Is it Possible to Develop an Objective Evaluation of the Teaching Activity and Quality at the University?: Results of Evaluation in a Group of Biotechnology Lecturers

Jaime Prohens[1], Ana M. Fita, Santiago Vilanova, Carmina Gisbert, Adrián Rodríguez-Burruezo

[1]jprohens@btc.upv.es

Universitat Politècnica de València (Spain)

Abstract

Evaluation of the teaching activity of the academic staff is useful for improving the quality of teaching as well as for certification procedures. The Universitat Politècnica de València (UPV; Spain) uses an "Educational Activity Index" (EAI) to evaluate the planning of the educational activity, the development of the teaching, and teaching results of lecturers. For each of these three dimensions, scores are obtained and, by applying a formula which gives different weights to each of the scores, the EAI is obtained. Individual thresholds for obtaining a "Very Favourable", "Favourable" or "Unfavourable" evaluation are established. We study the results of the application of the EAI to the evaluation of the full-time permanent, full-time hired and part-time lecturers of the Department of Biotechnology of the UPV. Application of the EAI showed that full-time hired lecturers got better scores of EAI than full-time permanent lecturers, and the latter also got higher EAI scores than part-time lecturers. We have found that there is a positive relation between the number of credits imparted and the EAI values. However, given that there are different teaching capacity levels among the academic staff, we developed an "Educational Activity Quality Index" (EAQI) which is based on the relative value of the EAI referred to the threshold levels for getting an Unfavourable (EAQI=0) or Very Favourable (EAQI=100) qualification. No differences were found among full-time permanent and full-time hired lecturers for EAQI, although both groups had higher values than those of part-time lecturers. Althogh EAQI is also correlated with the teaching capacity, the values of correlation are much lower than those obtained for the EAI. The results indicate that EAQI may be a better tool than EAI to compare the quality of the educational activity of the research and academic staff.

1. Introduction

The objective evaluation of the educational activity of the academic staff of the Universities is useful for quality improvement, as it allows establishing new actions that lead to better practices as well as to take corrective measures [1].

Unlike the research activity, for which there are a number of well established indicators [2, 3], there are less indicators developed for measuring the educational activity. In our University (Universitat Politècnica de València, UPV), an objective index for the measurement of the educational activity of the lecturers, the Educational Activity Index (EAI) [4], has been implemented.

The EAI of the PUV [4] measures the educational activity of the academic staff by providing scores for different dimensions of the educational activity, which include a) planning of the educational activity, b) development of the teaching, and c) results.

Based on the quantitative results obtained, a qualitative classification in three levels (Unfavourable, Favourable, or Very Favourable) is assigned to each lecturer. The classification obtained depends on the EAI score obtained and according to established thresholds, which depend on the "teaching capacity", which is the maximum number of credits that can be imparted by a lecturer according to his/her individual work contract and to reductions for research or management activities [4].

Here we study the results of the implementation of the evaluation of the group of lecturers of the Biotechnology Department of the UPV and evaluate the utility of a new index, which we have called the EAQI (Educational Activity Quality Index).

2. Methodology

Data used in this study were provided by the UPV and were treated anonymously. In total, we used data corresponding to 43 lecturers of the Department of Biotechnology of the UPV for the academic year 2008/09, and which for each lecturer consist of:

a) EAI data and the indicators used to obtain it. These indicators can be consulted in Table 1 and in reference [4].

b) Teaching capacity in credits (TC).

c) Overall evaluation according to the categories Unfavourable (U), Favourable (F), or Very Favourable (VF) [4]. Thresholds for obtaining an F or VF evaluation are the following: Threshold F = 5 + 1.2 · (TC) - (TC / 8.75)2; Threshold VF = 22 + 2.1 · (TC) - (TC / 8.25)2.

Table 1. Individual indicators used for obtaining the EAI score, their description and the maximum value that can be attained. For full details consult reference [4].

Indicator	Description	Maximum value
EAI	EAI = (0.3·EAI_PLAN + 0.7·EAI_DE) · K	No
EAI_PL	EAI_PL = EAI_FORM + EAI_GUIDE + EAI_INFOR + EAI_MATE	No
EAI_FORM	Measures the formation activities of the staff including formation courses and the results of the evaluation by students. It gets a maximum value if the evaluation of students is above 6 over 10 in the evaluation and several past years	15.00
EAI_GUIDE	Measures the participation of the staff in the elaboration of the teaching guide or course description	No
EAI_INFOR	Estimates the availability for students of information on tutorship timetables	1.00
EAI_MATE	Measures the publication of teaching materials (books, journals, etc.) as well as the materials made available in the UPV educational platform PoliformaT	15.00
EAI_DE	EAI_DE = EAI_TEACH + EAI_TUTOR + EAI_EVAL + EAI_OTHER	No
EAI_TEACH	Measures the number of credits imparted. The credits imparted are multiplied by 1.5 and 1.25 for the first and second year of teaching of a given subject, and also by 1.5 if the teaching is imparted in English or the Valentian local language	
EAI_TUTOR	Estimates the time devoted to tutorships according to the individual work contract and the participation in programmes of tutorship of students and in a specific programme for formation of young lecturers	11.04
EAI_EVAL	Estimates the time devoted to evaluation of students	No
EAI_OTHER	Measures other activities, like direction of BSc, MSc and PhD thesis, participation in commissions for evaluating BSc, MSc and PhD thesis, coordination of groups, organization of practical trips for students, etc.	40
K	K = 0.6·K1 + 0.3·K2 + 0.05·K3 + 0.05·K4	1.50
K1	Measures the results obtained in the evaluation by students. Minimum value is 1.	1.50
K2	Measures the performance of students in the subjects imparted, according to the percentage of students that have passed each of the subjects. Minimum value is 1.	1.50
K3	Measures the number of complaints by students made by students for failing to carry the tutorships timetables. Minimum value is 1.	1.50
K4	Measures the observance of staff in delivering the marks at the deadlines established by the University centers. Minimum value is 1.	1.50

In addition, we include a new indicator that we call "Educational Activity Quality Index" (EAQI) obtained using the formula EAQI = 100 · [(EAI - EAI Threshold F) / (EAI Threshold VF- EAI Threshold F)]. Values of EAQI below 0 correspond to Unfavourable classifications, values between 0 and 100 correspond to Favourable classifications, and values above 100 correspond to Very Favourable classifications. Therefore, EAQI is that it does not modify the qualitative classifications given by the EAI.

Three groups of lecturers were considered depending on their work contract category: 1) full-time permanent staff (n=17); 2) full-time hired staff (n=17); and, 3) part-time staff (n=9).

We compared the differences between the different groups by means of analyses of variance (ANOVA). Pearson correlation coefficients were obtained between EAI and EAQI and each of the parameters and indicators studied.

3. Results and discussion

3.1 Comparison among groups of lecturers

An important number of significant differences among the groups of lecturers considered has been detected (Table 2).

Table 2. Means for the teaching capacity, Educational Activity Index (EAI) and its main components (EAI_PL, EAI_DE, and K), thresholds for getting a Favourable (F) or Very Favourable (VF) evaluation, and Educational Activity Quality Index (EAQI) for each group of contract categories of the lecturers of the Department of Biotechnology of the UPV, and P-value of the differences observed according to an ANOVA.

	Work contract category			
Indicator[a]	Full-time permanent	Full-time hired	Part-time	*P*-value
Number of lecturers	17	17	9	---
Teaching capacity	16.63 b	22.00 c	10.75 a	<0.0001
EAI	42.66 b	55.38 c	27.42 a	<0.0001
EAI_PL	27.57 b	32.85 b	20.18 a	0.0006
EAI_DE	34.05 b	44.18 c	21.61 a	<0.0001
K	1.32 a	1.36 a	1.30 a	0.0710
Threshold F	21.07 b	25.08 c	16.27 a	<0.0001
Threshold VF	52.55 b	61.09 c	42.74 a	<0.0001
EAQI	69.43 b	84.16 b	42.21 a	0.0005

[a]Means within rows separated by different letters are significantly different according to the Student-Newman-Keuls tests (P<0.05).

The highest teaching capacity corresponded to the full-time hired lecturers, which has a much higher teaching capacity than the full-time permanent lecturers or the part-time lecturers. This is due to the fact that many members of the full-permanent staff have reductions in the teaching capacity due to having one or more positive evaluations of six-years periods of research [3] or having management activities.

The full-time hired lecturers get higher average values for EAI than the full-time permanent lecturers, and the latter gets higher values than that of the part-time lecturers (Table 2). The full-time hired lecturers have much more educational activity than the full-time permanent lecturers, indicating that the hired (usually younger) staff has a higher load of educational activities. When considering the components of the EAI, we observe that the planning indicator (EAI_PL) is significantly higher in the full-time than in the part-time lecturers, but there are no differences between the hired and permanent lecturers. For the development indicator (EAI_DE) we find that the three categories significantly differ one from each other so that the highest values are found for the full-time hired lecturers, followed by the full-time permanent lecturers, and finally by the part-time lecturers (Table 2). Finally, for the results indicator (K), no significant differences are found among the different work contract categories (Table 3).

For the threshold values of EAI to obtain a Favourable or Very Favourable evaluation, there are significant differences among the three work contract categories, being higher for the full-time hired lecturers, followed by the full-time permanent lecturers, and by the part-time lecturers (Table 2), reflecting the different teaching capacities of the three categories taken into account. For the EAQI, no significant differences are found among the full-time hired and permanent staff, but their values are significantly higher than those of the part-time lecturers, suggesting that although the full-time hired lecturers have higher educational activity than the full-time permanent lecturers, there are not so many differences in the quality of the teaching between these two categories (Table 2).

3.2 Correlations

The teaching capacity and the components used to calculate the EAI (EAI_PL, EAI_DE, and K) were positively correlated with the EAI (Table 3).

Table 3. Pearson correlation coefficients between the parameters taken into account and the Educational Activity Index (EAI) or the Educational Activity Quality Index (EAQI) for the data corresponding to the research and academic staff at the Department of Biotechnology of the UPV.

Indicator	EAI[a]	EAQI[a]
Teaching capacity	0.774***	0.353*
EAI_PL	0.704***	0.632***
EAI_DE	0.942***	0.543***
K	0.386*	0.373*
Threshold F	0.771***	0.349*
Threshold VF	0.773***	0.351*
EAQI	0.862***	---

[a]*,*** indicate significant at P=0.05 and P=0.001, respectively.

The teaching capacity was highly correlated with the EAI, indicating that the lecturers with higher teaching capacity obtained higher EAI values. In particular, very high values for the correlation coefficient are obtained between EAI and EAI_DE (r=0.942), indicating again that a good predictor of the EAI is the number of credits imparted. The lowest values of the coefficient of correlation were with the K indicator (Table 3). A highly significant correlation was obtained between the EAI and the EAI threshold values to obtain a Favourable (F) or Very Favourable (VF) evaluation, which was expected as the threshold values depend on the teaching capacity, which is highly correlated with the EAI. Also, the high correlation observed between EAI and EAQI (Table 3) is not a surprise, as the EAQI is obtained from the EAI.

Regarding the EAQI, as occurred with the EAI, the teaching capacity and the planning (EAI_PL), development (EAI_DE), and results (K) indicators were significantly correlated with EAQI (Table 3). However, in general, the coefficient of correlation values were smaller. In this respect, the coefficient of correlation of EAQI with the teaching capacity is much lower than between EAI and the teaching capacity, showing that EAQI does not depend so much as EAI on the teaching capacity, and therefore, may be more appropriate to measure the quality of the educational activity. Also, the correlation coefficient between EAQI and EAI_DE is much lower than the one between EAI and EAI_DE, showing that EAQI is less dependent on the time devoted to the development of teaching than EAI. Finally, the coefficient of correlation of EAQI with the EAI threshold values for getting a Favourable or Very Favourable evaluation are lower than those obtained for the EAI with these threshold values. This indicates that EAQI may be an indicator to measure the quality of the educational activity, and although it has some correlation with the teaching capacity and credits imparted, it is less biased than EAI.

4. Conclusions

Our results show that considerable differences in EAI are obtained between the different categories of lecturers. The fact that the better EAI scores are obtained by the full-time hired lecturers indicates that the younger staff has more educational activity than the full-time permanent lecturers. Regarding the

part-time lecturers, they have lower values for most of the indicators, including the EAQI, which may suggest that the quality of their educational activity, with the present indicators, could be considered lower than that of the full-time lecturers. The newly developed EAQI index may be a useful tool to measure the quality of the educational activity. Both the EAI and EAQI may serve as a platform for developing indicators for evaluating the educational activity in a similar way than indicators developed for evaluating the research activity [2, 3].

References

[1] Moses, I. 1988. Academic staff evaluation and development. A university case study. University of Queensland Press, Manchester, Australia.
[2] Hirsch, J. E. 2005. An index to quantify an individual's scientific research output. Proceedings of the National Academy of Sciences of the USA 102:16569-16572.
[3] Nieto-Martín, S.; Rodríguez-Conde, M.J. 2006. Reconocimiento administrativo de la actividad investigadora en la Universidad. Reflexión acerca de los denominados sexenios de investigación a partir de unos datos empíricos. Enseñanza 24:315-346.
[4] Universitat Politècnica de València. 2009. Manual de evaluación de la actividad docente del profesorado de la Universidad Politécnica de Valencia. Vicerectorat de Qualitat i Avaluació de l'Activitat Acadèmica, Universitat Politècnica de València. Available at http://www.upv.es/upl/U0472268.pdf