



LUND
UNIVERSITY
Campus Helsingborg

Quality Education in Italian universities: the state of the art

Salvatore La Rosa and Eva Lo Franco

University of Palermo, Dept. of National Accounting & Social Processes Analysis
larosaunipa@virgilio.it, eva.lofranco@unipa.it

Keywords: Quality education, Italian universities, exploratory survey, syllabus content.
Category: research paper

Introduction

In Italy, thanks to the recent reform of the higher education system (Ministerial Decree 509/99), university degree programs are shorter than in the past, and consequently, graduates enter the labour market earlier. Moreover, the implementation in Italian universities of rules shared at European level (for example: the introduction of information and linguistic courses in all degree programs, the adoption of a formative credits system) is widening labour market borders.

In the last ten years, universities have instituted several new degree programs, in order to differentiate their offer, and to meet current labour market demands and the expectations of future students. The introduction in degree programs of courses focused on topics related to "Quality" is a fairly recent phenomenon (Disney *et al.*, 2000); in particular topics that not are strictly related to statistical quality control, such as: quality management systems, quality awards, self-assessment models, etc..

According to Feigenbaum (1993), a national education system should recognize [*.. the fact that quality is fundamentally a body of knowledge - a teachable body of knowledge that goes far deeper than a set of statistical and motivational courses - ..*]. Moreover, he states that [*Although quality has become a fundamental way of managing, it is simply not taught as a serious, integral area in economics today*].

The survey carried out by the authors focuses on Quality education (Evans, 1996; Weinstein *et al.*, 1998) supplied by Italian universities and aims to verify if Feigenbaum's assertion can be applied to Italian higher education.

The following section summarizes the new higher education rules. The main objectives of our explorative survey are then defined. Methodologies for sample selection and the analysis of course syllabi are described. Finally, we present our results and conclusions.

The "3 + 2 Model"

The ministerial decree of November 3, 1999, published by the Italian Ministry of University and Research, and which came into force in the 2001/2002 academic year, introduced some relevant changes into higher education. In particular, the new rules are mainly related to degree program structure, teaching activities and the system to measure student engagement.

After the achievement of a secondary school certificate, a student can study for another three years at university for a first (I) level degree. Moreover, he/she, after the I level degree, can continue to study for a specialized degree. This is called a second (II) level degree and lasts for two years.

Programs of the same degree level with the same educational objectives and the same basic educational activities (lessons, exercises, etc.) are grouped into classes. The new higher education model identifies forty-two I level degree program classes and one-hundred and four II level degree program classes. All the degree classes are grouped into the following areas: health (13), scientific (64), social (42) and classical (37).

Practical activities such as stages and training sessions are fundamental in achieving a degree, both at I and II level. These types of activities vary according to the faculty and degree program.

Student engagement is measured by the traditional mark (expressed in thirtieths), and by university formative credits (UFC): one credit corresponds to twenty-five work hours.

Objectives

The survey carried out by the authors was exploratory. The main objective was to analyse the syllabi content of the Quality courses of leading Italian universities (in the sense specified below), and to highlight the subjects related to quality concepts and tools that are taught in Italy.

Moreover, the authors aimed to answer the following questions: “in which faculties and within which degree programs are courses on Quality taught?”, and “at which level are they taught?”.

A first phase of the survey was carried out during the first trimester 2007, and it was decided to consider as a course on Quality each course that included in its title the word “Quality”. The survey involved only courses that were included in degree programs belonging to the scientific and social areas. Traditionally, subjects related to quality topics, such as statistical quality control and total quality management (Vazzana *et al.*, 1997), are taught in the engineering and economic faculties: degree programs in engineering and economics are included in the scientific and social areas, respectively.

Methodology

The first part of the survey consisted of identifying the universities that could be considered leaders in Italian higher education. Two variables were considered relevant: the number of students enrolled and the number of degree programs supplied.

In Italy, according to official data (CINECA – Italian Interuniversity Consortium, January 2007) there are ninety-four universities. There are sixty-six state universities, which include the so-called special institutes (two universities for foreigners, two advanced schools, and three doctorate schools). The remaining twenty-eight universities are non-state, and eleven of them offer all their services on-line (distance learning).

For each university eight types of data were collected, relatively to the academic year 2005/2006:

- number of I and II level degree programs of the scientific area;
- number of I and II level degree programs of the social area;
- number of students enrolled at I and II level degree programs of the scientific area;
- number of students enrolled at I and II level degree programs of the social area.

The special and distance learning institutes were excluded because their services are very specific, and most of the relevant data were not available.

After collecting the eight data series, first and third quartiles were calculated for each of them.

For each area, and for each degree program level, the universities included in both upper tails (delimited by the third quartiles) were selected.

Figure 1 presents the scatter plots of the collected data. For example, in the scatter plot on the upper left side of the Figure, the straight lines parallel to the Cartesian axes are traced in correspondence of respectively the third quartile of the number of enrolled students and the third quartile of the number of degree programs. The upper-right quadrant so obtained includes a subset of universities. As it is possible to notice in the four plots of Figure 1, the University of *Palermo* is always included in that quadrant.

A similar reasoning was made for the lower tails by using the first quartiles.

Table I presents the summary framework. It includes all universities laying in at least one tail (lower or upper). Each inclusion is indicated with a cross. The final sample was then obtained by considering only the universities having four crosses. They are highlighted in Table I. So, the final sample was constituted by eight universities: *Milano S. Raffaele* and *Bolzano*, in the lower tail; *Padova*, *Bologna*, *Firenze*, *Pisa*, *Roma La Sapienza*, and *Palermo*, in the upper tail.

All the courses of all the sample universities' degree programs (I and II level; scientific and social area) were analysed to select those including the word "Quality" in their title. Syllabi of the selected courses were collected through the universities' official web-sites.

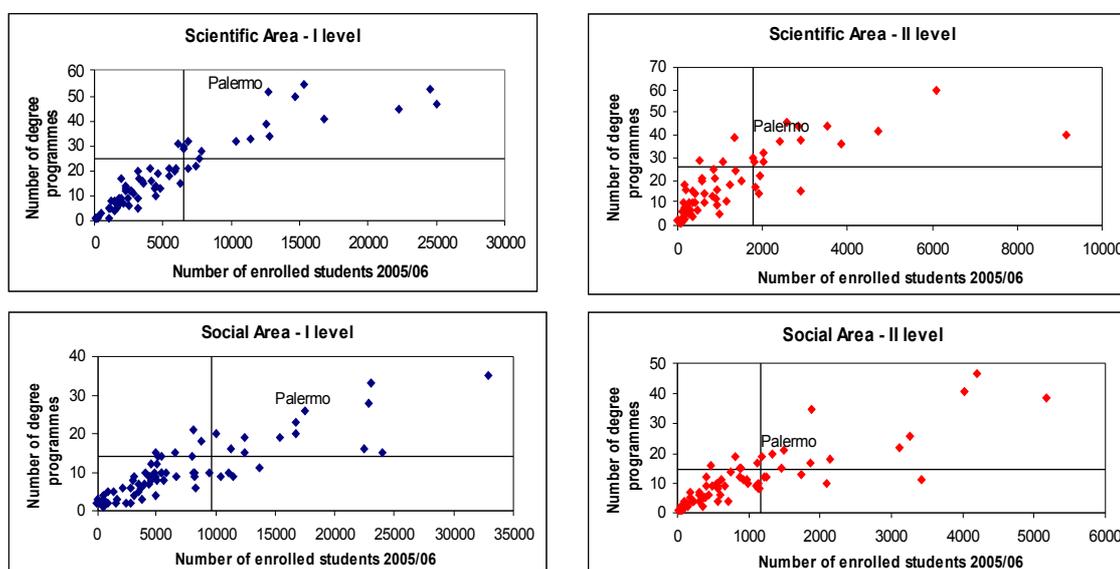


Figure 1. Scatter plots of number of enrolled student and number of degree programs (academic year 2005/2006)

Table I. Framework for the selection of the final sample of universities

Region	University	Lower tail				Upper tail			
		Scient. area		Social area		Scient. area		Social area	
		I	II	I	II	I	II	I	II
	Course Level								
PIEMONTE	TORINO							X	X
	BRA (CN)	X							
	POLITECNICO (Torino)					X	X		
	Piemonte Orient. "Amedeo Avogadro"		X						
VALLE D'AOSTA	AOSTA			X	X				
LIGURIA	GENOVA					X	X		
LOMBARDIA	Vita Salute San Raffaele (Milano)	X	X	X	X				
	MILANO					X	X		
	Carlo Cattaneo (Castellanza) LIUC	X	X	X					
	BICOCCA (Milano)							X	X
	CATTOLICA "Sacro Cuore"(Milano)							X	X
	POLITECNICO (Milano)					X	X		
	BERGAMO	X							
	INSUBRIA (Varese)				X				
TRENTINO ALTO ADIGE	BOLZANO	X	X	X	X				
VENETO	PADOVA					X	X	X	X
	VERONA	X							
	"CA' FOSCARI" (Venezia)	X							X
	IUAV (Venezia)			X	X				
EMILIA ROMAGNA	BOLOGNA					X	X	X	X
MARCHE	CAMERINO			X	X				
TOSCANA	FIRENZE					X	X	X	X
	PISA					X	X	X	X
LAZIO	La Sapienza (Roma)					X	X	X	X
	Tor Vergata (Roma)					X	X		
	Roma Tre								X
	IUSM (Roma)	X	X						
	Università non statale Europea (Roma)			X					
	San Pio V (Roma)			X	X				
	Campus Bio-medico (Roma)	X	X						
	TUSCIA (Viterbo)				X				
CAMPANIA	Parthenope (Napoli)				X				
	L'Orientale (Napoli)		X	X					
	Suor Orsola Benincasa (Napoli)	X		X					
	NAPOLI					X	X	X	
	SANNIO			X	X				
ABRUZZO	"G. D'Annunzio" CHIETI-PESCARA		X						
	TERAMO	X	X						
MOLISE	MOLISE (Campobasso)		X						
PUGLIA	BARI							X	X
	LUM Jean Monnet (Bari)			X	X				
	FOGGIA	X	X		X				
BASILICATA	BASILICATA (Potenza)			X	X				
CALABRIA	REGGIO CALABRIA			X	X				
	"Magna Grecia" (Catanzaro)	X	X		X				
SICILIA	Kore (ENNA)	X	X	X					
	PALERMO					X	X	X	X
	CATANIA					X		X	
SARDEGNA	CAGLIARI							X	

The outlined crosses indicate the absence of enrolled students in 2006.

In order to analyse the syllabi and classify their content, the authors referred to the index (of macro-areas, chapters and paragraphs) in [Bergman, B. & Klefsjö, B., 2003] which they believe constitutes a sufficiently varied and, at the same time, complete range of the traditional quality topics.

Table II. Classification of quality topics

<i>QUALITY FOR SUCCESS:</i>	M. Quality in the supply process
A. Quality & quality improvements	<i>QUALITY AS CUSTOMER SATISFACTION:</i>
B. Quality and success	N. External customer satisfaction
C. The history of the quality movement	O. Internal customer satisfaction
<i>DESIGN FOR QUALITY:</i>	P. Customer satisfaction index
D. Customer focused product development	<i>LEADERSHIP FOR QUALITY:</i>
E. Quality function deployment	Q. Leadership
F. Reliability	R. Mission, vision, goals & strategies
G. Design of experiments	S. Processes & process management
H. Robust design	T. Quality systems
<i>PRODUCTION FOR QUALITY:</i>	U. Company assessments
I. Statistical process control	V. The seven management tools
J. The seven improvement tools	W. Improvements programs
K. Control charts	BS (Basic statistics)*
L. Capability	PT (Peculiar Topics)*

*Headings added by the authors to A-W chapters in [Bergman & Klefsjö, 2003].

Each topic in a syllabus was allocated to one of the chapter headings. The authors added two other headings in order to cover all the syllabi content: Basic Statistics – BS (that includes, for example, inference, regression, multivariate statistics, etc.), and Peculiar Topics – PT (that includes those topics that in the authors’ opinion seem to be distant from the traditional quality topics) (Table II).

All the contents of each syllabus were classified according to the list reported in Table II, and counted. For each syllabus, the absolute frequencies of each topic were expressed in relative frequencies, in order to compare the data. Every syllabus and its content were characterized by a different degree of detail.

Results

One-hundred and eighty-five scientific and social area 2005/2006 courses supplied by the final sample universities include the word “Quality” in their title.

Details on these courses are shown on the left side of Table III. In general, most of the courses on quality belong to the scientific area (73%) rather than to the social area (27%). The courses are equally distributed between I and II level degree programs (51% and 49%, respectively). In particular, the universities of *Bologna* and *Firenze* supply the highest number of courses on quality (both 47%). Vice versa, no courses supplied at *Milano S. Raffaele* and *Bolzano* include the word “Quality” in their title.

With regard to the programs that include courses on quality some details are shown in Table III (right side). In the scientific area, 18% of all the degree programs include at least one course on quality, and only 9% in the social area.

The programs including courses on quality are equally distributed between I and II level degrees. In particular, the universities of *Bologna* and *Pisa* have the highest percentages of programs that include at least one course on quality (20% and 19%, respectively).

The courses on quality that are included in I level degree programs are taught mainly in the following faculties: Engineering (31%), Agriculture (21%), and Economics (11%); 18% of these courses belong to Engineering and Economics inter-faculty programs (see the pie chart on the left side of Figure 2). The percentages of courses on quality included in II level programs that are taught in the faculties of Engineering, Agriculture and Economics are 26%, 32% and 17%, respectively (Figure 2, right side).

One-hundred and twenty-three syllabi were collected, which correspond to 66% of the courses. For each syllabus, all content was classified according to the headings in Table II, counted and expressed in relative frequencies.

In order to identify the most frequently taught traditional quality topics, the relative frequencies of the content of ninety syllabi were considered (Table IV).

The data related to the remaining forty-three syllabi (35% of 123) were considered separately, because, according to the authors, over 80% of their content was classifiable as Peculiar Topics. This applied to all the sample universities, except Palermo. These courses belong mainly to II level degree programs.

With regard to the most frequently taught traditional quality topics, the analysis of the data led to the following observations:

- on average, fifty-five per cent of the syllabi of courses on quality include traditional quality topics: T. *Quality systems* (29%); F. *Reliability* (12%); A. *Quality & quality improvements* (7%); C. *The history of the quality movement* (7%).
- on average, each of the following traditional quality topics: H. *Robust design*, O. *Internal customer satisfaction*, and P. *Customer satisfaction index* represent a percentage equal to or less than 0,5% of all content of a course on quality. Consequently, the syllabi are strongly lacking in the “*Quality as customer satisfaction*” macro-area content (see Table II).
- “*Design for quality*” and “*Leadership for quality*” macro-areas are included in the syllabi in a non-homogeneous and incomplete way. Teaching is almost exclusively concentrated on topics related to *Reliability* and *Quality systems*, respectively.

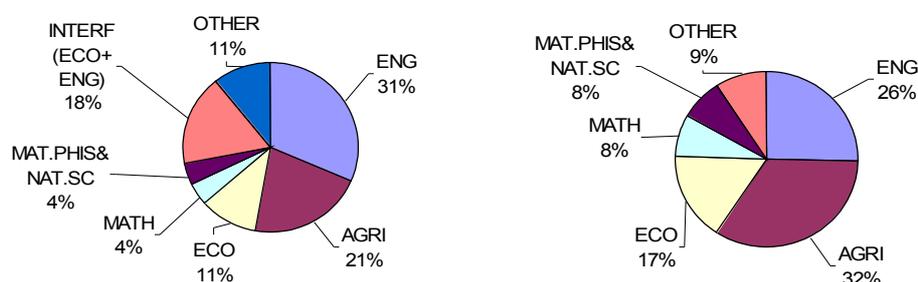


Figure 2. Distribution of the courses on quality that are included in I level (left) and in II level degree programs (right) per faculty

Table III. Number of courses on quality (left) and degree programs (right)

	Courses								Degree programs							
	I level				II level				I level				II level			
	Scient. area		Social area		Scient. area		Social area		Scient. area		Social area		Scient. area		Social area	
BOLOGNA	26	19	6	6	11	6	4	3	55	17	33	4	42	9	39	3
BOLZANO	0	0	0	0	0	0	0	0	3	0	4	0	1	0	1	0
FIRENZE	16	14	17	6	13	10	1	0	39	13	23	1	46	6	35	1
MILANO S. Raffaele	0	0	0	0	0	0	0	0	1	0	2	0	1	0	2	0
PADOVA	10	7	0	0	18	11	1	1	50	8	20	0	38	9	22	1
PALERMO	10	5	1	1	5	1	3	2	52	10	26	1	37	5	19	3
PISA	5	5	1	1	15	11	5	5	34	5	20	1	44	12	21	5
ROMA La Sapienza	2	1	1	0	4	3	10	5	53	2	35	1	60	4	47	9
Sum	69	51	26	14	66	42	24	16	287	55	163	8	269	45	186	22
(normal) number of courses that include the word "Quality" in their title								(normal) total number of degree programs								
(bold) number of the syllabi available on the university web-sites								(bold) number of degree programs that include at least one course on quality								

Table IV. Relative frequencies of the courses in quality content

Univ.	Level Area	course id.n.	Chapter/Heading (See Table II.)																								
			A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	BS	PT
B	I	5	6	3	6	0	0	6	6	0	6	3	6	6	6	12	6	0	0	0	0	18	3	0	3	3	0
O	SCIE	6	3	3	0	0	0	48	0	0	21	3	3	0	0	0	0	0	0	0	0	14	0	0	0	3	0
L		7	0	0	0	0	0	71	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	14	0	
O		8	6	3	6	0	0	6	6	0	6	3	6	6	6	12	6	0	0	0	0	18	3	0	3	3	0
G		9	10	3	3	3	0	20	0	0	10	3	3	0	3	3	0	3	3	0	17	0	0	0	3	7	
N		10	3	3	0	0	0	48	0	0	21	3	3	0	0	0	0	0	0	0	14	0	0	0	3	0	
A		11	3	3	0	0	0	48	0	0	21	3	3	0	0	0	0	0	0	0	14	0	0	0	3	0	
		12	0	0	0	0	0	71	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	14	0	
		14	10	3	3	3	0	20	0	0	10	3	3	0	3	3	3	0	3	3	0	17	0	0	0	3	7
		21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	81	0	0	0	0	19	
		23	0	0	0	0	0	0	0	0	4	0	8	12	24	0	0	0	0	0	0	52	0	0	0	0	0
		24	7	0	7	0	0	0	0	0	7	0	14	21	43	0	0	0	0	0	0	0	0	0	0	0	0
		26	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	0	0	0	0	0	
	I	1	15	8	23	0	8	0	0	0	8	8	0	0	0	8	0	0	0	0	15	0	0	8	0	0	
	SOC	2	7	7	7	0	0	17	0	0	0	0	0	0	0	3	0	0	0	0	57	0	0	0	0	3	
		3	15	8	23	0	8	0	0	0	8	8	0	0	0	8	0	0	0	0	15	0	0	8	0	0	
		4	7	7	7	0	0	17	0	0	0	0	0	0	0	3	0	0	0	0	57	0	0	0	0	3	
		5	15	8	23	0	8	0	0	0	8	8	0	0	0	8	0	0	0	0	15	0	0	8	0	0	
		6	7	7	7	0	0	17	0	0	0	0	0	0	0	3	0	0	0	0	57	0	0	0	0	3	
	II	3	3	3	0	0	0	48	0	0	21	3	3	0	0	0	0	0	0	0	14	0	0	0	3	0	
	SCIE	4	10	3	3	3	0	20	0	0	10	3	3	0	3	3	3	0	3	3	0	17	0	0	0	3	7
		5	3	3	0	0	0	48	0	0	21	3	3	0	0	0	0	0	0	0	14	0	0	0	3	0	
		6	0	0	0	0	0	71	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	14	0	
	II	3	0	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	SOC	4	0	0	11	11	0	11	0	0	0	0	0	0	0	56	0	0	0	0	0	0	0	0	0	11	
F	I	1	3	3	3	0	3	23	0	0	3	5	10	5	3	0	0	0	0	0	28	0	0	0	3	10	
I	SCIE	2	0	0	7	7	0	0	0	0	7	7	14	14	7	0	0	0	0	0	7	14	0	0	7	7	0
R		3	3	0	3	0	0	28	0	0	3	6	13	6	0	0	0	0	0	0	34	0	0	0	3	0	
E		4	3	3	3	0	3	23	0	0	3	5	10	5	3	0	0	0	0	0	28	0	0	0	3	10	
N		5	3	0	3	0	0	28	0	0	3	6	13	6	0	0	0	0	0	0	34	0	0	0	3	0	
Z		6	3	0	3	0	0	28	0	0	3	6	13	6	0	0	0	0	0	0	34	0	0	0	3	0	
E		7	0	0	7	7	0	0	0	0	7	7	14	14	7	0	0	0	0	0	7	14	0	0	7	7	0
		8	5	0	5	0	5	20	10	5	5	5	5	5	0	0	0	0	0	0	5	5	0	5	5	10	
		13	0	0	0	0	11	56	0	0	0	0	0	0	0	0	0	0	0	0	33	0	0	0	0	0	
		14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	0	0	0	0	84	
		8	0	0	0	0	6	12	0	0	6	18	6	6	0	0	0	0	0	0	6	0	0	24	12	0	6
	II	3	5	0	5	0	5	20	10	5	5	5	5	0	0	0	0	0	0	0	5	5	0	5	5	10	
	SCIE	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0	60	
		6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	
		8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	0	0	0	0	20	
		9	10	0	0	0	0	0	0	14	0	14	0	38	5	5	0	0	0	0	5	0	0	0	0	5	5
P	I	1	14	0	7	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	50	0	0	0	0	21	
A	SCIE	3	20	0	0	0	7	0	0	0	7	0	0	0	0	0	0	0	0	0	27	0	0	0	0	40	
D		5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	
O		7	7	0	0	4	0	0	0	0	11	0	4	0	4	4	0	0	7	0	7	50	0	0	0	4	
V		8	10	0	0	0	0	0	0	0	10	0	50	10	20	0	0	0	0	0	0	0	0	0	0	0	
A		9	7	0	0	4	0	0	0	0	11	0	4	0	4	4	0	0	7	0	7	50	0	0	0	4	
	II	5	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0	0	0	0	20	
	SCIE	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	
	II SOC	1	20	0	0	0	0	0	0	0	0	0	0	0	0	10	10	0	0	0	30	0	0	0	0	30	
P	I	1	14	0	24	5	0	0	0	0	0	0	0	5	5	0	0	10	5	5	24	5	0	0	0	0	
A	SCIE	5	0	6	0	6	6	6	0	6	6	0	22	11	6	0	0	0	0	0	17	0	0	0	0	17	
L		7	8	0	8	0	8	25	0	0	8	8	8	8	8	0	0	0	0	0	8	0	0	0	0	0	
E		8	8	0	8	0	8	25	0	0	8	8	8	8	8	0	0	0	0	0	8	0	0	0	0	0	
R		9	0	6	0	6	6	0	6	0	6	0	22	11	6	0	0	0	0	0	17	0	0	0	0	17	
M	I SOC	1	0	0	9	0	0	0	0	0	0	0	9	0	9	9	0	0	0	9	0	36	9	0	9	0	0
O	II SCIE	2	5	0	0	3	3	3	8	0	0	3	0	0	0	59	0	0	0	0	0	0	0	0	14	3	
P	I	2	12	0	24	4	0	0	0	0	4	0	0	0	4	4	0	0	8	4	4	24	8	0	0	0	0
I	SCIE	3	0	0	8	0	0	0	0	0	8	0	0	0	8	0	0	0	0	0	8	17	17	0	0	33	0
S		4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	0	0	0	0	79	
A		5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	56	0	0	0	37	
	I SOC	1	25	6	31	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	25	0	6	0	0	0	
	II	6	14	0	23	5	0	0	0	0	0	0	0	0	5	5	0	0	9	5	5	27	5	0	0	0	
	SCIE	7	14	0	23	5	0	0	0	0	0	0	0	0	5	5	0	0	9	5	5	27	5	0	0	0	
		8	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	56	0	0	0	37	
	II	1	25	6	31	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	25	0	6	0	0	0	
	SOC	2	25	6	31	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	25	0	6	0	0	0	
		3	25	6	31	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	25	0	6	0	0	0	
		4	0	17	0	17	0	0	0	0	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0	50	
		5	25	6	31	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	25	0	6	0	0	0	
R	II	2	0	0	13	0	0	0	0	0	0	13	0	13	13	0	0	0	0	0	38	13	0	0	0	0	
O	SOC	3	0	0	7	0	0	13	0	7	0	0	7	0	7	7	0	0									

Conclusions

The analysis of the content of a high percentage of courses on quality, included in scientific or social area degree programs, and supplied by an accurately selected sample of Italian universities, highlights the absence of an autonomous and sufficient body of knowledge focused on quality topics.

There is a widespread use of the word "Quality" within the title of courses included both in I and II level degree programs. However, very often, according to the authors, the content of these courses includes peculiar subjects, not directly related to traditional quality topics. Moreover, in most of the courses where traditional quality topics are taught, there seems to be a lack of a systematic vision of knowledge on "Quality".

The results presented in this article apply to the first phase of an exploratory survey on quality education carried out by the authors. Further research is required: for example, there are many other university courses without the word "Quality" in their title, where subjects related to quality topics are taught. Furthermore, Quality education in degree programs belonging to the health and classical areas should be explored.

REFERENCES

- Bergman, B., and Klefsjö, B., (2003), *Quality from customer needs to customer satisfaction* (second edition), Studentlitteratur, Sweden.
- Disney, J., Crabtree, H., Harrison, P., (2000), "The case for undergraduate education in quality management", *Total Quality Management*, 11 (4-6), pp.S574-S580.
- Feigenbaum, A. V., (1993), "We can't improve American quality if we aren't teaching it", *National Productivity Review*, 12 (2), pp.139-141.
- Evans, J. R., (1996), "What should higher education be teaching about quality?", *Quality Progress*, Vol. 29, No. 8, Aug, pp. 83-88.
- Vazzana G., Bachmann D., Elfrink J., (1997), "Does higher education practice what it teaches?", *Quality Progress*, Vol. 30, No. 12, Dec, pp. 67-70.
- Weinstein, L. B., Petrick, J. A., Saunders, P. M., (1998), "What higher education should be teaching about quality – But is not", *Quality Progress*, Vol. 31, No. 4, Apr, pp. 91-95.