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The Evaluation of Teacher's Performance: A Quantitative Proposal

Walfredo González Hernández[1], Teresa Milena Freire Aillón[2], Bolívar Efraín Morales Oñate[3], Jeanneth Elizabeth Balseca Basantes[4], Silvia Susana Torres Carrillo[5], Ricardo Patricio Medina Chicaiza[6]

Abstract

The article starts with the problems associated with subjectivity in the evaluation of teacher performance. Subsequently, the documentary analysis method is presented, describing the phases adopted that lead to the analysis of the main definitions of teacher performance, highlighting their strengths and weaknesses. Finally, the metric is presented, justifying each of the measurements made and the contribution it makes. The proposed metric evaluates teacher performance in an objective manner and allows for calculation based on the indicators selected by the institution.

Keywords: *Teacher Performance Appraisal, Metrics, Metrics in Education.*

Introduction

The evaluation of teachers' performance is one of the issues that today has the greatest impact on educational processes, which is conducive to reaching judgements to assess the performance of teachers. Paima-Paredes (2019) that makes it possible to reach judgements to assess their performance. For Cabero Almenara, Llorente Cejudo, and Morales Lozano (2018) establishing a measurement of the teacher's knowledge or performance is a problem that is difficult to solve due to the multiple activities that teachers carry out and the complexity of each one of them. Another solution to this problem is offered by Cañadas and Cuétara (2018) when they propose a University Teacher Evaluation Questionnaire which states 44 evaluation items from the student's perspective. The student's perspective is important because he or she is the main recipient of the teaching work; however, the university professor not only dedicates their work to teaching, but must also carry out research and extend the results obtained to society for its transformation through science. From this same perspective of teaching evaluation, it is projected by Moreno Olivos (2018) The same difficulties as the previous one.

The three studies analyzed above on evaluation (Moreno Olivos, 2018; Ochoa Sierra & Moya Pardo, 2019). coincide on several issues related to this process:

[1] Universidad Central "Martha Abreu" de las Villas, Villa Clara. Cuba, Email: wghernandez@uclv.cu, Orcid: https://orcid.org/0000-0001-8974-3721..
[2] Pontificia Universidad Católica del Ecuador, Ambato. Ecuador, Email: tfreire@pucesa.edu.ec, Orcid: https://orcid.org/0000-0003-2324-6495.
[3] Universidad Técnica de Ambato. Ecuador, Email: be.morales@uta.edu.ec, Orcid: https://orcid.org/0000-0003-4980-8759
[4] Universidad Técnica de Ambato, Ecuador. je.balseca@uta.edu.ec, Orcid: https://orcid.org/0000-0002-1552-1787
[5] Universidad Técnica de Ambato, Ecuador. ss.torres@uta.edu.ec, Orcid: https://orcid.org/0000-0002-6824-8518
[6] Universidad Técnica de Ambato; Pontificia Universidad Católica del Ecuador, Ambato. Ecuador. ricardopmedina@uta.edu.ec pmedina@pucesa.edu.ec Orcid: https://orcid.org/0000-0002-2736-8214.

- Evaluation is used to certify teacher salary promotions or accreditations, but not to place teachers in those activities where they can be most productive.
- Teacher evaluations from the student perspective suffer from shortcomings related to student irresponsibility or students' desire to punish a particular teacher.

In the same way as students, institutions can assume these evaluative processes as justification for holding teachers accountable, sanctioning them to the detriment of improving their professional work.

In the case of the research carried out by Ochoa Sierra and Moya Pardo (2019) analyses an essential aspect related to the absence of objectivity that generates teacher distrust towards assessment. According to the study by these authors, mistrust can generate little receptiveness from teachers and lead them not to use the evaluation as an opportunity for improvement. Generally speaking, several issues can be observed in the studies analyzed so far that undermine the evaluation process of a university teacher:

- Lack of greater objectivity in evaluation, which allows these processes to be used for purposes other than their educational function.
- Poor uniformity in evaluation criteria, based mainly on student perception, which does not allow for the certification of university teachers from their evaluation.

Need to integrate qualitative and quantitative processes in assessment to enable teachers to be used according to their potential.

The university, since its inception, has three substantive processes recognized in the current literature that could be used to standardize teacher evaluation. Each of these processes has indicators for their measurement that are recognized in a wide literature on the subject. (Lohman, 2021; Ochoa Sierra & Moya Pardo, 2019). Each of these processes has indicators for their measurement that are recognized in a wide range of literature on the subject, which could serve to standardize teacher evaluation at this level of education. For this it is necessary to complement the qualitative methods with a quantitative measurement that reflects the essential qualities that distinguish the university teacher.

Therefore, the objective of this research is to determine a metric that allows the elimination of subjective processes in the qualitative evaluation of university teachers based on the substantive processes.

Methodology

A number of current research studies use documentary analysis as a fundamental method. (Jiménez Vargas, Aguilera Valdivia, Valdés Morales, & Hernández Yáñez, 2017; Parga Lozano, 2018; Zaragoza Vega & Gutiérrez Pérez, 2019). Table #1 shows the stages used by each of the authors:

Authors	Information Search	Retrieve Texts	Organising Information	Critical Analysis	Gap Detection	Proposed Solution

Zaragoza Vega and Gutiérrez Pérez (2019)	X	X	X	X	X	
Parga Lozano (2018)	X	X		X		
Jiménez Vargas et al. (2017)	X	X	X			

Table #1: Phases of the Desk Research.

Source: Author's elaboration

The method used in this research is the documentary analysis, which is guided by the stages used by Zaragoza Vega and Gutiérrez Pérez (2019) The method used in this research is the documentary analysis, although the last stage shown in the table has been added. This stage aims to obtain a solution to the detected gap and a last stage of validation of the solution that will not be the subject of treatment in this article, so it is not shown in the table. Each of the stages will be described in the article in the appropriate sections.

Stage One

The Web of Science was searched using the search engine www.sciencedirect.com using the terms teacher performance evaluation as follows: (teacher) and (performance) and (evaluation) and (evaluation) and (evaluation) and (performance) in the title of the article, obtaining 18 documents (https://www.sciencedirect.com/search?title=%28evaluation%29%20and%20%28performance%29%20and%20%28teacher%29). This search was also carried out in Scielo (scielo.org) with the following items ((ti:evaluation) and (ti:performance) and (ti:teacher)) and in the same way with teacher performance evaluation yielding 38 documents (https://search.scielo.org/?q=*&lang=pt&count=15&from=16&output=site&sort=&format=summary&fb=&page=2&q=%28ti%3A%28evaluaci%C3%B3n%29%29+AND+%28ti%3A%28desempe%C3%B1o%29%29+AND+%28ti%3A%28docente%29%29&lang=pt).
Subsequently, a search for theses was carried out in the oatd.org repository (https://oatd.org/oatd/search?q=title%3A%28teacher%20AND%20performance%20AND%20evaluation%29), detecting 47 theses (7 master's and 40 doctoral). This site is a solution to the search for theses in various repositories, so its operation is similar to that of a meta-search engine. The site sends the keywords to several repositories that are in charge of the search and return the results shown on the site.

Second Stage: the search yielded a net total of 103 documents in total, of which 94 could be downloaded as several theses had download limitations. Two documents were discarded, a doctoral thesis and an article, which did not correspond to the evaluation of teaching performance.

Stage Three

These texts were incorporated into a digital library that was processed with EndNote X9, allowing them to be viewed, organized and selected more appropriately for the purposes of this article. The remaining stages will be described in the following sections of the article.

Result

Stage Four

The documents, especially the theses, contain several of the topics stated in the table, so that the units of analysis do not coincide with the number of documents. From the results obtained in the classification of the documents by thematic units, it can be inferred that the main concern lies in the search for criteria and indicators to evaluate in a general way, which leaves the scientific production dedicated to higher education with very few results. At the same time, the publications devoted to evaluation measurements do not investigate the quantitative relationships between indicators related to higher education. This research is mainly devoted to questionnaires and instruments for assessing the performance of teachers. Because of the importance of higher education and the qualities that distinguish it from other levels of education, it is important to determine a measure for performance evaluation in universities.

Discussion

Fifth Stage

The university as an educational level has qualitative differences with respect to the preceding levels and one of them is the processes that take place in it and its relationship with society. One of the fundamental processes of this institution is the training of professionals at undergraduate and postgraduate level, and in recent years the concepts associated with lifelong learning have become more prominent, integrating them as a single process. Postgraduate training has different forms and processes, including postgraduate, diploma, master's and doctorate programs. Another process, closely linked to postgraduate training, is research, the fundamental results of which are articles, books and events, among others. Last, but not least, is the extension of the knowledge produced in the university to society, which can take the form of projects. For this reason, this article considers that the evaluation of the university professor's performance should be based on these substantive processes, and to this end, the definitions of performance detected in the current literature will be analyzed below.

For Cuevas, Ntoumanis, Fernandez-Bustos, and Bartholomew (2018). generally, two aspects of the teacher are evaluated, the summative and supervisory elements. For this author,

... monitoring involves assessing teachers' lesson plans, their instructional skills and instructional strategies, and how well they have mastered the content. On the other hand, the summative element involves assessing how well students have learned the lesson content given by the teacher based on the students' ratings or their grades. (p. 154) (p. 154) (author's translation).

In this characterization of teacher performance, organizational, executive and cognitive elements are highlighted. However, there are other elements that are not strictly in these three elements and have an impact on the teacher's performance, such as experience and motivation for teaching. These three elements could constitute part of the academic dimension of the teacher, although they are inherent to the other substantive processes as also extension and research is organized and executed at the same time as it depends to a large extent on the cognitive elements.

This leads to a matrix of dimensions and indicators

It is important to have found a definition of professional performance in the context of the current educational transformations in Cuba, which reveals, with greater accuracy, the characteristics of the performance of professionals who assume new responsibilities.

The analysis of these definitions made it possible to provide the necessary answers to three questions related to professional performance, due to the variety that exists in their content. In relation to the question of what professional performance is, the authors point out that it is: actions performed or executed, suitability, action and effect of performing, the way in which the work is performed, capacity, set of actions, real performance. Although there is no consensus among the authors when defining what professional performance is, it can be deduced that it is associated with the activity carried out by people, in which they have to demonstrate whether they know how to perform it or whether they are qualified for it. This means that professional performance is closely linked to the preparation of individuals and the way in which they carry out this activity in their social interaction.

Cortés, Campos, and Moreno (2014) proposes a measurement of the performance of teachers at the Benemérita Universidad Autónoma de Puebla that focuses on teaching activities and the relationship they establish with students. It is important to highlight the importance that should be given to the opinion of students about teaching performance, but in higher education it is also necessary to evaluate the evaluation made by the employing organizations on the training of students. In this proposal, it is an indirect measurement as they would be evaluating teachers based on the performance of the students associated with the subjects taught. This indicator would play an important role as a measure of the prestige enjoyed by the university and its teachers among the employing organizations.

For the authors of this article, the dimensions are an improvement on previous work, but they do not fully reflect the complexity of the problem. This research does not present teacher research or the communication of its results. It is noteworthy that it analyses the learning process from the didactic act and communication with students without addressing the problems of teacher planning, teacher preparation, the use of the educational potential of teaching activities, among other issues.

Stage Six

The evaluation of teaching performance plays an important role in terms of the organization's objectives, but must be divided into academic, research and extension processes in which the university teacher is involved. In the case of academic processes, there are two distinct processes in higher education, postgraduate and undergraduate, which differ in their complexity. We will begin with the undergraduate and then analyses the postgraduate.

At the undergraduate level, the management structures of the degree program mark an added complexity to the teaching processes, known as the organizational levels of the teaching process. In Cuban higher education, three fundamental roles are distinguished in terms of the organization of the years: the degree coordinator and the main lecturer of the year, while in the organization of the subjects there are two other roles: the degree coordinator, the discipline coordinator and the subject coordinator. Each of these roles has different responsibilities, with the course coordinator being responsible for the methodological work of the course, which includes the work of the year groups and disciplines. Each of these responsibilities is typified in the law that governs teaching work (Superior, 2018) and are indicators for the evaluation of each of the

teachers who have these responsibilities.

This means that a metric that quantitatively models this process could behave as follows:

$$TDMP = \left[\begin{matrix} p_{direct} * ManagementRol + p_{docente} * TeachRol + O_{ind} \\ * Others \end{matrix}\right]$$

Where:

$TDMP$: is the value assigned to undergraduate methodological teaching work

$p_{direct}, p_{docente}$: are the weights that quantify the importance that the educational organization attaches to each of these functions, $Others$: refers to other indicators of the methodological undergraduate teaching work that the managers consider interesting to include, O_{ind}: refers to the weight given by the educational organization to these additional indicators, $ManagementRol$: is the value of its managerial functions, which is given by the following expression: $ManagementRol = \sum_{i=1}^{n} managementcomplexity_i * pcmanagement_i$ in which $managementcomplexity_i$is the value assigned to each complexity of its management and $pcmanagement_i$: is the weight quantifying the importance the organization attaches to each managerial function. $RolDocente$: is the value of their functions as a teacher which is calculated using the following expression: $TeachRol = \sum_{i=1}^{n} teachindicators_i * pIndD_i * (CNoespeciality_i * \sum_{j=1}^{m} groupsnumbers_j * fctamaño_j + Cespeciality_i * \sum_{h=1}^{m} grouosnumber_h * fctamaño_h))$ in which $teachindicators_i$: is the set of all teaching indicators assessed by each organization, $pIndD_i$indicates the weight given to each indicator by the organization, $groupnumbers_j$is the number of groups to which the lecturer teaches, and $fctamaño_j$: is the complexity factor added by the size of each group which can be determined by three categories: large group (5), medium group (2) or small group (1). A estos indicadores debe añadirse la complejidad de impartir una asignatura que sea de la especialidad o no. Los grupos deben diferenciarse en grupos de la especialidad y grupos que no sean de la especialidad, entonces debe asignarse un factor de complejidad $CNoespeciality_i$ y $CEspeciality_i$. Por supuesto, $CNoespeciality_i < CEspeciality_i$ because teach at speciality groups is more complex than not speciality..

In the case of postgraduate programs, there are also responsibilities depending on the type of postgraduate program and there is also a system of indicators to evaluate each of them established by many authors. In Cuba, the National Accreditation Board uses a system of indicators to evaluate specializations, master's degrees and doctorates as postgraduate degrees and is the body responsible for their certification based on international standards. Their certification processes conclude with a categorization on a 4-item scale, which implies a qualitatively higher level of rigor. Therefore, the indicators for evaluating Master's degrees, specializations and doctorates could be those established by the National Accreditation Board in the models for each of them. In each country, the ones that each university, entity or ministry considers could be used, but it is suggested that they be based on international standards that allow the results obtained from the application of the proposed metrics to be homogenized. Each university professor can teach in various postgraduate programs that can be carried out at institutional, regional, national and international levels. In order to quantitatively model these processes, the following metric is proposed:

$$TDPost = \left[p_{directpostg} * ManagementPostRolg + p_{docentepostg} * TeachPostRolg + O_{indpostg} * OthersPost \right]$$

Where:

$TDPost$: is the value assigned to the postgraduate teaching work, $p_{directpostg}$, $p_{docentepostg}$: are the weights that quantify the importance that the educational organization attaches to each of these functions. $OtrosPostg$:refers to other indicators of the methodological undergraduate teaching work that the managers consider interesting to include, $O_{indpost}$: refers to the weight given by the educational organization to these additional indicators, $ManagementPostRolg$: is the value of its managerial functions, which is given by the following expression: $ManagementRol = \sum_{i=1}^{n}(cdpostg_i * pcdpostg_i * ncertification_i * npostg_i)$ in which $cdpostg_i$: is the value assigned to each complexity of their management in the postgraduate course, $pcdpostg_i$: is the weight that quantifies the importance that the organization gives to each managerial function, $npostg$:whether it is an institutional (1), regional (2), national or international (5), or international (5) and $ncertification_i$: indicates the complexity added to its level of certification.

$RolDocentePostg$:is the value of their postgraduate teaching duties calculated using the following expression:

$$RolDocente = \sum_{i=1}^{n} idpostg_i * pIndDP_i * (\sum_{j=1}^{m} CGruposPostg_j * fctamaño_j * ncertificación_j * npostg_j)$$

in which $pIndDP_i$: is the set of all the teaching indicators evaluated by each organization, $pIndDP_i$:indicates the weight given to each indicator by the organization, $cantidadgrupos_j$: is the number of groups to which the professor teaches, $npostg$:whether it is an institutional (1), regional (2), national or international (5), or international (5) and $fctamaño_j$is the complexity factor added by the size of each group which can be determined by three categories: large group (5), medium group (2) or small group (1).

The metrics outlined so far can be integrated into a metric that evaluates academic processes in the following way:

$$EvalAcade = \frac{1}{Time} * \sum_{i=1}^{n}(Process_i.wprocess_i)$$

Where: $EvalAcade$: is the result of the expression that evaluates the undergraduate and postgraduate academic performance of each teacher, $Process_i$:: are the processes that will be evaluated, postgraduate and undergraduate, and $wprocess_i$: indicates the weight that the organization gives to each of them. In this case $\frac{1}{Time}$ allows the evaluation of how much teaching work has been done during the time allocated to it by the organization. This is done to take into account those research professors whose undergraduate teaching is minimal. It has been placed in the form of a summation, bearing in mind that there may be other processes in the future that allow for consistency in the metric.

In the case of scientific research in the literature on the subject, the breadth of activities of this nature in which teachers can be involved is well recognized. The fundamental ones recognized

in a wide literature on the subject are (Aguillo, 2016). The assumed metric is explained by González Hernández (2020):

$$EvalInvest = \frac{1}{Time} * \left[p_{public} * PrA + p_{proyec} * PrP + p_{tesis} * PrT + p_{premio} * PrR + p_{event} * PrE + p_{arb} * PrArb + p_{lib} * PrLib + p_{patente} * PrPatente + O_{ind} * Otros\right]$$

The last of the components is the extension component, assumed in this article as the projection of the university outwards in its interaction with society, and its characterization is complex due to the number of interactions it can have. One of its particularities is the transversely that characterizes its processes, since a postgraduate course taught in the territory, as well as the work experience carried out with students in a work center, is an extensionist process. Each of them has been evaluated in the previous chapters; however, their impact has not been taken into account, so this could be an interesting indicator to measure, taking into account their potential to transform society. One of these interactions is the services offered by the university to other institutions through knowledge transfer among others or science and technology parks that can generate income for the university. (Giuri, Munari, Scandura, & Toschi, 2019). By way of summary of the previous paragraph, three types of extension activities can be classified that have not been covered in the previous chapters. Those that generate impact on society, those that generate impact and financial income for the university, and those in which the university participates in decision-making. The metrics to model these processes are proposed as follows: $PExte = ActImpact * weight_{impact} + ActIn * weight_{in} + ActRepresent * weight_{represent}$.

Where $PExte$: is the quantitative expression resulting from the calculation of the expression$weight_{impact}$, $weight_{in}$ and $weight_{represent}$ are the weights representing the importance of each of these activities for the organization, and, $ActImpact, ActIn$, $ActRepresent$ are those activities that can generate income, impact or representativeness of the university.

The mathematical expression for the calculation of$ActIn = \sum_{i=1}^{n} (act_i * ing_i * pingre_i)/_{participants_i}$where act_i:are the activities, ing_i: the revenue generated by each activity, $pingre_i$: the weight of each activity for the organization and $participants_i$: is the number of people involved in each activity.

Impact activities are proposed to be calculated from the following metrics: $ctImpact = \sum_{i=1}^{n} (actimp_i * impacto_i)/_{participantes_i}$ where $actimp_i$: are the activities that generate impact and $impacto_i$ is the impact generated by each one of them, taking as a basis that they can be carried out by a group of people, which is expressed as $participantes_i$.

It should be noted that in the case of university representatives, they may or may not hold managerial positions in these organizations, so the metric is determined as follows: $ActRepresent = \sum_{i=1}^{n} (porg_i * ManagementRolOrg_i + pnodirect_i * NoManagement_i)$, where $porg_i$ y $pnodirect_i$ are the weights associated with the role that corresponds to each participation and Management$RolOrg_i$: is the number of activities in

which they participates as a manager and $NoManagement_i$: is the number of activities in which it participates as a non-manager.

Another indicator that should be used quantitatively is the satisfaction of students and employing organizations with the work of teachers. This indicator is transversal to all substantive processes in which the teacher is involved. The conduct of student scientific work, the introduction into the employing organizations as well as joint university - productive organizations research allow criteria to be obtained on the performance of the teacher and are located in all three substantive processes. A useful questionnaire is the one used in Iadov's method (Roque Herrera, García Santiago, & Maldonado León, 2019). method to evaluate the satisfaction of a group of people. In this case, the expression $GS = GSE + GSOrg + GSD + GSC$ where *GS* indicates the degree of satisfaction, *GSE* is the degree of satisfaction of the students, *GSOrg indicates* the satisfaction of the organizations with which it is related, GSD the satisfaction of their non-immediate managers with their performance, and *GSC* is the opinion of their teaching colleagues about the teacher. In this case, immediate managers are excluded as they are the ones doing the evaluation. Each of these degrees of satisfaction are expressed through different formulas in which it must be taken into account that, if teachers do not receive criticism of their work, then the denominator is set to 1 so as not to indeterminate the expression. The difference between positive and negative criteria could lead to a null expression which could have ambiguous meanings: either there are no criteria or the number of positive and negative criteria is the same. This eliminates the possibility of a null value affecting the overall measure as will be seen in its expression below.

$GSE = p_{est} * \frac{\sum_{k=1}^{t} CPEst_k}{\sum_{n=1}^{m} CNEst_n}$, where $CPEst_k$represent the positive criteria issued by the students and the negative criteria $CNEst_n$ negative criteria. If $GSE > 1 \Rightarrow \sum_{k=1}^{t} CPEst_k > \sum_{n=1}^{m} CNEst_n$. The student satisfaction is positive and its increase should be seen as positive. If $GSE < 1 \Rightarrow \sum_{k=1}^{t} CPEst_k < \sum_{n=1}^{m} CNEst_n$ and indicates that students have more negative than positive criteria and its decrease should be seen as negative and if it is equal to one it means that the number of criteria is halved. The variables *t* and *m* express the number of negative and positive criteria, whereas p_{est} expresses the weight that the organization where the teacher works gives to the students' opinion.

In the case of satisfaction with the organizations with which teachers interact, the formula is very similar to the one described for students. $GSOrg = p_{org} * \frac{\sum_{k=1}^{v} CPOrg_k}{\sum_{n=1}^{l} CNOrg_n}$,where $CPOrg_k$represent the positive criteria issued by the organizations and the negative criteria. $CNOrg_n$ negative criteria. If $GSOrg > 1 \Rightarrow \sum_{k=1}^{v} CPOrg_k > \sum_{n=1}^{l} CNOrg_n$. The satisfaction of the organizations is positive and the higher the better. . If $GSE < 1 \Rightarrow \sum_{k=1}^{v} CPOrg_k < \sum_{n=1}^{l} CNOrg_n$ indicates that students have more negative criteria than positive ones, whose tendency to zero should be valued negatively, and if it is equal to one, it means that the number of criteria is divided in half. The variables *l* and *v* express the number of negative and positive criteria, whereas p_{org} expresses the weight that the organization where the teacher works gives to the opinion of the organizations.

Similarly, to the two previous cases, for the satisfaction of non-immediate managers with whom teachers interact, the formula is very similar. $GSD = p_d * \frac{\sum_{k=1}^{w} CPD_k}{\sum_{n=1}^{q} CND_n}$ where CPD_k represent the positive criteria issued by the organizations and the negative criteria. CND_n negative criteria. If

$GSD > 1 \Rightarrow \sum_{k=1}^{w} CPD_k > \sum_{n=1}^{q} CND_n$. The satisfaction of the organizations is positive and the higher the better. If $GSD < 1 \Rightarrow \sum_{k=1}^{w} CPD_k < \sum_{n=1}^{q} CND_n$ indicates that students have more negative criteria than positive ones, whose tendency to zero should be valued negatively, and if it is equal to one, it means that the number of criteria is halved. The variables *w* and q express the number of negative and positive criteria, while w and q express the weight that the organization where lab p_d expresses the weight that the organization where the teacher works gives to the opinion of non-immediate managers.

As in the two previous cases, for the satisfaction of non-immediate managers with whom teachers interact, the formula is very similar. $GSC = p_c * \frac{\sum_{k=1}^{z} CPC_k}{\sum_{n=1}^{b} CNC_n}$ where CPC_k represent the positive criteria issued by colleagues and the negative criteria. CNC_n negative criteria. If $GSC > 1 \Rightarrow \sum_{k=1}^{z} CPC_k > \sum_{n=1}^{b} CNC_n$ the satisfaction of the organizations is positive and the higher the better. If $GSC < 1 \Rightarrow \sum_{k=1}^{z} CPC_k < \sum_{n=1}^{b} CNC_n$ indicates that colleagues have more negative criteria than positive ones, whose tendency to zero should be valued negatively and if it is equal to one, it means that the number of criteria is divided in half. The variables *z* and *b* express the number of negative and positive criteria, while z and b p_c expresses the weight that the organization where the teacher works gives to the opinion of colleagues.

These mathematical expressions allow us to observe the possible contradictions between the evaluations of the four spaces of expression that teachers have: organizations, non-immediate managers, students and colleagues. The possible contradictions express different criteria for each space that must be taken into account and analyzed by the evaluators, based on assuming as a principle the uniqueness and singularity of the expressions that are established between the teacher and each of the environments in which they act. An aid to the search for criteria to solve the contradictions can come from Qualitative Epistemology as a method of investigation of educational situations in which subjectivity and its associated processes are explored. (de-Alcântara & do-Carmo de-Oliveira, 2020).

From the expressions obtained so far, it can be inferred that the teacher's evaluation would be given by the formula $TeachEvaluation = p_{GS} * GS * (Eval_{Exte} * p_{exte} + Eval_{Acade} * p_{acade} + Eval_{Inves} * p_{Inves})$ where p_{GS}, p_{exte}, p_{acade} y p_{Inves}explicitly state the importance that the university gives to each of the variables. While $Eval_{Exte}$, $Eval_{Acade}$ y $Eval_{Inves}$express the values obtained in each of the substantive functions of the university in which the teachers are involved.

This metric allows a ranking of the university's human capital in terms of the substantive processes and allows the best performers to be placed in those activities where they have achieved the best results. This makes it possible for the key result areas to have the ideal personnel to carry out their activities, selected on the basis of their performance. It is also possible to use it to award merit based on the work performed in each of the components, as well as in the most comprehensive one. In this way, the organization can know which of its human resources stand out in one of the substantive processes and place them in the function that is most useful in terms of productivity.

Each of the formulas can be used separately or some of the expressions obtained can be eliminated depending on the selection of criteria you have to evaluate your staff. The neutral numbers for each of the proposed operations could be used in case that part of the formula is not

needed (one for multiplication and zero for addition) and extended to performance evaluation for other levels of education. It should also be noted that the metric is consistent with the emergence of new indicators and instruments for the evaluation of teacher performance, because it is based on the substantive processes that have been at the heart of university activity since its inception. At the same time, it allows each university or organization that wishes to adopt it to take into account its own measurement indicators without contradicting what is proposed.

The main limitation of this metric lies in the complexity of obtaining its criteria, as in large organizations it involves a large number of participants. This limitation can be solved by using an evaluation by objectives and eliminating from the formula those parts that cannot be fulfilled, hence it is essentially additive.

Conclusions

The evaluation of teaching performance is a complex activity in which there are multiple aspects and each one of them takes into account different indicators. Assuming a position of performance evaluation from the substantive university processes enables a comprehensive performance evaluation as it allows determining the degree of participation of each lecturer in each of them.

The proposed metric is an attempt to quantify the subjective evaluations that university managers may have of a professor's performance in their areas of activity. As it is based on substantive processes, it allows three fundamental variables that have been measured in turn in other variables to be taken into account.

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