

HEPro AI+ Scoring Logic & Threshold Documentation

Project: Dedicated Mentoring System for Students (HEPro AI+)

Module: Rule-Based Intelligence & Student Scoring

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Reference: System Architecture Document

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1. Overview

The core objective of the HEPro scoring system is to convert multi-dimensional raw student data—ranging from academic grades to sleep patterns—into a standardized, interpretable framework. This allows the AI system to move beyond simple "pass/fail" metrics and understand the Whole Student.

The system computes four-dimensional scores (APS, WWS, PTMS, CRS) which aggregate into a master Student Readiness Index (SRI).

2. Normalization Methodology

Since input data varies in scale (e.g., GPA is 0–10, Attendance is 0–100%, Sleep is 0–24 hours), all features are normalized to a 0–100 scale before weighting.

- Standard Normalization: $\text{Score} = (\text{Value} / \text{MaxValue}) * 100$
 - Inverse Normalization: Used for negative metrics like Stress and Distractions (where a higher number is "worse").
 - $\text{Score} = (\text{MaxValue} - \text{Value}) * 10$ (assuming base 10 scale).
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3. Dimensional Scoring Logic

A. Academic Performance Score (APS)

Objective: Measures scholastic achievement tempered by consistent effort. Logic: While GPA is the primary indicator, attendance and assignment submission rates act as "effort buffers." A student with high GPA but low attendance is flagged as "at-risk" for future burnout or disengagement.

- Formula:

$$APS = (0.60 * GPA_norm) + (0.20 * Assignments) + (0.20 * Attendance)$$

- Key Insight: Weighting GPA at 60% ensures academic rigor, while the remaining 40% rewards consistency.

B. Wellness & Wellbeing Score (WWS)

Objective: Quantifies the physical and mental state of the student. Logic: This score creates a "health baseline." If this score drops, academic interventions are likely to fail until wellness is restored.

- Formula:

$$WWS = (0.40 * Wellbeing_norm) + (0.30 * Sleep_score) + (0.30 * Stress_inverted)$$

- Inversion Note: A stress_level of 10 results in a score contribution of 0. A stress_level of 1 results in a score contribution of 90.

C. Productivity & Time Management Score (PTMS)

Objective: Assesses the student's efficiency and ability to focus. Logic: Combines subjective self-assessment with objective engagement metrics.

- Formula:

$$PTMS = (0.50 * Productivity_norm) + (0.30 * Distractions_inverted) + (0.20 * Engagement)$$

- Inversion Note: High distractions negatively impact the score. Platform engagement_score is included to reward active participation in the HEPro ecosystem.

D. Career Readiness Score (CRS)

Objective: Measures alignment between current skills and future goals.

Logic: Addresses the "Drifter" phenomenon (high academic performance but low career direction).

- **Formula:**

$$CRS = (0.50 * Clarity_norm) + (0.50 * SkillReadiness_norm)$$

- Weighting: Split evenly between *knowing what you want* (Clarity) and *being able to do it* (Readiness).
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4. Master Index: Student Readiness Index (SRI)

The SRI is the single "source of truth" regarding a student's status. It is a weighted average of the four-dimensional scores.

Formula:

$$SRI = 0.30(APS) + 0.25(WWS) + 0.20(PTMS) + 0.25(CRS)$$

Rationale for Weights:

1. APS (30%): Academics remain the core metric of an educational institution.
 2. WWS (25%) & CRS (25%): Wellness and Career are elevated to near-equal status with academics, reflecting the "Whole Student" philosophy.
 3. PTMS (20%): Productivity is a supporting metric that influences the others.
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5. Classification Thresholds & Intervention Logic

Once the SRI is calculated, students are classified into four "Risk Zones". These zones determine the intensity of AI and human intervention.

Zone	Colour	SRI Range	Student State	Intervention Strategy
Critical	Red	< 40	High Risk: Student is failing or completely disengaged. Likely to drop out or suffer burnout.	Escalation: Immediate alert to Human Counsellors. Mandatory face-to-face meeting.
Warning	Yellow	40 – 59	Struggling: Student is surviving but not thriving. Showing signs of stress or academic slip.	Nudge: Automated study plans, wellness reminders, and "Check-in" prompts.
Good	Blue	60 – 79	Stable: Student is performing adequately. Standard progression.	Maintenance: Regular content recommendations and career alignment tips.
Excellent	Green	80 – 100	Thriving: High performer across all dimensions.	Optimization: Encouraged to become a Peer Mentor; offered advanced projects.

6. Technical Implementation Note

The scoring logic is implemented in Python using the pandas library.

- Vectorization: Formulas are applied to entire data frame columns simultaneously for efficiency, rather than looping through rows.
- Scalability: The modular design allows weights (e.g., changing APS from 0.30 to 0.35) to be adjusted in a single configuration block without rewriting the core code.
- Handling Outliers: The code includes clamping functions (e.g., `min(val, 100)`) to ensure that bonus credits or exceptional values do not break the 0–100 scale logic.