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# Reflecting on how university rankings measure undergraduate academic excellence

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***Abstract- University rankings have emerged in recent years as the preferred indicator to compare somehow the quality of higher education institutions and underline the tough competition for attracting resources and students, not to mention their impact on the media. The figures from these rankings show that research has become one of the main assets of the university system. Since undergraduate instruction focuses on professional education, we reflect on whether undergraduate academic excellence should rely only on research activity or also on teaching and learning quality in terms of competency achievement and learning outcomes. Hence the latter should also be considered as a relevant feature within higher education rankings. Accreditation criteria look for quality education evidence. Surprisingly, the criteria employed by accreditation agencies for undergraduate programs lie far from the composite indexes used by ranking agencies to measure quality outcomes. In this study, we have found controversies and disagreements in the rankings. We influence and deepen what other publications support, concerning indicators that do not agree. With simple statistical calculations, we show the inconsistency in some rankings, in alignment with what other publications state.***

***This work overviews some national and international relevant rankings for Latin American universities, analyzes their criteria, and compares them. It also gives an insight into some dimensions proper for assessing quality in undergraduate higher education institutions (HEIs). Finally, this study suggests a group of quality indicators suitable for elaborating undergraduate education rankings. We conclude that HEIs should open a debate on the appropriate dimensions and criteria to measure undergraduate instruction quality in universities. Such dimensions also include features such as the impact on human progress, transversal competences, global competencies, and commitment to sustainability.***

***Keywords-- higher education quality, University rankings, learning outcomes, undergraduate instruction.***

## I. Introduction

Upon exiting Secondary School, students must decide whether they access higher education (HE) or not. In the former case, the next big question is which university degree they should enroll in. To tackle this dilemma, students generally consider their assets, i.e., their abilities, preferences, affordability, along with third-party features concerning candidate institutions like their locations, degree offerings, financial issues, quality, and prestige, among others. After discerning a variety of factors, they finally choose a target institution.

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In later years, many university rankings appeared and are, more frequently, taken into account as an undergraduate education quality indicator. These have become meaningful for students, their families, the job market, and institutions such as national or regional governments, NGOs, etc. Thus, is important to reflect if university rankings measure in an adequate way undergraduate academic quality.

The three most renowned rankings are the QS Ranking of the World's Best Universities (QSWUR), the Academic ranking of world universities - Shanghai Ranking (ARWU) and the Times Higher Education World Universities Rankings (THEWUR) [1]. These three rankings apply a similar methodology, which elaborates some synthetic indicators leading to a composite index that attempts to highlight the competitiveness of international research universities (Table I).

TABLE I
ARWU Ranking criteria, indicators and weights within the composite index.

| Criteria | Indicator | Code | Weight |
|---|---|---|---|
| Quality of Education | Alumni of an institution winning Nobel Prizes and Fields Medals | Alumni | 10% |
| Quality of Faculty | Staff of an institution winning Nobel Prizes and Fields Medals | Award | 20% |
| | Highly Cited Researchers selected by Clarivate Analytics | HiCi | 20% |
| Research Output | Papers (only "Article" type) published in Nature and Science between 2016 and 2020* | N&S | 20% |
| | Papers indexed in Science Citation Index-Expanded and Social Science Citation Index | PUB | 20% |
| Per Capita Performance | Per capita academic performance of an institution | PCP | 10% |
| *For institutions specialized in humanities and social sciences such as London School of Economics, N&S is not considered, and the weight of N&S is relocated to other indicators. | | | |

HEIs usually undergo three levels of quality assessment: first, the internal self-assessment mechanisms, then the accreditation processes, and lastly, the ranking lists.

Since most current undergraduate curricula focus on outcomes and competencies, an initial step is to spot, unambiguously, the desired outcomes and competencies of the educational process and the implications to achieve them. According to ABET, the Accreditation Board for Engineering and Technology, student outcomes describe what students are expected to know and be able to do by the time of graduation [2]. These relate to the knowledge, skills, and behaviors that students acquire as they progress throughout the syllabus. Besides, a quick definition of competency is the combination of skills, abilities, and knowledge needed to perform a specific task [3]. A deeper one could be the ability to successfully meet complex demands in a particular context through the mobilization of psychological prerequisites including both cognitive and non-cognitive aspects [4]. According to the latter definition, this concept entails a holistic nature, i.e. a behavioral implication, cognitive and non-cognitive abilities, and the ability to use a set of capabilities deliberately [5].

A summary of the attributes and core expectations that employers and society value from undergraduate alumni [2, 6] encompasses:

- Sound knowledge achievement in the selected field.
- Ability to think and learn autonomously.
- Ethical behavior.
- Ability to efficiently transmit discipline-specific knowledge to colleagues.
- Appropriate achievement of communication skills.
- Capacity for both teamwork and interdisciplinary tasks.
- Ability to work in a global and multicultural environment.
- Ability to propose sustainable solutions and care for the environment and society.

Most universities have accredited their programs to exhibit both the accomplishment of their education model offerings and an organization-underlying quality improvement model. Academic programs accreditation involves showing evidence of achieving these objectives. However, a lack of correspondence emerges when comparing the criteria used by the university rankings as education quality indicators with those of the accreditation agencies.

On the one hand, most current university rankings concentrate their indicators on research performance, thus sometimes measuring only the research capacity of the faculties or institutes but neither the instruction quality nor outcomes. For example, the Times Higher Education World University Rankings (THEWUR) 2022 report highlights that Universities that published high-impact medical research on Covid-19 have soared up the table, with 11 institutions from China reaping the most rewards and closing gaps with the top-located US universities [1].

Features like the numbers of Nobel prize winners, patents, or agreements are present, albeit it is not clear whether they are impacting the learning process of undergraduates or not. Undoubtedly, both Nobel Prize and Fields Medal awards highlight the prestige of institutions. Nevertheless, it appears surprising that a Nobel Prize in Literature awarded in the early 20th Century is an asset in qualifying an Engineering School one century later.

On the other hand, some rankings on education quality use indicators such as the ratio of professor/student, retention, qualification of professors, etc., but they disregard other relevant dimensions.

All rankings claim to measure academic excellence, but there is a lack of consistency across all rankings systems since not all show the same results [7-10]. Moed (2017) [7] found that even though there is an overlap among rankings, odd results appear, such as some institutions positioned at the top 100 in one table league but ranked at lower positions or, in some cases, not found at all in other ranking systems.

Most ranking systems measure citations but use different metrics to do so. One way to compare these metrics is by analyzing the correlation between two rankings and examining how strongly they correlate. Several studies have used this technique [7,12]. Thus, Moed (2017) [7] compared how different the metrics are among some of these rankings and found that the QS's citation per Faculty indicator shows a weak correlation with the citation indicator from other ranking systems, including the THEWUR ranking.

Many other published rankings perform their own criteria, however there is an open debate on their extent and even their legitimacy [8, 13-16]. Thus, Johnes [9] states that university ranking criteria "*are potentially open to manipulation and gaming because many of the measures underlying the rankings are under the control of the institutions themselves*". She raises doubts about using a composite index to assess overall performance as it does not reflect the information contained in the data set, which may lead HEIs to engage somehow in gaming behavior. Then she proposes a fairer methodology to produce groupings rather than numerical rankings.

Another criticism of these rankings is that they do not acknowledge uncertainty [10]. As these authors explain, the measurement system by each university comes with some degree of error. Then, giving a fixed position within a ranking is not quite right since this position stems from an estimation with some uncertainty around it. Then, as Barnett and Gadd (2022) [10] point out, an improvement in one or more positions in a ranking can be just noise.

Some studies focus on the relation between rankings and financial sustainability. Indeed, by performing an analysis of 102 UK universities, Baltaru et al., 2022 [11] found that rankings exacerbate resource inequalities between elite universities (those with historically consolidated reputations) and all other universities (non-elite universities), which are more dependent on both the tuition fees and ranking tables, unlike the former.

Diverse multi-dimension, self-tailored rankings are also in use. For instance, the Spanish CYD Ranking (a unique online tool to compare the performance of Spanish universities) measure performance in terms of various indicators grouped into several dimensions: teaching and learning (12 indicators), research (ten), knowledge transfer (eight), internationalization

(13), and contribution to regional development (three). Such an experience involved a large number of institutions and had a positive impact on the higher education framework, increased their visibility, and allowed them to analyze their positions by dimension and by the education sector, thus enriching the information available to students [17].

In this study, we show some controversies and disagreements between some indicators in the rankings applied for Latin American universities and the accreditation criteria used to evidence undergraduate education programs quality. Section II details the material and methods used. In section III, in alignment with other publications, we show such inconsistencies in the rankings using simple statistical calculations. Also, to give an example of how universities work in quality assurance, a summary of the internal evaluation procedure at the Universidad Politécnica de Madrid (UPM) and Universidad de Piura (UdeP) is presented.

In Section IV, conclusions are presented. We suggest some feasible indicators to elaborate a ranking focused on undergraduate education quality. These indicators may provide objective information to decision-makers. This proposal is far from conclusive but aims to open a debate around this issue.

## II. Materials and Methods

The methodology comprises a straightforward stepwise procedure to guide the justification of the study and synthesize the findings, allowing us to detect significant gaps and opportunities concerning the ranking indicators. Albeit the latter provide information on the quality of undergraduate education, it seems appropriate to extend them to obtain more information and thus shed light on families, students, regulators, or national institutions to achieve better decisions. Although most rankings use to compare universities for objective parameters, these do not always reflect what the most relevant aspects of undergraduate education quality should be. In other cases, they are conceived from a traditional education scenario, so innovative institutions do not achieve notable performance results. So, a question arises: what elements should be considered in a ranking to measure the quality of undergraduate education?

The steps to explore the research premise in terms of the question posed are: i) review of the literature using the Web of Science (WOS), Google Scholar, SpringerLink and Scopus-Elsevier databases. Databases were used to track the sequences through their citations and by whom they have been cited and as well as high-impact journals from 2010 to date (for example, Journal of Higher Education Policy and Management, Journal Significance Magazine, CYD Ranking) and the most influential authors. ii) locate the most cited articles and book chapters and select the most cited articles by applying the search terms: University Rankings, Undergraduate Education, Instruction Quality of higher education, sustainable higher education. iii) Correlation and linear regression analysis were used to evaluate the relationships among the indicators of the QS Latam and Scimago rankings on Latin American universities.

Correlation analysis, specifically Pearson's correlation, was used to evaluate the relationships among indicators and between indicators and overall score within the same ranking and between rankings. Pearson correlation measures the strength and direction of a linear relationship between two quantitative indicators.

Then, linear multiple regression was performed on the data from Latin American universities from each ranking: QS Latam and Scimago. In both models, one per ranking, the overall indicator was the dependent variable while the rest of the indicators were the independent variable. This analysis allows us to evaluate the multicollinearity among the indicators, giving us some indication of redundancy in the information contained in the rankings.

We applied this analysis focusing on Latin American universities. These results serve as an exploratory analysis for i) studying how correlated the metrics within the same ranking are and which metric is more correlated with the overall score of the ranking and ii) how different the metrics from different rankings are which may provide some indication of inconsistency among them.

## III. Results and Discussion

### A. A review of criteria for university ranking parameters.

*1) Overview:* Higher education institutions (HEIs) play a paramount role in promoting concern and addressing efforts in future professionals. No wonder HEIs support and perform their two main missions, i.e., generating and disseminating knowledge, as main contributions to society. In this regard, the criteria used to measure the university outcomes encompass a large number of dimensions.

Apart from the above three top-renowned rankings, it is worth to mention some useful ones:

- Leiden Ranking: provides information exclusively about the research done at over 1200 major universities worldwide [18].
- The National Taiwan University (NTU Ranking) issues Performance rankings of scientific papers for world universities [19].
- U-Map classification: grants a European classification of higher education institutions. The study covers only institutions that offer at least one program accredited or recognized by a nationally recognized accreditation authority or by a government body [20].
- Global Universities Ranking: institutions are ranked per their teaching environment, research environment, research influence (citations), industry income, and international outlook [21].
- CHE German University Ranking: shows rankings for German universities [22].
- CYD Ranking: shows a ranking of the Spanish HE institutions and displays a comparative assessment concerning instruction, research, knowledge transfer, international outlook, contribution to regional development and job placement [17, 23].
- QS Latin America University Rankings (QS LatAm) handles eight indicators: academic reputation, reputation among

employers, ratio learners/instructor, PhD research personnel, international research network, number of citations per paper, number of papers per Faculty and web impact [24].

- SCImago is an international institution that evaluates universities and institutions focused on research around the world. Thus, it prepares its international ranking through the measurement of three indicators: research performance, innovation results and social impact. It is a public web platform for consulting data and tools related to a series of scientometric indicators that allow analyzing, comparing, and evaluating the scientific productivity of institutions in charge of carrying out research, experimental development, and innovation. It allows visualization of scientific production in the different regions of the world, such as Africa, Asian Region, Eastern Europe, Latin America, Middle East, North America, Pacific Region and Western Europe [25, 26].
- SUNEDU Ranking focuses on a single evaluation element, i.e., the scientific research outcomes whereas neglects other features such as teaching quality, infrastructure, cooperation agreements for internationalization, alumni job quality, or societal responsibility actions, among others [27].

*2) Teaching performance dimensions at UPM and UdeP*: To exemplify what an accredited university usually defines as part of its quality education assurance tasks, we share related information from UPM and UDEP. In our institutions, instructors' performance also emerges as a key feature to account for when measuring instruction quality. Thus, the current internal assessment procedure for teaching quality and effectiveness carried out by the UPM, named Docentia 2.0, focuses on the following dimensions (relative weights of each dimension from D1 to D4 within brackets):

D0 (sine qua non): fulfillment of teaching obligations. These refer to the assessment of a teacher's activity: class attendance, tutoring, review of exams, and delivery of programs and minutes. Student perceptions weigh 62.5%, whereas the Head of Department perception weighs 37.5%. Passing this issue is mandatory to proceed further to the teaching activity assessment; otherwise, the latter is discarded.

D1 (23.6%): Teaching settings planning and strategy given the expected learning outcomes and competencies. It involves the intensity of the imparted modules, weighing 33.3%, their variety (14.8%), the student perceptions (29.7), the Head of Department perception (11.1%), and the Evaluation Committee's assessment on how the instructor updates and improves the teaching resources necessary to take the subject - books, notes, presentations, videos, podcasts, etc.- (11.1%).

D2 (36.8%): Pedagogic development. It includes the adequacy of impartations and time, the fulfillment of the syllabus and the student perception about the resolution of doubts and orientation in the tasks.

D3 (21.8%): Results from satisfaction surveys and perceptions on achievement of learning outcomes and enticing instructor's performance.

D4 (17.8%): Innovation and improvement. It includes participation in educational innovation projects, training courses and identification of aspects that should be improved in their teaching performance.

As shown in Table II, student perceptions, delivery performance data and the internal committee assessment of the instructor's self-reports determine the punctuations of the indicators involved. Student surveys are surprisingly significant to value the teacher's impartations and delivery, whereas they disregard inquiring about student interest, attitude, and readiness. In addition, surveys do not distinguish among student profiles, e.g., whether students are to drop out or not, repetitors or not.

Likewise, the current internal procedure for assessing the teaching performance at the UdeP, i.e., teaching quality and effectiveness, builds on the so-called Technical Competence. This area covers the content of the research, teaching and academic advisory activity with the following dimensions:

TABLE II.
DIMENSIONS AND SOURCES OF SCORES FOR THE INTERNAL EVALUATION OF TEACHING ACTIVITY AND PERFORMANCE AT UPM

| Dimension | Dimension weight (%) | Student surveys | Committee assessment of Instructor's self report | Student union report | Department Head report | Faculty Head report |
|---|---|---|---|---|---|---|
| Fulfillment of teaching obligations | sine qua non | 62.5% (*) | | | 37.5% (*) | |
| Teaching settings planning and strategy | 23.6% | 5.7% | 6.4% | 0 | 0 | 0 |
| Development of teaching and learning tasks | 36.8% | 16.4% | 11.4% | 1.8% | 1.1% | 1.1% |
| Results and performance | 21.8% | 13.6% | 8.2% | 0 | 0 | 0 |
| Innovation and improvement | 17.8% | 0 | 15.4% | 0 | 0 | 0 |
| Total | 100% | 35.7% | 41.4% | 1.8% | 1.1% | 1.1% |

(*) These weights only apply for the cutoff to qualify for the evaluation.

D01: Mastery of disciplinary content. In-depth knowledge and management of the fundamentals and specific concepts of the subject and teaching in their academic area. It refers to the amount and organization of knowledge of a disciplinary content that the teacher possesses. It is depicted through their mastery of the subject, initial and continuous training, and scientific production.

D02: Teaching method and delivery. It comprises several functions, such as teaching planning, didactic execution and

evaluation, ICT management for the teaching-learning process, and reflection on this process.

D03: Research. It encompasses the ability to design, execute and coordinate research by showing intellectual skills (related to conceptual, analytical-synthetic, critical thinking, interdisciplinary, innovative, strategic, etc.), knowledge and mastery in the use of methodologies and approaches regarding the needs of the regional, national and international environment.

D04: Mentories. It refers to the distinct types of educational and professional guidance, accompaniment and help that the teacher does in order to address the concerns and difficulties of students and teachers in training. The guiding role is inherent to the teaching profession. It can be evidenced through the accompaniment task toward achieving both the learning objectives from their subject and learners academic and personal development.

Both universities evidence the instruction quality in accordance with the quality assurance mechanisms required by the accreditation agencies and is carried out through mid-term and end-of-semester surveys, which measure the teacher performance concerning the mentioned dimensions. The results are arranged on a Likert scale, ranging from "Strongly agree" (5) to "Strongly disagree" (1). (1) Organization (2) Teaching – learning (3) Communication skills (4) Use of tools (5) Service attitude (6) Infrastructure (laboratories, workshops, etc.).

This study suggests other indicators that may allow a better measurement, control and improvement of the quality of teaching, responding to a society that strives to train good professionals in accordance with national and international accreditation bodies [28-31].

*3) Analysis of some relevant ranking criteria*: Table III summarizes various indicators from rankings relevant to the Peruvian universities. At a glance, they lack uniformity across rankings: QS Latam and SUNEDU indicators differ notably from those of QS World and THE [32].

Table IV collects the Pearson correlations among the indicators of the QS Latam and Scimago rankings, all but a few are statistically significant at the p-value of 0.05. The top left and bottom right parts of this table show the correlations among indicators of the same ranking. For instance, the top right (colored with gray) shows the correlation indicators from Scimago ranking, its overall indicator is highly correlated with Research and Societal indicators (0.975 and 0.945, respectively). Also, Research and Societal indicators are highly correlated (0.897). In QS Latam (bottom right part, colored with blue), we observe that its overall indicator is highly correlated with Academic Reputation (above 0.902), Employer Reputation (0.701) and Web Impact (0.643). Academic Reputation is highly correlated with Employer Reputation (0.822), then Web Impact (0.679) and International Research Network (0.637). When comparing the indicators between both rankings (bottom left part of Table IV), surprisingly, the correlations are all negative. Research from Scimago is highly negatively correlated with the Overall (-0.697), Web Impact (-0.722), International Research Network (-0.633) and Academic Reputation (0.625) indicators from QS Latam ranking. Similar pattern is found between Research and the rest of the indicators from QS Latam.

From the regression analysis, when fitting the overall score on the rest of the indicators from the Scimago ranking, we see that there is a multicollinearity problem since the variance inflation factor (VIF) of Societal and Research indicators is above five because both are highly correlated. This indicates that including both to calculate the overall score might be redundant.

When fitting a regression model on the overall score on the rest of the indicators from the QS Latam ranking, we find that the indicators' VIF are less than five which means that the multicollinearity problem is not serious.

### *B. Toward a proposal of criteria*

#### *1. Disagreement between criteria stemming from different institutions and agencies.*

Table III gathers the variety of criteria employed by ranking companies, accreditation agencies (quality models), and ruling institutions. In most features regarding education quality, it appears evident that ranking results do not match with what they are intended to measure. This disagreement is notable in aspects strongly related to the student education, service, and learning experience. Also, rankings barely consider faculty features other than research outcomes.

#### *2. Dimensions*

The relevant consequences of the implementation of multidimensional rankings in Spain, such as the CYD, have led us to study this experience to apply it to the context presented in this study. The dimensions they evaluate are classified by the field of knowledge and at the institutional level. Thus, they propose the following dimensions:

- Teaching and learning.
- Research.
- Knowledge transfer.
- International orientation.
- Dimension of contribution to regional development.

This work builds on the existing dimensions and focuses on additional measures intended to improve the quality of teaching. The evaluation models of the education quality encompass between ten and 12 indicators with definitions.

#### *3. Teaching quality indicators.*

In short, the most usual indicators feature as follows:

1. Graduation rate: is the ratio between the number of enrolled students in an undergraduate program and that of the resulting graduates.

TABLE III.

COMPARISON AMONG CRITERIA FROM RANKING SYSTEMS, ACCREDITATION AGENCIES AND RULING INSTITUTIONS.

| Criteria | Specification | QS World | QS Latam | Scimago Univ Rank | THE Ranking | ARWU (SUNEDU) | Historical ranking SUNEDU | Webo-metric | Quality models (accreditations) | CBC-SUNEDU (Regulators) |
|---|---|---|---|---|---|---|---|---|---|---|
| Publication quality | In top-ranked magazines | | | X | | | X | | | |
| | Citations | X | X | X | X | | X | X | | |
| | In top journals (Nature ...) | | | | | X | | | | |
| | On selected bases (SCIELO) | | | | | X | | | | |
| Number of publications | Total publication in Scopus | | X | X | X | | | | | |
| | Total publ. in Web of Science | | | | | | X | | | |
| | Leadership in publications | | | X | | | | | | |
| | Publications per teacher ratio | | X | | | | | | | |
| Research centers | Center budget | | | | | | | | X | X |
| Faculty composition | Professor with PHD | | X | | | | | | X | X |
| | Foreign professors | X | | | X | | | | X | X |
| | Professors' Academic degree | | | | | | | | | X |
| | Recognition of teaching work | | | | | | | | X | X |
| | Teaching mobility | | | | | | | | X | |
| Teaching | Student to professor ratio | X | X | | X | | | | | |
| | Postgrad/undergrad ratio | | | | X | | | | | |
| | Postgrad/professor ratio | | | | X | | | | | |
| | Curriculum | | | | | | | | X | X |
| Graduates | Number of graduates | X | | | | | | | | |
| | Employability rate | X | | | | | | | X | X |
| | Graduate Follow-up | | | | | | | | X | X |
| | Internship agreements | | | | | | | | X | X |
| Research funding | From the private sector | | | | X | | | | | |
| | From the public sector | | | | X | | | | | |
| | Own research funds (Budget) | | | | X | | | | | X |
| | Record of running projects | | | | | | | | | X |
| Institute Budget | Annual finance plan | | | | | | | | X | X |
| Inclusion | Student´s procedence | | | | | | | | X | X |
| | Accessibility | | | | | | | | X | X |
| Infrastructure | Facilities | | | | | | | | X | X |
| | Safety and use of laboratories | | | | | | | | | X |
| Internationa-lization | Co-authoring of publications | X | X | X | X | | | | | |
| | Foreign students | X | | | X | | | | X | |
| Innovation | Patent requests | | | X | | | | | | |
| | Patents in force | | | | | | X | | | |
| | Cited Patent Papers | | | X | | | | | | |
| Researchers | Financed with own funds | | | | | | | | | X |
| | Financed with external funds | | | | | | | | | X |
| | Publishing authors | | | X | | | | | | X |
| | Researchers at RENACYT | | | | | | | | X | X |
| Web metrics | Ranking web | | X | | | | | | | |
| | Web size | | | X | | | | X | | |
| | backlinks | | | X | | | | X | | |
| | Altmetrics | | | X | | | | | | |
| Academic Reputation | Academic Survey | X | X | | X | | | | | |
| | With awards (Nobel, fields) | | | | | X | | | | |
| | Highly Cited Researchers | | | | | X | | | | |
| | Quotes in Google Scholar | | | | | | | X | | |
| Reputation of graduates | Employer survey | X | X | | X | | | | X | |
| | With awards (Nobel, Field) | | | | | X | | | | |
| Selectivity | Admission fees | | | | | | | | X | X |
| | Entrant performance result | | | | | | | | X | X |
| | Leverage Activities | | | | | | | | X | |
| Social and Environmental | Responsibility Programs | | | | | | | | X | X |
| | Environmental policies | | | | | | | | X | X |
| ICT | Management systems R+D+i | | | | | | | | X | X |
| | Info and reference centers | | | | | | | | X | X |
| Educational services | Health, social, volunteering… | | | | | | | | X | X |
| | Sports, cultural services | | | | | | | | X | X |

TABLE IV.

PEARSON CORRELATION AMONG INDICATORS CONCERNING LATIN AMERICAN UNIVERSITIES.

| | Overall | Research | Societal | Innovation | Overall | Academic reputation | Employer reputation | Faculty to student ratio | Citations per paper | Paper per faculty | Staff With PhD | Web Impact | International research network |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall | 1.000 | | | | | | | | | | | | |
| Research | 0.975 | 1.000 | | | | | | | | | | | |
| Societal | 0.945 | 0.897 | 1.000 | | | | | | | | | | |
| Innovation | 0.626 | 0.463 | 0.557 | 1.000 | | | | | | | | | |
| Overall | -0.697 | -0.685 | -0.649 | -0.472 | 1.000 | | | | | | | | |
| Academic reputation | -0.625 | -0.596 | -0.595 | -0.433 | 0.902 | 1.000 | | | | | | | |
| Employer reputation | -0.383 | -0.369 | -0.373 | -0.241 | 0.701 | 0.822 | 1.000 | | | | | | |
| Faculty to student ratio | -0.14 | -0.126 | -0.132 | -0.115 | 0.164* | 0.112* | 0.132 | 1.000 | | | | | |
| Citations per paper | -0.445 | -0.385 | -0.409 | -0.463 | 0.331 | 0.337 | 0.198 | -0.008** | 1.000 | | | | |
| Paper per faculty | -0.573 | -0.573 | -0.518 | -0.337* | 0.295 | 0.35 | 0.149 | -0.116* | 0.47 | 1.000 | | | |
| Staff with PhD | -0.456 | -0.447 | -0.433 | -0.289 | 0.165* | 0.196 | -0.014** | 0.142 | 0.294 | 0.684 | 1.000 | | |
| Web Impact | -0.722 | -0.703 | -0.723 | -0.387 | 0.643 | 0.679 | 0.448 | 0.131 | 0.335 | 0.515 | 0.52 | 1.000 | |
| International research network | -0.63 | -0.59 | -0.605 | -0.457 | 0.528 | 0.637 | 0.395 | 0.029** | 0.566 | 0.616 | 0.442 | 0.697 | 1.000 |

2. Effective graduation rate: is the above ratio but referred to the number of students that finish their degree within the prescribed number of semesters.
3. Non-local student rate: is the percentage of students coming from other locations.
4. Ratios of students per course and per tenure professor.
5. Faculty qualification: is the ratio of PhD lecturers to the total number of research teachers of each area.
6. Drop-out rate: is the percentage of registered students for any semester that have failed to both accomplish all the subjects and register for two consecutive academic years.
7. Performance rate: is the ratio of a cohort's total number of passing credits to the total number of registered credits.
8. Success rate: is the ratio of a cohort's total number of passing credits to the total number of exam-attended credits.
9. Degree preference: is the percentage of the first-choice registrations within the available vacancies offered by a degree.
10. Requested average grade for incoming students.

## IV. Summary and Conclusions

Some ranking promoters submit surveys to academia to collect answers which lead to composite indexes. The queries are sometimes arid and subjective. Indeed, the survey items often seek only individual perceptions, which somehow lack objective data or facts supporting such answers.

A quality evaluation procedure based on dimensions has proved to be a valuable method to assessing university performance. In turn, each dimension gathers a set of criteria intending to evaluate, detect improvement opportunities, and compare among similar entities. This model would even embrace more universities in a system of free competence, thus enabling accounting for diversity and teaching expertise.

Teaching quality measurement is open for study, reflection and debate. For instance, it may be worth reflecting about separating research from teaching and adopting a more complex structure based on differentiated faculty roles. This split would enable both economies of scale and the benefits of research-informed instruction. Besides, this would yield more objective information to potential students seeking a specific professional career. The current job market is fickle, undergoing rapid changes, and witnessing the emergence of new professional and scientific areas, so the higher education mission becomes less indisputable, more unclear, and challenging. This context of indeterminacy involves variations and uncertainties, not to mention the geographical and political situation, the social context, and the activity sector of the societal environment of each university region.

In addition, two features should not be overlooked when assessing instruction quality: the promotion of transversal competencies and the inclusion of sustainable development issues in academic programs. Thus, universities are prompted to promote the basis for educating future professionals on the complex set of behaviors, disciplines, and decisions involved in the sustainable development (SD) horizon. It is time that HEIs focus their efforts toward the so-called "third university mission", as they may become a driver to promote a mind-shift in students and graduates toward a more sustainable world. Some action fields to undertake are: integrating sustainability competencies into university curricula, addressing HE efforts toward sustainable entrepreneurship, production, consumption, and Circular Economy [33].

Additional issues in this regard are suggested:

• Designing specific activities for high-achieving students would benefit practitioners and institutions.

• Developing democratic, sustainability competencies and humanistic education within courses.

• Rethinking the ethical dimension of education and favoring the acquisition of personal and transversal skills, since the only goal of “acquiring the discipline-specific knowledge and getting a job” is a reductionism that would impoverish the university's mission and vision. The successful process of transversal competencies’ attainment is directly related to attitudes, expectations, readiness, and behavioral engagement.

• Implementing innovations in pedagogy toward “scientific teaching” [34], that is, to apply the same standards of success evidence to both teaching and scientific research.

• Not only the ratio of teacher/student and the international outlook are quality indicators. Furthermore, learner-centered settings should focus on learning outcomes.

• Extracurricular activities: humanistic-type activities related to soft skills, which are complementary to the ones achieved during the degree pursuing holistically trained alumni. It also includes promoting learning projects involving teachers and learners, aiming at empowering both. Societal responsibility through corporate volunteering in favor of the community and environment can be a valuable tool, especially when blended with a service-learning model.

• Internationalization experience: in addition to exchange agreements and mobility issues, other aspects should be accounted for in this regard, such as COIL (collaborative online international learning) courses, international co-authorship in scientific or academic works; engagement of foreign lecturers in teaching.

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