Incorporating TQM in higher education: Students' assessment of academic performance

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Abstract

The implementation of Total Quality Management (TQM) principles in Higher Education Institutes (HEIs) is still controversial although the debate is a long standing one. The main objective of the paper is to contribute to the preceding debate in support of the view that TQM can be implemented at departmental level in HEIs as well as in business. The paper examines whether the adoption of TQM by a department of a HEI can lead to academic quality improvement and increase in students' satisfaction. A student sample of 4325 electronic questionnaires was employed in a three semester period before, during and after acquiring an ISO 9001:2000 qualification. The results provide evidence that students' satisfaction of academic performance was enhanced due to implementation of TQM at departmental level. The strengths and weaknesses of the department were revealed while motivation of faculty members has been witnessed. The paper also suggests that TQM principles can be applied in Higher Education just as easily as in business. The contribution of the paper is the propositions made to educational authorities in order to improve the quality of tertiary education.

Keywords: TQM, higher education, assessment, student satisfaction.

JEL Classification: I21, I23, L89, M19

Introduction

At the dawn of the previous decade an interesting debate emerged among academics concerning the quality of teaching and learning. This debate inspired many developed countries to undertake initiatives in order to assess and assure the proclaimed high quality of their tertiary

education. This phenomenon was observed simultaneously in many countries which is not a coincidence. The quality and efficiency of education provided by Higher Education Institutes (HEIs) was questioned and challenged. The source of such doubts were mainly

1 the important differences in the efficiency of national economies,
2 the public concern about the increasing governmental expenditure,
3 the priorities and efficiency of the publicly financed sector,
4 the enormous expansion of HEIs' activities,
5 the transition from elitist education to education for the masses,
6 the prospects of a domestic graduate in a global context,
7 the consequences of financial cut-offs in tertiary education witnessed in many European countries and
8 the low levels of customer satisfaction about the product of "education" (Webler, 1995).

In a demanding framework of globalised knowledge, HEIs have to meet the increasingly high expectations of society due to the pressure placed upon them especially in times of great depression. Thus, HEIs ought to prove constantly the excellence of their performance in a quest for a new quality in relation to the society. Although, institutional initiatives towards quality can be identified in the late 1980s (Doherty, 1993), organised and co-ordinated political action in a legislative form was not undertaken until 1999 with the signature of the Bologna declaration and the establishment of the European Higher Education Area.

However, the issues of quality assurance and accreditation were officially introduced in the Hellenic legislation in 2005 when the Hellenic Quality Assurance Agency (HQAA) was established by law No.3374/2005. Moreover, the preceding legislation

1 defined the objective and essence of assessment,
2 established the institutional bodies of assessment,
3 established the procedures (internal and external) of assessment,
4 described the criteria and standards of assessment and
5 introduced E.C.T.S. and diploma supplement.

In June 2009 HQAA released the first and only until now, Report about Quality in Higher Education which revealed the reluctance of many academics to participate in the evaluation procedure. According to the Report, out of 286 university departments, internal assessment was in progress in 77 departments and only 22 of them submitted a Report of Internal Assessment to HQAA while out of 213 Technological Educational Institute (TEI) departments, internal assessment was in progress in 90 departments and only 25 of them submitted a Report of Internal Assessment to HQAA. One of these first 25 TEI departments was the Information Management Department (IMD) of the TEI of Kavala.

The main objective of the paper is to contribute to the current debate about quality assurance in Higher Education in support of the view that Total Quality Management (TQM) can be implemented at departmental level in HEIs as well as in business, based on the experience of prior implementation of TQM at the IMD of the TEI of Kavala. The remainder of this paper is organised as follows: In the second part, we present an extensive literature review concerning the implementation of TQM in Higher Education. In the third part, we describe our research methodology. Our results and discussion are embedded in the fourth part of this paper. Practical implications of our study are reported in the fifth part. We summarise our concluding remarks in the last part of this paper.

Literature review

The adoption of TQM principles by HEIs as far as teaching and research are concerned can be historically characterised at least as controversial. Jauch and Orwig (1997) were among the major advocates of the inappropriateness of TQM's application in HEIs. Based on Deming's and Juran's work, they argued that the main principles of a TQM system of continuous improvement, customer focus and integrated management systems and their underlying assumptions do not fit the higher education context or culture. Considering students as customers and raw materials simultaneously was the focus of their criticism.

Responding to Jauch and Orwig's analysis, Mullin and Wilson (1998) questioned the *a priori* declaration of TQM as inappropriate because it requires a dramatic culture change and before a complete implementation and test of the quality model against the existing quantity model. They implied that academic community should focus its energy on increasing awareness and analysis of our existing model and redesign a better system for higher education of the next century. Identifying students as customers or consumers is a semantic dilemma and it is concerned with who pays or/and receives the "product" of education. However, that distinction seems of minor importance when the target of continuous improvement of academic performance is triggered by the commercialisation of education. Since the debate over elitism versus widening access to universities rightly or wrongly is heading toward education for the masses, increasing workloads, class sizes and demands can deviate academic performance from continuous improvement despite the proclaiming will of academics to provide quality educational service (Redding, 2005).

In a comparison of ISO and non-ISO institutions, Sakthivel et al. (2005) found evidence that an increase in top management commitment and improvement in campus facilities lead to student's satisfaction. However, they found no association between demographic variables (gender and size of institutions) and TQM variables. They concluded that the ISO 9001:2000 certified institutions provide their students with better quality of educational services than the non-ISO institutions. Therefore, student's satisfaction of academic performance is much higher in ISO certified institutions than in non-ISO institutions.

Although the vast majority of the studies classify teaching and learning among the most important aspects for students, the evidence about the importance of physical facilities is contradictory. There are studies to support that campus facilities are among the least important aspects for students (Douglas et al., 2006). Furthermore, the type of tuition (full-time vs part-time) and students' professional status (working vs non-working students) is an important factor that affects students' perception of academic quality. Apparently, working and part-time students are less interested in additional university services such as international relationships, placement, lecture halls and infrastructures than the non-working and full-time students (Petruzzellis et al., 2006).

Self-assessment exercises is a useful methodology adopted by corporations and HEIs as well that aim at quality improvement and customer satisfaction. Although private managerial practices may be appropriate to public HEIs, there is an obvious necessity for

adaptation to a different context. In a case study analysis, Tari (2008) compared the application of internal assessment processes at the University of Alicante and in a private organisation. He supported that HEIs may successfully develop self-assessment processes if they comply with all the stages suggested by EFQM (2003). These are developing management commitment, communicating self-assessment plans, planning self-assessment, establishing teams and training, conducting self-assessment, establishing action plans, implementing action plans and review. On the other hand, the problem of identifying weak, good, best and excellent leadership practices by HEIs that adopt the EFQM model was addressed by Osseo-Asare et al. (2005). They argued that leadership is a critical success factor for sustaining quality and performance improvement in UK HEIs, although the exact nature of the association between effective leadership and sustainable levels of academic quality improvement was not explained.

Research methodology

Although HQAA has not officially embraced the ISO 9001:2000 qualification as a recommended policy towards quality, the administration of the IMD of the TEI of Kavala adopted it as a pilot of its quality assurance system. Therefore, IMD released its Report of Internal Assessment to HQAA (academic year 2007-2008) after it had acquired an ISO 9001:2000 qualification (summer 2007). A quantitative survey in a three semester period before, during and after acquiring the ISO 9001:2000 qualification was selected as appropriate to measure students' satisfaction of academic performance. The research period was extended from the lent term of the academic year 2006-2007 to the lent term of the academic year 2007-2008. Due to considerable student participation that was expected, an internet application has been developed for the management of the questionnaires.

The internet application has been developed using only open source software tools. The HyperText Markup Language (HTML) was used for the design of the web-based user interface. The PHP Hypertext Preprocessor (www.php.net) was the selected scripting language. It is especially designed for developing Web applications. PHP is an open source product and its main purpose is to help web applications programmers to develop dynamic web pages. Besides, PHP has a large library to manage data from a database management system. MySQL (www.mysql.com) was selected to be used as a database management system. MySQL has been proven a very fast and powerful tool in many applications. The Apache server, an open source web server, was used to shelter the application's web pages and it was installed under a Unix operating system.

The design of the questionnaire was inspired by the propositions made by HQAA (2007) and it consisted of 57 questions which were subdivided in the following categories: i) Questions 1-7 concerning information about date, year, id assessment, course, lecturer and semester were automatically provided by the administrator (lecturer) who granted access (distribute questionnaires) to students, ii) questions 8-15 concerning demographical and other information were answered by ticking or filling in a number, iii) questions 16-54 concerning academic performance were designed in a six point Likert-type scale ranging from strongly disagree (1) to strongly agree (5) while there was consideration for not applicable questions (6) and finally iv) questions 55-57 asked students to comment on their most/least

favourite aspects of the course/lecturer and to make suggestions for the enhancement of the specific course/lecturer.

The internal evaluation of academic performance by students was implemented during the last two weeks of each semester in order i) students to have attended sufficient number of lectures before the evaluation and ii) certainly before the examinations to mitigate the moral hazard for the lecturers and avoid agency problems for the students (Smith et al., 2005). The participation to the survey was anonymous and voluntary for the students attending the lectures of these last two weeks. Students answered the questionnaires electronically in the webpage of IMD (http://infoman.teikav.edu.gr) after they had been granted access by the lecturer.

Statistical analysis was performed by the use of Minitab statistical package. Questionnaires with missing values in questions 8-15 were treated as if they were not answered and value 6 (not applicable) in Likert-type questions 16-54 was ignored and replaced with missing value (*) in order to avoid distortions in the statistical analysis. Furthermore, questions 41-49 were answered only in laboratorial courses while questions 36-40 were answered only in theoretical courses. In addition Likert-type questions 16-54 were designed positively in order to explore the virtues of academic performance thus, the higher the mean value of a questionnaire the higher student’s satisfaction.

Results and discussion

Out of 4.364 electronic questionnaires that were answered in a three semester period, 4.325 of them (99,1%) were complete and considered useable for statistical analysis which is a strong indication that
1 the process of internal evaluation was well embraced by students and
2 the consciousness and maturity of students is of the highest degree.

Table 1: Composition of demographic variables

Variables		**N**	**%**
Gender	Male	1719	39,7%
	Female	2397	55,4%
	Missing value	209	4,8%
Resit	0	2230	51,6%
	1	1147	26,5%
	2	404	9,3%
	>2	544	12,6%
Attendance	1-5 lectures	348	8,0%
	6-10 lectures	3121	72,2%
	11-15 lectures	725	16,8%
	Missing value	131	3,0%
period	2007 B	1543	35,7%
	2008 A	1376	31,8%
	2008 B	1406	32,5%
Tuition year	1	1168	27,0%
	2	722	16,7%
	3	1002	23,2%
	4	953	22,0%

>4	480	11,1%

The composition of demographic variables of the respondents is cited in Table 1. As we can see, 40% of the sample is male and 55% is female. Apparently, 5% of the respondents preferred not to answer that question. The homogeneity of the sample over the three semester period of the survey is accomplished since students' participation in every semester is equivalent. Moreover, 52% of the respondents would sit for the examinations of the specific course for the first time while 26%, 9% and 13% of the respondents would sit twice, three times and more than three times respectively.

As it is mentioned earlier, the internal evaluation of academic performance by students was implemented during the last two weeks of each semester in order students to have attended sufficient number of lectures before the evaluation. That objective can be considered as successful since 89% of the respondents have attended more than six lectures before the evaluation. According to the Report of Internal Assessment of IMD (2008), 34% of the enrolled students exceeded the four years of tuition to IMD although only 11% of them participated to our survey. This phenomenon can be easily explained since the vast majority of students who fulfil their four year tuition in IMD are absent during the evaluation period because they choose to leave from Kavala and return only in the examination period due to financial reasons.

Table 2: ANOVA for students' satisfaction between semesters

Source	Df	Sum of Squares	Mean square	F	Significance
Factor	2	23,07	11,53	29,20	0,000
Error	4322	1707,06	0,39		
Total	4324	1730,13			

The significant differences of students' satisfaction within the three semester period are tested with analysis of variance (ANOVA). The results of the ANOVA are presented in Table 2 and provide strong evidence that there is significant difference of students' satisfaction within the three semester period of our survey. Having in mind the main objective of this paper is to support that TQM implementation in a HEI at departmental level can lead to academic quality improvement and increase in students' satisfaction, t-tests are performed in order to find if there is any significant difference in the mean values of students' satisfaction in a three semester period before, during and after acquiring the ISO 9001:2000 qualification. The null hypothesis is that there is no significant difference in the mean values of students' satisfaction while the alternative hypothesis is that there is an increase in the mean values of students' satisfaction during and after acquiring the ISO 9001:2000 qualification in comparison with the period before.

Table 3: T tests for students' satisfaction between semesters

	1st Semester		2nd Semester			
Semesters	**Mean**	**SD**	**Mean**	**SD**	**T-values**	**Significance**
2007B-2008A	3,7791	0,6155	3,8262	0,6217	-2,05	0,020*
2008A-2008B	3,8262	0,6217	3,9516	0,6488	-5,21	0,000**
2007B-2008B	3,7791	0,6155	3,9516	0,6488	-7,39	0,000**

Note: *P<0,05 and **P<0,001

According to Table 3, the alternative hypothesis is accepted in all three periods that are tested. Even during the implementation period of TQM and before acquiring the ISO 9001:2000 qualification, the academic performance was enhanced as well as students' satisfaction (P<0,05). During the last semester of our survey, TQM principles were fully adopted by IMD and that led to significant improvement in students' satisfaction on both semester and annual basis (P<0,001). Moreover, it is encouraging that the starting point of IMD's academic performance in the present survey can be characterised as satisfactory since the mean value of students' satisfaction in the semester before the ISO 9001:2000 certification is above average (mean value 3,7791>3 when values range from 1 fully dissatisfied to 5 fully satisfied).

Although it is evident that the overall students' satisfaction was enhanced at departmental level during the period of TQM implementation, it is important to identify whether this enhancement was diffused at course - lecturer level and thus lecturer motivation towards academic quality had been accomplished. In order to find if there is any significant difference in the mean values of students' satisfaction in the semesters before and after acquiring the ISO 9001:2000 qualification at course level, t-tests are performed for every course that had been evaluated. Out of 74 courses of IMD's curriculum, 63 of them were evaluated in the semester before TQM implementation while 69 of them were evaluated in the semester after TQM implementation. This indicates that lecturer motivation towards the evaluation process is positive since lecturer participation was increased from 85% to 93%. Moreover, in an effort to explore the causes that prevented students from participating in the evaluation procedure of the preceding 11 and 5 courses respectively, the lecturers of these courses were interviewed. The results of these interviews can be summarised to the following:

1 the majority of the unevaluated courses were elective and the low rates of students' attendance discouraged them from participating because they believed that their anonymity would not be retained and
2 some of the courses were joint and since they were taught outside of IMD's facilities, students did not have access to laboratories.

Nevertheless, the courses that were considered valid for statistical analysis (courses evaluated in both periods) were 60 or 81% of the population which allows us to consider our sample as representative. The results of our t-tests in these 60 courses are illustrated in Table 4. Out of these 60 courses, we witnessed decrease in the mean value of only 8 courses and increase in the mean value of 52 courses. The null hypothesis is that there is no significant difference in the mean values of students' satisfaction and the alternative hypothesis

1 for the 52 courses is that there is an increase in the mean values of students' satisfaction and
2 for the 8 courses is that there is a decrease in the mean values of students' satisfaction in the semester after acquiring the ISO 9001:2000 qualification.

The results show that statistically significant difference in the mean values of students' satisfaction exists in 48% (29 out of 60) of the courses. In fact, only 3 courses suffered statistically important decrease in the mean values of students' satisfaction (red boxes) while 29 courses witnessed statistically important increase (green boxes). Apparently, TQM implementation in IMD led to lecturer

motivation, academic quality improvement and increase in students' satisfaction as in Sakthivel et al. (2005).

Table 4: T tests for students' satisfaction between courses

			2007B		2008B			
cid	N2007B	N2008B	Mean	SD	Mean	SD	T-values	Significance
1	4	21	3,1450	1,3570	3,0750	0,5850	0,100	0,463
2	53	63	3,9116	0,6155	3,9372	0,7846	-0,200	0,422
3	5	4	4,0560	0,5540	4,3800	0,6080	-0,830	0,220
4	68	80	3,7388	0,6117	3,9166	0,6536	-1,710	0,045**
5	5	8	3,6240	0,7650	4,2940	0,4570	-1,770	0,068*
6	19	40	4,3430	0,5340	3,8896	0,6098	2,910	0,003***
9	10	5	3,5360	0,4270	3,5850	0,4530	-0,200	0,423
11	16	12	3,7470	0,8500	4,0730	0,7000	-1,110	0,138
17	23	14	3,5080	0,4800	4,3960	0,4950	-5,350	0,000***
18	80	47	3,8205	0,6397	3,9050	0,5966	-0,750	0,227
19	18	10	4,2440	0,5830	4,4110	0,4800	-0,820	0,212
21	6	19	3,5450	0,5370	4,0300	0,8360	-1,670	0,060*
23	19	21	3,7100	0,7080	4,0680	0,5040	-1,830	0,039**
25	3	12	3,7460	0,2610	3,8150	0,9190	-0,230	0,412
26	13	33	3,8520	0,6000	4,0542	0,5198	-1,070	0,150
27	9	18	3,5220	0,8130	4,2620	0,5710	-2,450	0,015**
33	24	14	3,9224	0,3534	3,7370	0,6640	0,970	0,173
34	65	65	3,5623	0,6073	3,6179	0,7770	-0,450	0,325
35	8	4	3,3080	0,4530	4,4060	0,3180	-4,870	0,001***
36	48	50	3,7847	0,4396	3,8116	0,5728	-0,260	0,397
37	5	14	3,6290	0,5210	3,8800	0,5260	-0,920	0,194
38	76	31	3,7989	0,5005	3,8620	0,5670	-0,540	0,296
39	16	6	4,1530	0,5230	4,2860	0,3570	-0,680	0,254
40	77	28	3,8428	0,6664	4,0940	0,5950	-1,850	0,035**
45	20	23	3,4970	0,4820	3,8810	0,5150	-2,520	0,008***
49	6	6	3,9800	0,2850	4,1320	0,7640	-0,460	0,332
50	64	50	3,6602	0,5009	4,1855	0,5319	-5,370	0,000***
51	21	14	4,1130	0,4870	4,4730	0,4700	-2,190	0,019**
53	26	18	3,9420	0,5370	4,0400	0,4690	-0,640	0,262
55	13	8	3,0630	0,3830	3,3990	0,7370	-1,190	0,131
56	95	81	3,6450	0,5554	3,7735	0,5759	-1,500	0,068*
59	20	11	4,1140	0,5480	4,2530	0,6150	-0,630	0,270
60	23	11	4,2490	0,5550	4,2270	0,4360	0,130	0,451
61	11	4	4,1740	0,5820	3,9285	0,1786	1,250	0,118
64	44	36	3,7920	0,7040	3,8925	0,5321	-0,730	0,235
67	6	13	3,8450	0,4050	3,7730	0,7700	0,270	0,397
68	67	72	4,1516	0,4995	3,9748	0,6106	1,870	0,032**
69	3	12	3,3040	1,0390	3,5490	0,5580	-0,390	0,366
70	71	84	3,4197	0,6296	3,7886	0,6429	-3,600	0,000***
73	10	5	3,8930	0,6280	4,5540	0,4050	-2,460	0,016**
75	6	3	3,7860	0,4570	4,1840	0,6950	-0,900	0,232
76	12	14	3,6410	0,4560	4,1240	0,4620	-2,680	0,007***
77	19	15	3,4950	0,5190	4,3435	0,3807	-5,500	0,000***
78	60	61	3,5904	0,5933	3,7562	0,7739	-1,320	0,094*
79	16	9	4,1930	0,5300	4,4380	0,5850	-1,040	0,158
83	14	7	3,8140	0,9290	4,2700	0,5510	-1,410	0,088*
85	12	4	3,8042	0,2873	4,2690	0,5010	-1,760	0,088*
89	4	4	3,3225	0,0936	3,5473	0,1986	-2,050	0,055*
90	22	20	3,7350	0,5270	3,8120	0,4830	-0,490	0,312
91	13	14	3,8741	0,2940	3,9810	0,8030	-0,470	0,324
92	30	17	3,7790	0,7210	4,0550	0,6710	-1,320	0,098*
93	37	9	3,9840	0,4192	4,2380	0,7270	-1,010	0,170
94	10	10	4,2527	0,2840	4,4750	0,6020	-1,060	0,156
99	17	5	3,0910	0,7430	3,7420	0,7310	-1,740	0,066*
100	11	9	3,3460	0,5230	3,9230	0,6780	-2,090	0,027**
101	26	28	3,9230	0,5580	4,4470	0,4046	-3,930	0,000***
102	10	22	3,6990	0,7030	4,1797	0,3257	-2,060	0,033**
103	16	19	3,8680	0,5890	4,2250	0,4440	-1,990	0,028**
104	11	2	4,1350	0,5170	3,5000	0,1930	3,060	0,019**
106	9	6	3,7990	0,4440	3,9443	0,1888	-0,870	0,201

Note: * P<0,10, **P<0,05 and ***P<0,01

In order to study the gender differences in students' satisfaction, ANOVA and t-tests have been conducted as we can see in Table 5 and Table 6 respectively. The results of the ANOVA support that there is significant gender difference of students' satisfaction within the three semester period of our survey. Our null hypothesis is that there is no significant difference in the mean values of male and female students' satisfaction while the alternative hypothesis is that the mean values of male students' satisfaction is less than the mean values of female students' satisfaction within the period of our survey. According to Table 6, we accept the alternative hypothesis since the mean values of male students' satisfaction is significantly less than the mean values of female students' satisfaction (P<0,01).

Table 5: ANOVA for students' satisfaction between genders

Source	Df	Sum of Squares	Mean square	F	Significance
Factor	1	2,46	2,46	6,22	0,013
Error	4114	1632,62	0,40		
Total	4115	1635,08			

Table 6: T tests for students' satisfaction between genders

	Male		Female			
Period	**Mean**	**SD**	**Mean**	**SD**	**T-values**	**Significance**
2007B-2008B	3,8239	0,6175	3,8735	0,6387	-2,51	0,006*

Note: *P<0,01

To comprehend the strengths and weaknesses of the various aspects of academic performance which are explored with the Likert-type questions 16-54, we report the descriptive statistics of the answers to these questions in Table 7. Having in mind that the higher the mean value of a question the higher students' satisfaction, the five aspects of academic performance students are more satisfied with are the following:

1 the lecturer's punctuality concerning the timetable,
2 the lecturer's sufficiency and efficiency concerning teaching of the specific subject,
3 the clarity of lecturer's explanations,
4 the lecturer's adherence to the prescribed course objectives and
5 the lecturer's ability to establish an atmosphere of trust and respect in the class.

On the other hand, the five aspects of academic performance students are less satisfied with are the following:

1 the functionality of IT facilities,
2 the use of alternative (ICT) methods of teaching besides blackboard,
3 the utility and information content of the course's webpage,
4 the lecturer's objectivity concerning coursework assessment and
5 the contribution of IT facilities to the enhancement of academic quality.

As it is shown in Table 7, besides the descriptive statistics of the entire sample, t-tests are performed for every aspect of academic performance that had been evaluated, in order to find if there is any significant difference in the mean values of students' satisfaction in

the semesters before and after acquiring the ISO 9001:2000 qualification. Our null hypothesis is that there is no significant difference in the mean values of students' satisfaction towards the various aspects of academic performance and our alternative hypothesis

1 for the 35 aspects of academic performance is that there is an increase in the mean values of students' satisfaction and
2 for the 4 aspects of academic performance is that there is a decrease in the mean values of students' satisfaction in the semester after acquiring the ISO 9001:2000 qualification.

Table 7: T tests for students' satisfaction between questions

	Entire sample			2007B			2008B				
Q	N	Mean	SD	N	Mean	SD	N	Mean	SD	T-val.	Sign.
16	4313	4,0074	0,8357	1540	3,9162	0,8585	1406	4,1323	0,8010	-7,07	0,000*
17	4312	4,1732	0,8116	1539	4,1378	0,8242	1405	4,2399	0,7900	-3,43	0,000*
18	4276	3,9549	0,8538	1526	3,8781	0,8749	1400	4,0750	0,8219	-6,28	0,000*
19	4307	4,0346	0,9339	1537	3,9902	0,9266	1403	4,1433	0,9105	-4,52	0,000*
20	4295	4,0249	0,8176	1533	3,9524	0,8253	1395	4,1362	0,8098	-6,08	0,000*
21	4117	3,6544	0,9731	1455	3,5003	0,9826	1365	3,8286	0,9679	-8,94	0,000*
22	4147	3,8862	0,9754	1471	3,8178	0,9881	1358	4,0147	0,9284	-5,46	0,000*
23	3820	3,4806	1,2225	1336	3,3391	1,2653	1276	3,6904	1,1791	-7,34	0,000*
24	4062	3,4840	1,1176	1434	3,2538	1,1231	1345	3,7294	1,1125	-11,21	0,000*
25	3716	3,5869	1,0598	1296	3,4460	1,0756	1243	3,7924	1,0303	-8,29	0,000*
26	4309	3,7528	1,0259	1535	3,6391	1,0465	1405	3,9082	0,9911	-7,16	0,000*
27	4300	3,9037	0,9668	1529	3,8273	0,9942	1402	4,0342	0,9233	-5,84	0,000*
28	4250	3,8868	0,9360	1516	3,8384	0,9500	1384	3,9429	0,9262	-3,00	0,001**
29	4277	3,9546	0,8369	1524	3,8930	0,8309	1396	4,0501	0,8254	-5,12	0,000*
30	4246	3,9976	0,8936	1511	3,9153	0,9218	1388	4,1131	0,8359	-6,06	0,000*
31	4138	3,9241	0,9334	1469	3,8584	0,9662	1355	4,0288	0,8914	-4,87	0,000*
32	4294	3,9304	0,9406	1531	3,8197	0,9769	1399	4,0479	0,9029	-6,57	0,000*
33	4300	4,0165	0,8906	1533	3,9537	0,9017	1400	4,1121	0,8767	-4,82	0,000*
34	4243	3,7768	0,9746	1515	3,7373	0,9912	1378	3,8665	0,9662	-3,55	0,000*
35	4267	3,9883	0,9173	1521	3,9395	0,9468	1387	4,0671	0,8952	-3,73	0,000*
36	985	3,7005	1,0634	314	3,6083	1,0737	344	3,7529	1,0853	-1,72	0,043***
37	975	3,6872	1,0181	311	3,5498	1,0731	340	3,8147	0,9645	-3,30	0,001**
38	967	3,7435	0,9919	307	3,6612	1,0013	338	3,8225	0,9856	-2,06	0,020***
39	916	3,5480	0,9552	282	3,3298	0,9325	323	3,7585	0,9444	-5,61	0,000*
40	958	3,6785	0,9799	305	3,5738	1,0075	333	3,8408	0,9672	-3,41	0,000*
41	2640	3,8538	0,9492	895	3,7385	1,0171	862	3,9849	0,8853	-5,42	0,000*
42	2611	3,7415	0,9721	867	3,6251	0,9902	856	3,8855	0,9470	-5,58	0,000*
43	2619	3,8897	0,8933	872	3,7443	0,9390	858	3,9988	0,8888	-5,79	0,000*
44	2558	3,7682	0,9537	826	3,6077	0,9489	855	3,9170	0,9527	-6,67	0,000*
45	2614	3,7927	0,9332	875	3,6994	0,9507	855	3,9158	0,9027	-4,86	0,000*
46	2858	3,6291	1,0752	1011	3,7003	0,9941	921	3,5071	1,1851	3,86	0,000*
47	2860	3,3080	1,2042	1012	3,4032	1,1197	919	3,1676	1,2826	4,28	0,000*
48	2870	3,5951	1,0514	1020	3,6549	1,0095	916	3,4563	1,1487	4,02	0,000*
49	2890	3,8557	0,9697	1029	3,8931	0,9399	928	3,7813	1,0462	2,48	0,007**
50	4289	3,8792	0,9177	1523	3,8089	0,9297	1400	3,9721	0,9027	-4,81	0,000*
51	4282	3,7679	0,9757	1520	3,7033	0,9821	1406	3,8511	0,9794	-4,07	0,000*
52	4276	3,9581	0,9764	1521	3,9310	0,9665	1391	4,0137	0,9938	-2,27	0,012***
53	4288	4,0931	0,9077	1524	4,0538	0,9322	1400	4,1750	0,8811	-3,61	0,000*
54	4288	4,0070	0,9375	1523	3,9435	0,9554	1401	4,1142	0,9156	-4,93	0,000*

Note: * P<0,001, **P<0,01 and ***P<0,05

According to our results cited in Table 7, there is a statistically significant difference in the mean values of students' satisfaction towards all aspects of academic performance (39 out of 39 or 100%).

Although a minority of only four aspects of academic performance suffered a statistically significant decrease in the mean values of students' satisfaction (questions 46-49), the vast majority of aspects of academic performance witnessed a statistically significant increase (35 out of 39 questions). As we mention earlier, questions 46-49 that suffered a decrease were answered only in laboratorial courses which is a strong indication of poor performance of IT facilities and laboratorial equipment. Apparently, TQM implementation in IMD did not only lead to academic quality improvement and increase in students' satisfaction but also revealed the weaknesses of IMD concerned with the lack of permanent technical staff and the generally inadequate funding of HEIs in Greece.

Practical implications

The IMD's curriculum provides students with knowledge from two contemporary scientific areas such as Informatics and Management. Although, it has been designed and formed in a way to fulfil IMD's mission, it has also been revised twice in order to adapt to the rapid changes of the technological and economic environment. The implementation and success of IMD's curriculum has been tested by the quality assurance system that IMD adopted since 2007. However, the quality of a service should always be evaluated in accordance with the mission that is assigned to the department in order to fulfil the needs of the society and the labour market. For example, the meaning of "hospitality" service can be defined differently by the manager of a five-star hotel and by the owner of a "bed & breakfast" motel. Likewise, the meaning of "education" service is defined differently by the faculty of a HEI and by the owner of a post high-school vocational training centre (PHVTC) (Terzidis, 1999). Therefore, the expectations of a HEI "client" towards the quality of education and knowledge are extremely different from the expectations of a PHVTC "client". Consequently, the comparison of academic performance and quality of education is valid and meaningful when it is performed among institutes with similar mission and status and among "clients" with similar expectations and needs.

In Greek Higher Education, the issue of quality assurance was officially introduced in 2005 with the establishment of HQAA. Until now, HQAA released only one Report about Quality in Higher Education which unveiled the low rates of academic participation in the evaluation procedure. According to the Report (2009), out of 286 university departments and 213 TEI departments only 22 and 25 of them respectively submitted a Report of Internal Assessment to HQAA. As we stated earlier, one of these first 25 TEI departments was the IMD of the TEI of Kavala. However, for the last five years HQAA completed the External Assessment of only five departments (2 university and 3 TEI) which indicates the plethora of problems HQAA encountered. The most significant problems can be summarised to:

1 the imperfect legislative framework,
2 the inadequate funding,
3 the lack of Internal Regulation,
4 the lack of permanent personnel and
5 the problematic accommodation (HQAA, 2009).

It is evident that educational authorities and in particular, the Ministry of Education should embrace more closely HQAA and accelerate the pace of quality assurance in Higher Education by providing solutions and alternatives to the preceding problems.

Although IMD has not been externally assessed yet, TQM has been incorporated in IMD's culture. The results of IMD's self-assessment exercises and the Reports of Internal Assessment provide evidence that IMD's students are satisfied with the commitment of academic stuff, the quality of education and other departmental services. However, our survey traced problems concerning the sufficiency and functionality of IT facilities, the use of alternative methods of teaching and the utility of the course's webpage. The source of these problems is mainly concerned with the lack of permanent technical staff and the inadequate state-funding of IMD. After four years of self-assessment exercises in IMD, we conclude that TQM implementation in HEIs can lead to academic quality improvement and certainly our survey can be used as a pilot study for departments that wish to adopt TQM principles and acquire an ISO 9001:2000 qualification.

Conclusions

Although the debate about the adoption of TQM principles by HEIs is still a source of epic conflicts, our survey provides evidence about the appropriateness of TQM's application in HEIs. The main objective of the paper is to contribute to the current debate about quality assurance in Higher Education in support of the view that Total Quality Management (TQM) can be implemented in HEIs at least at departmental level. Based on a quantitative survey in a three semester period before, during and after acquiring the ISO 9001:2000 qualification, we attempted to measure students' satisfaction of academic performance. Due to considerable student participation, an internet application has been developed for the management of the questionnaires.

The results of our survey and the experience of prior implementation of TQM at the IMD of the TEI of Kavala allow us to argue that the main principles of a TQM system can be incorporated in the higher education culture. TQM implementation in IMD led to enhanced academic performance, increased students' satisfaction and motivated faculty members. On the other hand, the weaknesses of IMD have been exposed especially those concerned with the lack of permanent technical staff and the generally inadequate state-funding of HEIs in Greece. Another contribution of the paper is the propositions made to educational authorities in order to improve the quality of tertiary education.

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