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Una mirada a la calidad de la educación desde la eficiencia económica docente
A look at the quality of education based on the teacher´s economic efficiency

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Resumen: Teniendo en cuenta como problema de investigación la no existencia de un proceder metodológico que permita determinar la eficiencia económica-docente en la Universidad de Guantánamo como una de las dimensiones de la calidad de la educación, los autores, a partir de la consulta a referentes actualizados sobre la temática y el empleo de métodos científicos de investigación, formulan una propuesta que, de ser aplicada, pondría en manos de los directivos una herramienta imprescindible de análisis y valoración para la toma de decisiones dirigida al logro de una mejor calidad de la educación.

Palabras clave: Calidad de la educación; Eficiencia económica-docente; Costo; Productividad del trabajo

Abstract: Taking into account as a research problem the non-existence of a methodological procedure that allows to determine the teacher´s economic efficiency in the University of Guantánamo as one of the dimensions of the quality of education, the authors, based in the consultation of updated references on the subject and the use of scientific research methods, formulated a proposal that, if applied, would place in the hands of the executives an essential tool for the analysis and assessment for decision making aimed at achieving a better quality of education.

Keywords: Quality of education; Teacher´s economic efficiency; Cost; Productivity of work

Introduction

For the National Institute of Educational Evaluation of Mexico (INEE) (2008) the quality of the educational system is "the quality that results from the integration of the dimensions of relevance and importance, internal efficacy, external effectiveness, impact, sufficiency, efficiency and equity" (p.19), being for university education identified by De la Orden (1997), (...) with a complex explanatory construct of evaluations, supported by the coordinated consideration of three interrelated dimensions: functionality, effectiveness and efficiency". Both agree in

recognizing efficiency as a tribute to the quality of education, that is, education must be rational in the use of the resources put at their disposal if it is of quality.

The definitions of the term of efficiency in education are diverse, as diverse as the authors who have approached it. Lauchy Acosta (2006, p.19) cites those offered by Chase and Aquilano (1995), Monserrat et al. (1998) and Espinosa et al. (1994).

For the first is the one achieved when a desired result is obtained with the minimum of inputs, while for Monserrat et al. (1998), it is the result of achieving the proposed objectives if this is done with minimal costs. Espinosa et al. (1994) associates it with the optimal use of resources for the benefit of the achievement of the planned objectives.

However, as the resources allocated to education must serve to support the substantive processes that take place in it and its products are of a formative nature: learning, professional training, values education, among others, then the economic resources employed by them they acquire a different connotation, since their final destiny is educational-educational; that is why the principal author of this work calls them economic-teaching resources. By establishing the relationship between output indicators of the process and economic-teacher resources it is possible to measure the economic-teacher efficiency; a complex task, in the end, because there are many exit indicators of the process that are difficult to quantify.

The economic-teaching efficiency would be, then, the result of relating the economic resources destined directly or indirectly to the professional's training and the results achieved in it. Their determination is of the utmost importance at the present time, since, as stated in some of the Economic and Social Guidelines of the Sixth and Seventh Congress of the Party, maximum rationality must be achieved in the use of the resources assigned to the parties and different sectors of the economy, with a significant weight in education.

This imperative contrasts with the fact that at this time at the University of Guantánamo there is no methodological procedure that allows for its calculation based on the indicators that measure it: cost per student, productivity of the teacher's work, performance of resources material-teaching, which deprives its managers of the possibility of having an important tool for analyzing and assessing the efficiency with which they develop the substantive processes they manage.

Therefore, it is the objective of this paper to design a methodological procedure for calculating the cost per student as a basis for determining the remaining economic-teacher efficiency indicators.

To achieve this, a theoretical and methodological framework of reference on efficiency, cost and determination is offered at first; then a proposal to proceed to calculate the cost of training a student and its use in the analysis of "irrational expenses" and ends with some considerations on the calculation of economic efficiency for substantive processes at the University of Guantánamo.

Development

Quality, efficiency and indicators for its measurement

Lofourcade (1998), cited by Valdés Pérez (1999), defines quality as "(...) one or several properties of that something, which allows to appreciate it as equal, better or worse than other units of the same species" (p.13).

One of those attributes of quality present in the education system is the efficiency with which they manage and achieve their objectives. The authors Aedo (2005), Alpízar (2011), Lauchy Acosta (2016) recognize it although they define it in a different way, without ceasing to coincide in its main characteristics.

For Aedo (2005) any program or product to be efficient must achieve its objectives "(...) without waste of resources" and then refers to the technical and economic efficiency as two different types of efficiency. The first refers to the relationship between the product and the quantity of a given input, and the second occurs when, in addition to technical efficiency, preferences or technologies are taken into account and concludes that "the criterion of economic efficiency can be related to a cost-effectiveness index" (p.11).

Later on it refers to productivity as a measure of economic efficiency and that (...) results from the relationship between the resources used and the quantity of products or services produced" (Aedo, 2005, p.12).

Alpízar (2011) reveals the existence of factors of economic inefficiency in Higher Education in particular "when the teaching capacity of the faculty does not correspond to the magnitude of enrollment or when the latter does not conform to the capacities in positions in the teaching

facilities or either when it is not exploited as it should (...) the optimum or economic capacity (...) or the existing equipment is not exploited in the same way. For this"- he affirms, "the faculty of teachers and the teaching capacity of the facilities must be balanced (...)" (p. 5).

Therefore, it is important to draw attention to the need to evaluate the performance of the available economic resources: humans, infrastructure, equipment, bibliographic funds, among others, based on the determination of the level or degree of use or exploitation thereof.

Lauchy and Acosta (2016) assume the definitions of efficiency of the authors Chase and Aquilano (1995), Monserrat *et al* (1998) and Espinoza *et al* (1994) to affirm afterwards that it describes the relationship between two magnitudes: the product obtained and the inputs used in its generation, therefore, it can be cognitively focused in two dimensions: internal efficiency and external efficiency (p.6).

Later on, they refer to the following economic-financial efficiency indicators used in the Ministry of Higher Education of Cuba (MES):

- Total current expenditure per student.
- Expenditure per graduate.
- Losses in the training process.
- Current expenditure on fuel and lubricants per student.
- Current expenditure in energy per student.
- Current expenditure in salary per student.
- Expenditure by weight of operations income. (p.11)

However, the most commonly used efficiency indicator, judging from the articles consulted, is the cost indicator. In general, authors such as Boschin and Metz (2009), Palacios (2011), Gonzales (2013) and Alpízar (2011) have referred to cost and cost per student. The latter defines it as "(...) the magnitude of the financial expenditure used by each student in undergraduate courses leading to a university degree" (p.1).

In general there is a consensus that the cost of a student is the result of dividing the total expenses incurred for the training of a student between total enrollment, being able to use different

methods of costing, preferably the method of costing by activities, but some methodological difficulties present in its determination are pointed out. Between them:

• Taking into account only the total number of graduates of educational institutions and not" (...) those students who do not complete their studies and who use resources in the educational institution, generate additional costs within the graduate's production process, increasing the costs" (Boschin-Metz, 2009, p.12)

• (...) the existence of several types of course in undergraduate studies such as: regular day course, course by meeting, continuity of studies and distance education, introduces another degree of difficulty to achieve a consistent and stable classification of spending "(Alpízar, 2011, p.4).

• "(...) the essential unit of academic processes (pre and postgraduate training, research, university extension, just to mention the nouns) and their interrelationships in a university, which makes the recording and classification of expenditure extremely complex pure employee in the education of students in undergraduate courses" (Alpízar, 2011, p.4).

Therefore, it is recommended to make an annual cut of the actual enrollment of the day course and make it equivalent to that of the course by meeting to correlate it with the magnitude of the expense at the end of the year, and thus determine a cost per student that exceeds, if feasible, what is indicated about the diversity of existing courses at the University. In the case of postgraduate courses there is no alternative but to differentiate those expenses for the levels of activity they generate, even when they are not specific or "pure" of those activities.

On the other hand, Alpízar (2011) also points out several factors that affect the cost per student, among them: the postgraduate improvement of the faculty, the physical location or location, among others and recommends accompanying them with indices and indicators that characterize them among those that relate some of general and real coverage of economic resources for teaching and performance, which for the author should be considered as indicators of economic efficiency, independent of the cost per student (p.6).

It is interesting to highlight the Financial Loss Index due to Academic Losses (IPBA), as shown in Figure 1.

Figure 1: Formula for calculating the IPBA

IPBA = B (G x E *) / G

Where

Expense per Student = GxE

Expenses executed in the cycle = G

Academic losses in cycle = B

* Indicator of Expense by Student (G x E) differentiated applied to the losses (B), according to the academic year that the student was studying

Source: Alpízar (2011)

Another indicator of economic efficiency to consider is the productivity that Alarcon Mendez (2011) defines as "(...) the relationship between outputs and inputs, that is, between the products and the inputs necessary for their production" (p. 10) and considers it as an indicator of economic efficiency.

For the calculation of public expenditure, such as education, Lauchy and Acosta (2016) propose the formula shown below.

Figure 2: Formula for the calculation of the Public Expenditure Productivity

PGP = R / GP

Where:

PGP: Productivity of public expenditure.

R: Result obtained.

Gp: Public expenditure.

Source: Lauchy and Acosta (2016)

Economic efficiency and indicators for its determination at the University of Guantánamo

The path used by the referenced authors is assumed to determine the cost per student, the cost per student or the cost of training the student, which is how it will be called in what follows.

In most of the texts and articles consulted, the cost is considered an expenditure that represents the value of the resources that are expended in the realization of activities that generate income, therefore it is recoverable.

González (2013) considers it as "(...) a resource that is sacrificed or that is waived to reach a specific objective" (p.10).

For the authors Boschin and Metz (2009), referring to education, the cost "(...) includes all the economic resources generated by the activities carried out in an academic unit or another object of cost, with the purpose of creating value in society. Knowledge is the most valued product, therefore the university must generate and communicate knowledge and culture, that is, allocate efforts to achieve the proposed objectives "(page 13).

Therefore, it includes all the economic resources generated by the activities carried out in a school institution with the purpose of obtaining the different educational products.

Thus, in order to measure the training costs of the graduates of the different courses that take place in the University, it is necessary to consider all the expenses in national currency (MN) and in convertible pesos (CUC) included in the financial statements of expenses by items and the investment one.

The expenses recorded in those states that are broken down into items and elements, as established in Resolution 499 of the Ministry of Finance and Prices, in the Republic of Cuba, are, almost all, directly or indirectly destined to finance the expenses associated with all the processes that take place in the universities, so it would be a mistake, methodologically, to exclude from the cost of training a doctor, or an activity to overcome professors, kitchen dining expenses, transport, or maintenance to hygiene and cleanliness, since all of them are taxed, to a greater or lesser extent, to the effective development of the activities associated with the processes described above.

The consideration of investment expenses is due to the fact that their destination is the simple or expanded reproduction of installed capacities and existing equipment, which are taxed, when exploited or used, to substantive processes and not substantive that in the University they develop, so that, in practice, it is difficult to allocate the expense to one of them in specific, hence the convenience of assuming for each activity or process analyzed a proportion of the total

expenditure incurred in that component, starting from the norm unit of expenses to be determined and the level of activity that corresponds.

For this reason, in determining the economic efficiency of the internal processes that occur in the University, the output results must be taken into account, in the qualitative and quantitative aspects of the aforementioned processes, as well as the expenses incurred to obtain them. . Such relationships should be established when appropriate to determine the cost of training a student, a doctor or a specific activity.

In the case of the cost of training a student, account must be taken of the items and elements of expenses included in the financial statement of expenses per item: raw materials and materials, fuels and lubricants, energy, personnel expenses, depreciation and amortization, other monetary expenses, expenses of the social security budget, among others; and the investment: investments in process, construction and assembly, equipment and other expenses, as well as those for the acquisition of fixed assets, purchases of tangible fixed assets for use and purchases of intangible fixed assets.

With this education one would be in a position to proceed to determine the cost of training the student in a year, in a month, or in a cycle, depending on the education available about the elements and related expense items.

Proposal of procedures to follow for the calculation of some indicators of economic efficiency in the University

To calculate the cost of training a student in a period taken as a reference, in this case one year, we proceed to determine the total cost, which is not more than the sum of the total current, financial and investment expenses.

The amount, thus obtained, is divided between the actual equivalent average enrollment at the end of the year, which is determined through the formula shown in Figure 3.

Figure 3. Formula for calculating the Average Equivalent Matrix

MPE = MP x (1) + MP x (0.25)

Diurnal meetings

Actual registration of the course that ends x 8 + atteding the course

MP = school that starts x 4 - Low x Low index

_____

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Where:

MP = Average enrollment

Casualty rate: 0.45833

MPE = Equivalent Average Enrollment

The actual enrollment of the course that ends is that existing in the month of July of the current year, which is multiplied by eight to determine the total enrollment accumulated in the first eight months of the year, that is, until the month of August. To this is added the result of multiplying the planned enrollment for the school year that begins (month of September) by four in order to obtain the total cumulative enrollment from the months of September to December. The total enrollment accumulated in the year thus obtained is divided among twelve months to obtain the average enrollment for each type of course.

Source: Resolution 210 of 2006 of the Ministry of Finance and Prices

How to proceed for its calculation?

• The actual registration is taken until the month of July of the previous year, of the day course and the course by meeting, taken separately and multiplied by eight, to that result the initial enrollment of the course that began in the month of September, multiplied by four. The result of this sum is subtracted from the total of losses, multiplied by the low index, with which the average enrollment of the day course and by separate meeting is obtained.

• In the case of the average enrollment of the course per encounter, it is multiplied by 0.25 or divided by four, and the result obtained is the one that is added to the average enrollment of the day course to obtain the equivalent average enrollment.

Following this procedure, we proceeded to calculate the cost of a student in the University and in the faculties, which was presented in the Board of Directors for the month of May.

The cost of training a student in 2016 was 9164 pesos.

To determine the cost of the activities, a very simple procedure can be applied.

It starts from the total cost previously determined ($ 26 997 711), in this case corresponding to 2016, and is divided by the total activity level (1881), which is not more than the sum of the average equivalent enrollment and the average of workers.

The result obtained is divided by 12 months to determine the monthly expense by activity level ($ 14,353). This last figure is divided by 190.6 hours to obtain the unit cost per hour of activity ($ 75).

What and how use the unit cost per hour of activity?

To determine the cost of student absences to the classroom: multiplying the total absence hours of students in the month or day by the unit cost per activity hour.

• Determine the irrational expenses incurred due to the absence of teachers to planned activities: events, meetings, among others, following the same procedure as before.

• Know the total cost of an activity that lasted, for example, two hours with 20 participants, multiplying the unit cost per activity hour for the total number of participants and what results for the duration of the activity.

Other economic-teacher efficiency indicators to consider

• The productivity of the teacher's work in the areas of teaching, improvement and research work. For this purpose, the results achieved in these areas would be divided among the Average of Teaching Workers. For example, if they promote 60 students out of a total of 90 and the average teacher is 30, the productivity will be two students per teacher, when the optimum would have been a productivity of three. For the publications, a similar relationship would be established, also for the courses taught and any other output result of the substantive processes.

• The performance of material-teaching resources: bibliographic funds, equipment for teaching use, among others, for which it is necessary to have in education about their quantity. In this case, a relationship would be established between the amount of resources that are used - obtained from the controls that are held, for example, in the education center or by the available traces of the query of the computer resources located in the network.

Divide the level of total activity (sum of teachers and students).

• The percentage of use of the workload of the teacher. It is determined by relating the actual workload of the teacher between the potential or established, according to their category. Because it is difficult to determine the real load, it would be convenient to establish an index of use of the labor fund by expected results of the teacher, that is, if producing a scientific article consumes an X amount of hours and gives a course of overcoming consumption and number of hours , then the teacher who did not have those results would have as coefficient of use of the labor time fund that is obtained by subtracting from the potential time pool the hours X and Y left to take advantage of and this result would be divided among the potential time fund to obtain the coefficient of the use of the workload (CACT in Spanish) or of the labor time fund used by the teacher.

In the meeting celebrated on June 6, 2017 at the University of Guantanamo, the productivity of the teacher's work was reported in the scientific work item of the 1.7 article published by the teacher; Following the same procedure and based on the behavior of some of the indicators shown, other indicators of teacher productivity can be determined in terms of incorporation into research projects, courses taught, awards obtained, among others.

Conclusions

The quality of education seen from one of its dimensions of analysis: the efficiency with which they achieve the expected results in the professional training, allows to focus their analysis from an unusual point of view - due to the scarcity of studies in this line they have been carried out, throwing with it in education of great utility and pertinence for the taking of decisions directed to its improvement.

An approach to this subject from the economy allows putting at the reach of the managers and workers of the different levels of the organizational-functional structure of the University a methodological procedure to be used in the analysis of the substantive processes, from the perspective of the efficiency economic

It is not a finished proposal and therefore it can be improved, so it constitutes a first approach to this topic, of great value for the planning of the expenses assumed by a University in the teaching plane.

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