measuresHE
Higher Education Analytics

Methodology Document

Country 100 Methodology 2026

Welcome to the inaugural edition of **measuresHE Country 100**. This document outlines the comprehensive and robust methodology used by **measuresHE** to evaluate and rank national higher education systems globally based on their research output, international integration, demographic investments, academic integrity, and sustainability. This framework is designed to provide a transparent, fair, and field-normalised assessment of national higher education standing across diverse metrics.

Purpose and Scope

The primary purpose of the measuresHE Country 100 ranking is to serve as a robust, ethical, and data-driven tool for recognising and evaluating high-quality national higher education ecosystems that are genuinely advancing the frontiers of human knowledge. In an era of varying national investments and evolving research priorities, discerning true systemic scholarly impact is crucial, and this ranking provides a reliable mechanism to achieve this goal.

While universities conduct the actual research and teaching, it is the country that builds the ecosystem, sets the financial priorities, cultivates the talent pool, and establishes the ethical norms allowing those institutions to thrive. This relationship forms the core philosophy behind the measuresHE Country 100. Rather than simply rewarding the sheer volume of publications, the ranking is structured to accommodate the multifaceted nature of national research systems. It aggregates **25 distinct metrics** grouped into **7 pillars**: Research, Sustainability, Openness, International Integration, Global Standing, Demographics and Investment, and Academic Integrity. By normalising data against demographics and economic resources, the framework ensures that countries are compared fairly, acknowledging distinct population sizes, financial capacities, and collaborative cultures.

To provide a comprehensive evaluation, the ranking measures a country's impact across the entire research lifecycle:

- **The Inputs (Building the Ecosystem & Cultivating Talent):** A country sets the financial priorities and cultivates the talent pool upon which universities rely. The ranking evaluates these systemic foundations by measuring genuine societal prioritisation through financial investment, such as Tertiary Spend by GDP. It also measures structural density—the concentration of students, teachers, and active researchers relative to their specific age cohorts—and ensures a nation is

maximising its entire available talent pool by rewarding student and teacher gender parity.

- **The Process (Establishing Ethical Norms & Collaboration):** The country establishes the overarching ethical norms governing how research is conducted. The methodology acts as a crucial systemic counterbalance through its Academic Integrity pillar, aggressively penalising exploitative practices like citation cartels (high self-citation rates) and paper mills (high retraction rates). It also evaluates Openness and International Integration, measuring a national system's ability to attract global talent, collaborate across borders, partner with industry, and democratise knowledge through open-access publishing.
- **The Outputs (Thriving Ecosystems & Global Influence):** Finally, the ranking measures the real-world footprint of a thriving academic ecosystem. Instead of relying on raw citation counts, which are easily inflated, it utilises a PageRank algorithm to measure Research Gravitas—identifying foundational research that truly shapes and leads global academic discourse. It also assesses consistent baseline quality by trimming extreme outliers, evaluates targeted contributions to global challenges via the UN Sustainable Development Goals (SDGs), and gauges the global soft power driven by the nation's flagship institutions.

Core Principles of the Methodology

The methodology underpinning the **measuresHE** Country 100 is fundamentally designed to reward genuine scholarly contribution, recognising a nation's research quality, openness, investment, global standing, and fairness. Our guiding principle is to create a ranking that is transparent and data-driven as well as being highly resistant to common manipulative practices that undermine the integrity of academic metrics.

Key Design Robustness Features:

A key focus of this framework is its structural resilience against metric manipulation. The ranking algorithms are specifically engineered to neutralise or minimise the impact of exploitative practices through several key mechanisms:

- **Self-Citations and Citation Cartels:** The framework takes a balanced approach, accounting for legitimate self-referencing while strictly penalising exploitative practices. The methodology incorporates explicit penalties for high Self-Citation Rates (at both the author and university levels), utilising statistical thresholds to aggressively penalise significant high deviations from global norms.
- **Paper Mills and Fraudulent Authorship:** The Retraction Rate metric directly penalises countries with high volumes of retracted publications. This ensures

that the index rewards only genuine, rigorously peer-reviewed research, actively degrading the standing of academic ecosystems that tolerate potential fraudulent behaviour.

- **Outlier Distortion in Quality:** To assess a nation's typical research standard, the methodology employs an Olympic (trimmed) mean for Field-Weighted Citation Impact (FWCI) scores. By mathematically stripping away the top 5% and bottom 5% of a country's FWCI scores, the index prevents a small handful of extreme outliers—whether extraordinarily high-impact anomalies or low-quality noise—from disproportionately skewing the baseline quality assessment.
- **Prioritising True Influence via Research Gravitas:** Instead of relying on raw citation counts, which are easily inflated by volume-driven "publish or perish" cultures, the framework utilises a PageRank algorithm applied to subject-level citation networks. This measures genuine structural influence, ensuring that nations are rewarded for producing foundational research that truly shapes and leads global academic discourse.

Data Source

The ranking data is primarily sourced from OpenAlex, an open-source, community-driven bibliometric database. OpenAlex's global perspective and open nature overcome many of the limitations associated with closed-source systems.

Specifically, the bibliometric calculations for this ranking utilised a data snapshot extracted on 1st November 2025. This ranking evaluates “relevant works” which are research works that have to fulfil the following criteria:

- published between 2020 and 2024 inclusive
- the publication type is an article, review, book, or book chapter
- not retracted
- not paratext
- the work has been produced by a higher education institution within the country, either solely or with other institutions

Additional systemic and demographic data is integrated from:

- UNESCO Institute for Statistics (Feb 2026),
- UN World Population Prospects (2024),
- THE World University Rankings (Oct 2025),
- QS World University Rankings (Jun 2025)
- measuresHE Talent100 2026 (Feb 2026)

Eligibility Criteria

To ensure statistical significance and reliability, strict eligibility criteria are enforced. Specifically a country must have produced a minimum of **4,000 relevant works** across the **5-year evaluation period (2020-2024)**.

Pillars and Metrics

The ranking aggregates 25 metrics grouped into seven pillars. To ensure fair comparison, some metrics are normalised against the size of a country's active research base or specific population demographics (such as the 18-23 or 20-64 age cohorts).

1. Research (35% Weight)

This pillar measures the quality and leadership of a country's research output. Rather than relying on easily distorted citation volumes and citations, it places the heaviest emphasis on 'Research Gravitas,' utilizing network analysis to measure true global influence and thought leadership. This is supported by dual metrics that capture both the consistent baseline standard of a nation's output ('Quality') and its capacity for producing frontier-pushing breakthroughs ('Excellence'). Finally, the inclusion of elite researcher counts ensures the pillar acknowledges the vital role of top-tier human capital in driving sustained academic success.

- **Research Gravitas (18%):** Measures a nation's capacity to lead academic discourse. This is calculated using a PageRank algorithm applied to subject-level citation networks, identifying structural influence within the academic community rather than mere citation volume.
- **Research Quality (6%):** Assesses the baseline standard of a nation's research while mitigating the skew of extreme outliers. It is calculated as the outlier-trimmed arithmetic mean (Olympic mean) of the Field-Weighted Citation Impact (FWCI) for the country's published works.
- **Research Excellence (6%):** Evaluates a country's contribution to breakthrough, frontier knowledge. This is calculated by the proportion of a nation's research works that rank within the global Top 5% based on FWCI.
- **Authors in Talent 100 2026 (5%):** Examines a nation's ability to cultivate and retain elite academic human capital, measured by the total count of a country's researchers recognized in the *measuresHE Talent 100 2026* ranking.

2. Sustainability (7% Weight)

The Sustainability pillar quantifies a nation's contribution to global challenges through the lens of the UN SDGs. The pillar heavily favours impactful thought leadership ('SDG Research Gravitas') over publication volume ('SDG Research Rate') to reward true, foundational contributions to sustainability science. Furthermore, the methodology employs a dynamically calibrated thresholding system using OpenAlex data. This ensures high-precision relevance for clearly defined SDGs while applying adjusted thresholds for broader, highly interdisciplinary goals (SDGs 9, 12, 17) to maintain robust, representative sample sizes without sacrificing analytical integrity.

- **SDG Research Gravitas (5%):** Measures a nation's influence and thought leadership specifically within sustainability discourse. This applies a PageRank algorithm to SDG-related citation networks to identify foundational, highly impactful sustainability research.
- **SDG Research Rate (2%):** Assesses a nation's overall strategic commitment to sustainability. This is calculated as the proportion of the country's total academic output that is directly aligned with the SDGs.

Methodology Note: SDG Classification Thresholds

To systematically classify research as SDG-aligned, the index leverages the OpenAlex database. A calibrated thresholding system is applied to OpenAlex's SDG scores to balance high relevance (precision) with a sufficient sample size for robust analysis (recall). A research work is considered to cover an SDG if it meets any of the following criteria:

- Standard Threshold: SDG Score >= 0.7
- SDG 9: SDG Score >= 0.6
- SDGs 12 & 17: SDG Score >= 0.5

3. Openness (10% Weight)

The Openness pillar captures the collaborative and accessible nature of a nation's academic infrastructure. By utilizing Shannon entropy to measure the 'Diversity of Citing Institutions,' the methodology goes beyond raw citation counts to reward true global distribution and penalize insular research networks. This is paired with an evaluation of 'Industry Collaboration,' which measures the system's ability to translate theoretical knowledge into real-world innovation. Finally, the inclusion of 'Open Access Research Rate' ensures that nations are recognized for democratizing their findings, reflecting the modern standard that world-class science must be both globally applicable and globally accessible.

- **Diversity of Citing Institutions (4%):** Measures the global breadth and distribution of institutions engaging with the country's research. This is calculated using Shannon entropy to ensure the citations are genuinely widespread rather than concentrated within a few insular networks.
- **Industry Collaboration Rate (3%):** Assesses the nation's capacity for translational research. This is calculated as the proportion of total relevant works that are co-authored with corporate or industry partners.
- **Open Access Research Rate (3%):** Evaluates the commitment to democratizing knowledge. This represents the proportion of a country's total research output published under open access licenses, making it freely available to the global public and academic community.

4. International Integration (8% Weight)

The International Integration pillar quantifies a nation's ability to attract global talent and engage in cross-border knowledge creation. To ensure strict cross-national comparability, the methodology employs robust demographic adjustments. By logarithmically scaling international co-authorship against the working-age population, the index removes the systemic bias that typically penalizes geographically large nations. Furthermore, by measuring international students and researchers as a density metric against their specific age cohorts (18–23 and 20–64, respectively), the pillar accurately assesses how effectively a country functions as a global academic hub, capturing both its immediate 'brain gain' and its future talent pipeline..

- **International Research Level (4%):** Measures the extent of a country's cross-border academic collaboration. This is calculated as the proportion of research works involving international co-authorship, scaled logarithmically against the country's working-age population to ensure an equitable comparison between demographically large and small nations.
- **International Researchers (2%):** Assesses a nation's ability to attract and integrate established global academic talent. This is measured as the number of international authors per thousand individuals in the broader working-age population (ages 20–64).
- **International Students (2%):** Evaluates a country's global appeal as a destination for emerging talent. This is calculated as the number of inbound international students per thousand individuals in the typical higher-education demographic (ages 18–23).

5. Global Standing (20% Weight)

The Global Standing pillar focuses on the average rank of a nation's top two institutions to measure peak systemic capability. This 'top 2' threshold ensures a size-agnostic comparison that does not penalize geographically smaller nations, while simultaneously mitigating the statistical volatility of relying on a single institution. It acknowledges that a country's global academic reputation and soft power are heavily driven by its flagship institutions, making their performance across THE, QS, and Research Gravitas a highly accurate proxy for national academic competitiveness on the world stage.

- **Best 2 Universities in THE WUR (7.5%):** The average rank of the country's top two institutions in the Times Higher Education World University Rankings.
- **Best 2 Universities in QS WUR (7.5%):** The average rank of the country's top two institutions in the QS World University Rankings.
- **Best 2 Universities Research Gravitas (5%):** The average subject-level Research Gravitas rank of the country's top two institutions.

6. Demographics and Investment (10% Weight)

The Demographics and Investment pillar contextualises academic outputs by evaluating the systemic inputs that make them possible. By normalising financial spend against GDP and human capital against specific age cohorts, the methodology measures genuine societal prioritization and structural density, preventing large or wealthy nations from dominating through sheer volume. Furthermore, the use of a 50% plateau for gender parity ensures nations are rewarded for maximizing their entire available talent pool. Finally, the strategic use of a 10-year data window—tempered by a linear sliding scale that heavily favours data from 2023 onwards—balances the realities of global reporting lags with a rigorous demand for systemic transparency and current data..

- **Tertiary Spend by GDP (3%):** Evaluates a nation's financial prioritization of higher education, calculated as the percentage of the national Gross Domestic Product (GDP).
- **Tertiary Students by 18-23 Population (2%):** Measures higher education penetration by normalizing total tertiary enrollment per thousand individuals in the traditional student demographic (ages 18–23).
- **Tertiary Teachers by 18-23 Population (1%):** Assesses the teaching capacity and instructional density of the system, normalized per thousand individuals in the 18–23 age cohort.

- **Researchers by 20-64 Population (1%):** Quantifies the density of a nation's active scientific workforce, normalized as the total number of active authors against the broader working-age population (ages 20–64).
- **Tertiary Teachers Gender Parity (1%):** Evaluates gender representation within the academic workforce. This is scored based on the percentage of female tertiary teachers, optimizing at a 50% plateau to reward true parity.
- **Tertiary Students Gender Parity (1%):** Evaluates gender inclusivity within the student body. Scored based on the percentage of female students enrolled, optimizing at a 50% plateau.
- **UNESCO Data Timely Submission (1%):** Rewards systemic transparency and administrative efficiency by evaluating the recency of data submitted to UNESCO.

Methodology Note: Data Recency and Sliding Scale

To accommodate the inherent lag in global macroeconomic and demographic reporting, the index accepts data up to 10 years old. However, to incentivize modern and accurate benchmarking, a recency multiplier is applied. Data from 2023 onwards receives full marks (100% value). Data aged between 2018 and 2023 is scored on a linear sliding scale, proportionally reducing the awarded score to reflect its aging relevance.

7. Academic Integrity (10% Weight)

The Academic Integrity pillar acts as a crucial systemic counterbalance, ensuring that a nation's academic standing is built on rigorous, ethical, and organic foundations. By introducing strict penalties for high Retraction Rates, the index directly addresses the proliferation of compromised research and paper mills. Furthermore, by penalising both high Author and University Self-Citation Rates, the methodology neutralises attempts to game bibliometric indicators. This guarantees that the influence and excellence measured elsewhere in the index reflect genuine global impact rather than artificially inflated, closed-loop citation practices.

- **Retraction Rate (4%):** Retractions are a healthy process in scientific work, however excessive retractions are a sign of citation manipulation. This measures the prevalence of such excessive retractions. This is calculated as the total number of retracted articles, reviews, books, and book chapters normalised against the country's total relevant academic works.
- **Author Self-Citation Rate (3%):** Self-citations are also a healthy part of scientific research, most Nobel prize-winners will cite themselves. However, excessive self citation is a sign of gaming (this article outlines one such case). This metric assesses the artificial inflation of individual academic impact. This is calculated as the ratio of author self-citations to the total number of citations received by the country's research works. Only research with less than 100 authors are

considered in this analysis to avoid issues with large consortia publications, which are common in areas like High-Energy Physics.

- **University Self-Citation Rate (3%)**: University self citations are also a healthy part of scientific research. This metric evaluates high levels of institution self-citation. This is calculated as the ratio of citations originating from within the same institution to the total citations received by the country's research works. Only research with less than 100 authors are considered in this analysis to avoid issues with large consortia publications, which are common in areas like High-Energy Physics.

Metric Scoring

The previous section describes how the values of each metric is calculated. This section describes how the metric values are transformed into metric scores that range from zero to 100, and then how the overall scores and ranks are calculated.

Metric	Pillar	Scoring Algorithm	Weight
Research Gravitas	Research	Percentile Rank	18.0%
Research Quality	Research	Normal CDF	6.0%
Research Excellence	Research	Exponential CDF	6.0%
Authors in Talent 100 2026	Research	Exponential CDF	5.0%
SDG Research Gravitas	Sustainability	Percentile Rank	5.0%
SDG Research Intensity	Sustainability	Normal CDF	2.0%
Diversity of Citing Institutions	Openness	Normal CDF	4.0%
Industry Collaboration Rate	Openness	Exponential CDF	3.0%
Open Access Research Rate	Openness	Identity	3.0%
International Research Level	International Integration	Normal CDF	4.0%
International Researchers by 20-64 population	International Integration	Exponential CDF	2.0%
International Students by 18-23 population	International Integration	Exponential CDF	2.0%
Best 2 Universities in THE WUR	Global Standing	Percentile Rank	7.5%
Best 2 Universities in QS WUR	Global Standing	Percentile Rank	7.5%
Best 2 Universities Research Gravitas	Global Standing	Percentile Rank	5.0%
Tertiary Spend by GDP	Demographics and Investment	Linear	3.0%
Tertiary Students by 18-23 population	Demographics and Investment	Exponential CDF	2.0%
Researchers by 20-64 population	Demographics and Investment	Exponential CDF	1.0%
Unesco Data Timely Submission	Demographics and Investment	Identity	1.0%
Tertiary Teachers by 18-23 population	Demographics and Investment	Exponential CDF	1.0%
Tertiary Teachers Gender Parity	Demographics and Investment	50% Peak	1.0%
Tertiary Students Gender Parity	Demographics and Investment	50% Peak	1.0%
Retraction Rate	Academic Integrity	Zscore +0.5 clip	4.0%
Author Self Citation Rate	Academic Integrity	Zscore +0.5 clip	3.0%
University Self Citation Rate	Academic Integrity	Zscore +0.5 clip	3.0%

Scoring Algorithms

- **Normal CDF**: Transforms the metric value into a percentile score based on a normal distribution. The mean and standard deviation are statistically learned from the dataset (often omitting extreme outliers to ensure a robust fit).
- **Exponential CDF**: Transforms the metric value into a percentile score based on an exponential distribution. The scale parameter is learned from the dataset, rewarding values that significantly exceed the expected average.
- **Percentile Rank**: The metric values are ranked relative to all other eligible countries. The resulting rank is then linearly scaled between 0 and 100, ensuring an even distribution of scores across the cohort.
- **Z-Score +0.5 Clip**: Used for penalty metrics where lower is better (such as self-citations or retractions). Values are scaled based on their standard deviation from the mean. Countries performing worse than the mean + half a standard deviation (i.e. z-score above 0.5) are penalised, the higher the z-score the lower the metric score.
- **Linear:** Values are scaled proportionately from zero to the maximum observed value across all eligible countries.
- **50% Peak**: Used for parity metrics. Scores increase linearly as they approach a 50/50 balance. Once 50% is reached, the score is maximised (100). Any deviation away from 50% (in either direction) linearly decreases the score.
- **Identity**: The raw metric value itself naturally represents a percentage or a pre-calculated 0 to 100 scale, and is used directly as the final metric score.

Overall Score and Rank Creation

The overall score of each country c is defined as the weighted sum of the metric scores.

$$overall_c = \sum_{metric} score_{metric,c} \times weight_{metric,c}$$

The rank is determined by rounding the overall score to 1 decimal place and then ranking from highest to lowest. Countries with the same score are given the same rank.

Appendix

Subfield to domain mapping

The details of the mapping of OpenAlex subfields to **measuresHE** subjects and domains is available here.

Why OpenAlex

Powering the Next Generation of Research Intelligence