inputs can include behaviors, attributes, timing, and history. A model learns patterns in historical data and produces an estimate tied to a particular outcome.

Results depend on data quality, feature engineering, and how well historical records represent the records being scored. Models may detect patterns people miss, but complexity alone does not make a model useful.

You do not need to build every part of the model yourself to use it responsibly. You do need to understand its intended output, limitations, and place in the decision process.

Feature engineering

Counts alone rarely tell the full story. Useful features may describe time between actions, relationships between event behaviors, and sustained engagement.

Choose inputs that help answer the actual question. Features may suggest intent, but should not be treated as direct proof of a person's motivation. Review whether each feature adds useful information or noise.

Accuracy bias and guardrails

A model can appear accurate overall and still cause harm. Historical data reflects historical systems, including their limitations and inequities.

Review outputs, test performance across relevant subgroups, and set limits on use. Revisit those checks as data and circumstances change. Ethical review belongs in the work from the start.

When to model

Modeling may help with later-funnel planning, resource allocation, and forecasting when an estimated outcome is useful. A transparent scoring rubric may be sufficient for early engagement or exploration.

Choose the method that fits the decision and available evidence. A need for probability estimates does not remove the need for explanation, review, and appropriate safeguards.

From models to practice

Connect estimates to dashboards, translation codes, outreach, and other tools the team actually uses. Planning, targeting, and intervention design are possible applications.

Use the model where its output fits the strategy. Check trends against other evidence before committing to action. Clear interpretation and a defined workflow help turn an estimate into useful practice.