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Differences between the personal, social and emotional profiles of teaching and computer engineering professionals and students[1]

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The evidence suggests that emotional intelligence and personality traits are important qualities that workers need in order to successfully exercise a profession. This article assumes that the main purpose of universities is to promote employment by providing an education that facilitates the acquisition of abilities, skills, competencies and values. In this study, the emotional intelligence and personality profiles of two groups of Spanish students studying degrees in two different academic disciplines – computer engineering and teacher training – were analysed and compared. In addition, the skills forming part of the emotional intelligence and personality traits required by professionals (computer engineers and teachers) in their work were studied, and the profiles obtained for the students were compared with those identified by the professionals in each field. Results revealed significant differences between the profiles of the two groups of students, with the teacher training students scoring higher on interpersonal skills; differences were also found between professionals and students for most competencies, with professionals in both fields demanding more competencies that those evidenced by graduates. The implications of these results for the incorporation of generic social, emotional and personal competencies into the university curriculum are discussed.

Keywords: emotional intelligence; personality; higher education; professional requirements

Introduction

The quest for maximum employee achievement in the work context has prompted research into the skills possessed by those employees who are most successful in increasing their company's performance. In the analysis of these abilities, several authors (Boyatzis, Goleman, and Rhee 2000; Goleman 2001; Mayer and Salovey 1997) have concluded that in addition to general intelligence, emotional intelligence and personality factors also form part of the complex web of competencies that people need in order to carry out their professional work successfully.

The relationship between emotional intelligence and performance has been demonstrated in numerous studies (Boyatzis 2008; Dreyfus 2008). A high level of emotional

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intelligence can contribute to job performance (reflected in salary, wage rises and position held in the company) and allows people to promote positive relationships at work, work effectively as a team and build social capital (Koman and Wolff 2008).

For Boyatzis, Goleman, and Rhee (2000), a person's capacity to adapt to their environment could be determined by emotional intelligence, and good adaptability may result in professional success in various fields. This has been evidenced in studies of the workplace by Rozeil, Pettijohn, and Parker (2001), in education by Parker, Summerfeldt, Hogan, and Majeski (2004) and in the field of mental health (Ciarrochi, Deane, and Anderson 2002). In relation to teachers, analyses conducted of the relationship between emotional intelligence and burnout in secondary school teachers (Chan 2006) have demonstrated that burnout has a negative effect on student performance, the quality of teaching and teacher well-being (Woods 2010), and adversely affects the teacher–student relationship (Yoon 2002).

The evidence suggests that emotional intelligence is important for employee performance; however, few university degree curricula incorporate or adequately address the emotional skills that potential employers are increasingly demanding of their employees and that employees use most at work (Jaeger 2003).

Data from workforce entry surveys highlight the importance of promoting the acquisition of social, decision-making and leadership skills and of stimulating creativity and management as well as developing other competencies (National Agency for Quality Assessment and Accreditation 2005). Meanwhile, other studies have indicated that university students studying different academic disciplines have different emotional skills (Kafetsios, Maridaki-Kassotaki, Zammuner, Zampetakis, and Vouza 2009). However, the studies conducted to date have only defined generic competencies and have also included a wide range of degrees simultaneously. The Tuning Project (González and Wagenaar 2003) and 'The Flexible Professional in the Knowledge Society: new demands on higher education in Europe' project (better known as the REFLEX project) (National Agency for Quality Assessment and Accreditation 2007) both establish a set of generic competencies, as well as specific competencies for different areas. Many of these generic competencies are related to skills which form part of emotional intelligence and personality traits.

On the one hand, therefore, it seems necessary to establish whether differences exist between different groups of university students as regards their generic competency profiles, and in this case, whether such differences exist between computer engineering and teacher training students, since they belong to clearly distinct academic and professional fields in which differences could theoretically be expected in the personal, social and emotional skills required for professional practice. On the other hand, it is necessary to determine the differences that exist between students and professionals in these fields of knowledge, in order to design academic programmes which promote the skills necessary for professional practice.

Generic social and emotional skills of computer engineers

Some studies in the field of science and engineering have highlighted the importance of personal, social and emotional competencies for professional achievement. García-Aracil, Mora, and Vila (2004) observed that professional success (defined as monetary reward) depended more on competencies related to the individual's capacity to tackle complex situations with leadership and personal involvement than on the specific knowledge needed in the jobs. Attitudes towards work rather than knowledge were

the most rewarded characteristics in the labour market for young graduates in fields such as Mathematics (including data processing and computer specialists).

The current curriculum for computer engineering is based on the curriculum developed jointly by the IEEE (Institute of Electrical and Electronic Engineers) and the ACM (Association of Computer Machinery) (Joint ACM/IEEE-CS 2001, 2005), which deals only with skills relating to the specific discipline. As a result of the Bologna declaration (Ministers of Education of the European Union, 1999) recommendations, proposals have been made regarding the generic skills of computer professionals. Such is the case of the Career Space project (2001), which focuses on the profile of information and communications technology (ICT) professionals (and does not therefore analyse computer engineers), providing a series of recommendations for the 'competencies' that their curriculum vitae should include. In this report, generic abilities are grouped under the title of 'personal skills' and do not detail the specific areas that these skills should be broken down into, or how they are assessed. In a similar vein, another series of studies in Spain at a national level, known as PAFET, also provides a profile of technical knowledge and personality traits or personal skills for ICT professionals, but does present proposals for inclusion in the curriculum.

Different levels of generic social and emotional skills are required in the different professional fields; however, the studies conducted to date have defined generic skills for a wide range of degrees (such as ICT professionals), and the REFLEX project, such as Tuning, does not deal specifically with the degree in computer engineering. One of the objectives of this research was to establish the level of generic social and emotional competencies of computer engineers using widely accepted emotional intelligence (EI) and personality models, and to compare their level of these skills with that of professional teachers and teacher training students.

Teachers' social and emotional skills

Studies conducted of teachers include those by Jennings and Greenberg (2009) and Sutton and Wheatley (2003), who concluded that there are empirical and theoretical reasons to believe that teachers' emotions have an important influence not only on the teachers themselves, but also on teaching and students.

Di Fabio and Palazzeschi (2008) assessed the relationship between emotional intelligence and self-efficacy in a sample of Italian teachers. In a similar study, Chan (2008) evaluated the relationship between emotional intelligence, self-efficacy and coping skills in teachers in Hong Kong. Of particular note in Spain was the study of perceived emotional intelligence and satisfaction with life among academics by Landa et al. (2006).

Socially and emotionally competent teachers have high self-awareness. They recognise their emotions, and know how to use emotions to motivate learning in others. Socially and emotionally competent teachers also recognise and understand the emotions of others, and are able to build supportive interpersonal relationships. They can regulate their emotions in ways that facilitate positive classroom outcomes (Jennings and Greenberg 2009). When teachers experience mastery over these social and emotional competencies, teaching becomes more efficacious (Woolfolk and Weinstein 2006).

Despite the need to educate university students in accordance with the demands of the labour market, few studies have analysed the relationship between the so-called

generic competencies that students possess, such as those relating to emotional intelligence, and those required of them in professional life.

Theoretical models of Emotional intelligence

In order to describe emotionally intelligent people, an ability model has been defined (Mayer and Salovey, 1997; Mayer, Caruso, and Salovey 2000; Mayer, Salovey, and Caruso 2000) in which emotional intelligence is considered as a set of cognitive abilities for using and coping with emotions adaptively. Mixed models have also been developed, whose authors prefer to define EI as a trait, including some of the key personality traits necessary for behaving in an emotionally intelligent way (Bar-On 2000; Goleman 2001).

The relationship between emotional intelligence and personality has been widely debated in the literature. The authors of the ability model (Mayer, Salovey, and Caruso 2000) have argued that emotional intelligence is independent of stable personality traits (Grewal and Salovey 2005), in contrast to the mixed models where emotional intelligence is considered a combination of stable personality traits, emotional skills, motivational factors and various cognitive abilities (Bar-On 2000; Boyatzis, Goleman, and Rhee 2000).

Current research has shown that whether assessing emotional intelligence using instruments based on the ability model or instruments based on mixed models, numerous researchers simultaneously apply both emotional intelligence and personality instruments in their studies (Tok and Suleyman 2009). In this study, both theoretical formulations served as the basis for assessing emotional intelligence; the TMMS-24 instrument was used to assess the ability-based model of perceived emotional intelligence, and the EQi:S to assess the mixed-based model of emotional intelligence. These instruments include both emotional and social skills; skills which are similar to the generic social and emotional competencies established in the Framework of the European Higher Education Area.

Based on this theoretical context, the objectives of this research were: (a) to assess the emotional intelligence and personality traits of a sample of final-year students taking two different degree courses (computer engineering and teaching), and to conduct a comparison to determine whether differences existed between the intelligence and personality profiles of the groups, (b) to analyse the emotional intelligence skills and personality traits that employees (computer engineers and teachers) need most in their work, by consulting the opinion of professionals working in these fields, and (c) to compare the profiles obtained for the students with those demanded in professional practice related to each degree.

Method

Participants

Two different groups participated in the present study; students and professionals associated with each degree course (computer engineering and teaching).

The computer engineering student sample consisted of a group of 138 students in the final two years of the Computer Engineering degree course at the Polytechnic School of the University of Alicante. Of the 138 participants, 128 were male, and 10 were female, aged from 20 to 40 ($\bar{x}$= 24 years old). The teacher training student

sample consisted of 139 students in the final year of their degree at the University of Alicante, of whom 29 (21%) were male and 110 (79%) female, aged between 19 and 52 ($\bar{x}$= 22 years old).

The professional sample consisted of a group of teachers and another of computer engineers, both in professional practice. The teacher group comprised 148 professionals selected through a process of stratified random sampling of nursery and primary schools included in the list of schools held by the Valencian Regional Government Department of Education and located in the province of Alicante (Spain). Both state and state-assisted private schools were included (10 were state schools and 2 were state-assisted private schools). The teachers' ages ranged between 22 and 66 ($\bar{x}$ = 39 years old). There were 114 (77%) female teachers and 34 (23%) male teachers.

The group of professional engineers consisted of 117 individuals belonging to different professional associations for computer engineers. Their ages ranged between 23 and 48, with a mean age of 32 years old. In this group, 22 (19%) were female and 95 (81%) were male.

Instruments

Instruments administered to the students

The Trait Meta-Mood Scale-24 (TMMS-24). This is a version of the TMMS-48 (developed by Salovey and Mayer) adapted and shortened by the Malaga research team (Fernández-Berrocal, Extremera, and Ramos 2004). This self-report measure uses a Likert-type scale to assess three key dimensions of the Mayer-Salovey Emotional Intelligence model. This shortened version has increased reliability for all the following factors: Attention (.90), Clarity (.90) and Repair (.86).

The Emotional Quotient Inventory: Short version (EQ-i:S) by Reuven Bar-On (2002). This is a shortened version of the Emotional Quotient Inventory, adapted to Spanish by MHS, Toronto, Canada. This self-report measure assesses five general EI factors from mixed models: intrapersonal skills, interpersonal skills, adaptability, stress management and general mood. The EQ-i:S shows adequate evidence of validity, and internal consistency of the subscales ranges between .66 and .86.

The short version of the NEO Personality Inventory, the NEO Five Factor Inventory (NEO-FFI) by Costa and McCrae (1992), adapted to Spanish by TEA editions in 2002. This instrument assesses the Big Five personality factors and offers an abbreviated measure of the dimensions Neuroticism, Extroversion, Openness, Agreeableness and Conscientiousness (Costa and McCrae 2002; Digman, 1990). The internal consistency reliability of the questionnaire has been demonstrated through use and validation, with values ranging between .86 and .95, as has test–retest stability, with values ranging between .70 and .92 in the Spanish sample, in addition to factorial validity.

Instruments administered to the professionals

In order to determine the opinion of professionals as regards the level of emotional intelligence they require for professional practice, a questionnaire (see Appendix) was used to assess the eight competencies related to emotional intelligence and five personality factors extracted from the tests administered to students to assess emotional

intelligence: the TMMS-24, EQ-i and the NEO-FFI. This enabled us to compare the views of professionals with the level of emotional intelligence students possessed.

Procedure

Data on students was collected during the first semester of the academic year, by administering the tests in their respective classrooms during teaching time. Test administration took approximately one hour.

The procedure employed to gather information from working teachers was to distribute the questionnaires among teachers at several schools in the province of Alicante (Spain), which were chosen at random from the official list of educational centres.

To obtain the data for computer engineering professionals, several professional colleges and associations for computer engineers in Spain were contacted. These sent the information, together with the web address, to their members, inviting them to participate in this study.

Design and data analysis

Different data analysis techniques were used within an overall ex-post-facto comparative research design.

First, the emotional intelligence profile of students on each degree course was obtained through administration of the different tests, and the scores were converted to a scale of 1 to 10. Subsequently, the emotional intelligence profile required by professionals associated with each degree was determined from the mean of the scores given in the questionnaires for the different variables. Lastly, comparisons were conducted between the student profiles obtained for each degree course, and between students and professionals associated with the same degree.

Statistical analysis was conducted using the GLM (General Linear Model) module of the statistical software package SPSS version 17.0. Employing a procedure widely used in profile analysis (Tabachnick and Fidell 2007), a multivariate analysis of variance (MANOVA) and a univariate analysis of variance (ANOVA) of repeated measures were performed.

Results

Comparison of computer engineering and teacher training students

Table 1 shows the means and standard deviations obtained for each student group for the different variables. The values obtained were generally high for most of the variables and very similar between the two groups of students.

To compare the profiles of students from each of the degree courses, multivariate (MANOVA) and univariate (ANOVA) analyses of variance for repeated measures were performed.

Box's M test was used, obtaining homogeneity of variance–covariance matrices ($F(91,208215) = 1.16$; $p = .140$). However, Mauchly's sphericity test did not confirm sphericity for the DV matrix ($W = .038$; $\chi^2 = 831.03$, $df = 77$, $p = .000$). Therefore, the degrees of freedom for the within-subjects test were corrected, using Epsilon correction values. Although the Epsilon values, calculated according to the Greenhouse-Geisser estimate $\varepsilon = .083$, the Huynh-Feldt estimate $\varepsilon = .621$, and the lower bound

Table 1. Descriptive statistics, means and standard deviations for students of each degree course.

	Computer engineering students			Teacher training students			Total		
	N	$\bar{x}$	*S*	*N*	$\bar{x}$	*s*	*N*	$\bar{x}$	*s*
Attention	135	5.78	1.45	133	6.81	1.43	268	6.29	1.53
Clarity	135	6.88	1.40	133	6.85	1.43	268	6.87	1.41
Repair	136	7.06	1.42	133	6.91	1.42	269	6.98	1.42
Intrapersonal Skills	134	7.34	1.19	138	7.51	1.15	272	7.43	1.17
Interpersonal Skills	135	8.17	.68	138	8.84	.73	273	8.51	.78
Adaptability	135	7.89	1.07	138	7.60	1.06	273	7.74	1.07
Stress Management	134	7.47	1.30	138	7.44	1.22	272	7.46	1.26
General Mood	134	7.89	1.02	138	7.89	1.09	272	7.89	1.06
Neuroticism	134	4.89	1.20	138	5.34	1.31	272	5.12	1.28
Extroversion	134	7.25	1.04	138	7.71	1.08	272	7.48	1.08
Openness to Experience	134	6.72	1.09	138	6.99	1.00	272	6.85	1.05
Agreeableness	135	6.76	.95	138	7.55	.83	273	7.16	.97
Conscientiousness	135	7.35	1.14	138	7.55	.98	273	7.45	1.06

estimate $\varepsilon = .644$, were low, once these corrections had been made, the F ratios in all cases were significant, both for flatness test ($F = 115.33$, $p = .000$, η^2partial $= .30$), and for parallelism test ($F = 11.98$, $p \leq .001$, η^2partial $= .04$). The profiles of both groups are shown in Figure 1.

In order to determine whether there were significant differences between the level of emotional intelligence of students on each degree course, the level test was conducted,

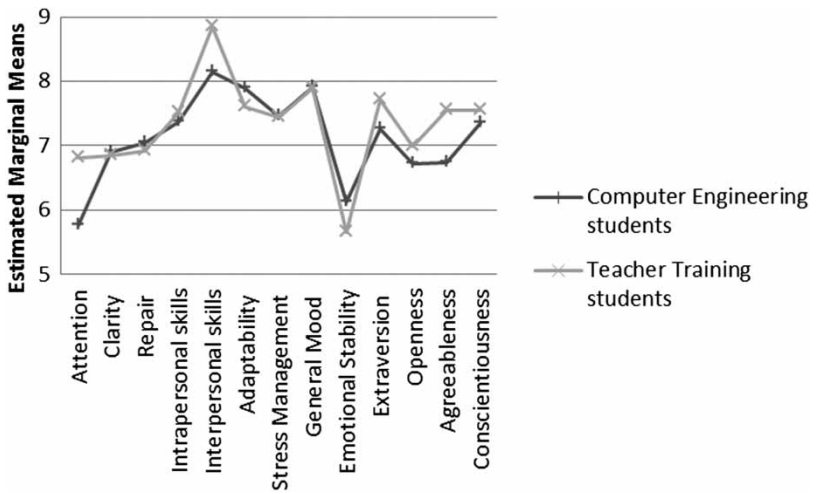

Figure 1. Emotional intelligence profiles for students of computer engineering and teacher training.

Table 2. *t*-test of independent samples between students of computer engineering and teacher training.

	t-test for equality of means						
	t	gl	Sig. (bilateral)	Mean difference	Standard dev. of the difference	95% confidence interval for the difference	
Attention[1]	-5.82	265.99	.000	-1.02	.17	-1.37	-.68
Clarity[1]	.17	265.60	.863	.02	.17	-.31	.37
Repair[1]	.84	266.87	.399	.14	.17	-.19	.49
Intra[1]	-1.17	268.69	.240	-.16	.14	-.44	.11
Inter[1]	-7.68	270.26	.000	-.66	.08	-.83	-.49
Adapta[1]	2.20	270.72	.028	.28	.12	.03	.54
Stress mgmt[1]	.24	267.41	.808	.03	.15	-.26	.33
Mood[1]	-.00	269.70	.999	-.00	.12	-.25	.25
Neuro[1]	-2.89	269.06	.004	-.44	.15	-.74	-.14
Extroversion[1]	-3.58	269.98	.000	-.46	.12	-.71	-.20
Openness[1]	-2.11	266.42	.036	-.26	.12	-.51	-.01
Agreeableness[1]	-7.27	264.94	.000	-.79	.10	-1.00	-.57
Conscientiousness[1]	-1.57	263.06	.115	-.20	.12	-.45	.05

[1] Equal variance is not assumed

the results of which showed that the emotional mean for each group was significantly different from that of the other ($F = 7.11$, $p = .008$, η^2partial $= .02$), although the size of the effect indicated that the groups were not far apart.

In order to assess which variables showed differences between the groups and which did not, a difference of means test (*t*-test) was conducted for independent groups (Table 2). The results showed significant differences in attention, agreeableness, interpersonal skills, extroversion, neuroticism, adaptability and openness. Except for adaptability, teacher training students obtained higher scores for these EI competencies than the computer engineering students.

Comparison of the profiles of computer engineering students and professionals

Table 3 shows the means and standard deviations obtained for the computer engineering students and professionals for all variables. In general, the mean values were high for the majority of variables (except for neuroticism – students $\bar{x}= 4.89$ and professionals $\bar{x}= 2.86$). It should be noted that for the majority of the variables, the mean scores for the students' profile were lower than those of the professionals.

Box's M test did not show homogeneity of variance–covariance matrices ($F(91,154675) = 4.209$, $p = .000$); however, the violation of this assumption had minimal impact because the groups were of roughly equal size (Hair et al. 1999) and the highest ratio of variance between groups (1:3.75) did not exceed the ratio 1:10 (Tabachnick and Fidell 2007).

Table 3. Descriptive statistics, means and standard deviations, for computer engineering students and professionals.

	Student			Professional			Total		
	N	$\bar{x}$	*s*	*N*	$\bar{x}$	*s*	*N*	$\bar{x}$	*s*
Attention	135	5.78	1.45	114	7.08	1.89	249	6.38	1.79
Clarity	135	6.88	1.40	113	7.35	1.76	248	7.09	1.59
Repair	136	7.06	1.42	111	7.55	1.37	247	7.28	1.42
Intrapersonal Skills	134	7.34	1.19	114	7.00	1.81	248	7.19	1.51
Interpersonal Skills	135	8.17	.68	113	8.60	1.32	248	8.37	1.04
Adaptability	135	7.89	1.07	114	8.61	1.08	249	8.22	1.13
Stress Management	134	7.47	1.30	114	8.64	1.10	248	8.01	1.34
General Mood	134	7.89	1.02	113	8.09	1.18	247	7.98	1.10
Neuroticism	134	4.89	1.20	111	2.86	1.14	245	3.97	1.55
Extroversion	134	7.25	1.04	114	6.64	1.64	248	6.96	1.38
Openness to Experience	134	6.72	1.09	112	8.06	1.40	246	7.33	1.41
Agreeableness	135	6.76	.95	114	6.47	1.84	249	6.63	1.43
Conscientiousness	135	7.35	1.14	114	8.68	1.33	249	7.96	1.39

Mauchly's test showed that the assumption of sphericity of the DV matrix was not fulfilled ($W = .127$; $\chi^2 = 467.50$, $df = 77$, $p = .000$). Consequently, the degrees of freedom for the within-subjects test were corrected for the effects of flatness and parallelism using Epsilon correction values calculated according to the estimates of Greenhouse-Geisser $\varepsilon = .083$, Huynh-Feldt $\varepsilon = 0.737$, and lower bound $\varepsilon = 0.772$, with the result that all the F ratios were significant ($p = .000$), both for the within-subject effect and the effect of interaction.

The new tests of flatness and parallelism with the corrected degrees of freedom showed profiles which were not flat and not parallel, flatness effect: $F = 70.30$, $p = .000$, η^2partial $= .23$; parallelism effect: $F = 25.61$, $p = .000$, η^2partial $= .10$. Both effects are presented graphically in Figure 2.

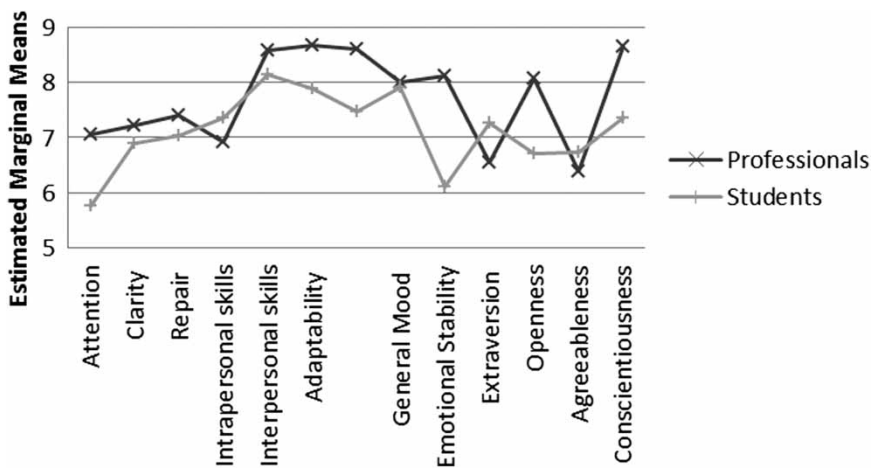

Figure 2. Emotional intelligence profiles for computer engineering students and professionals.

Table 4. *t*-test of independent samples between computer engineering students and professionals.

	t-test for equality of means						
						95% confidence interval for the difference	
	t	gl	Sig. (bilateral)	Mean difference	Standard dev. of the difference	Higher	Lower
Attention[1]	-5.98	209.84	0.000	-1.30	0.21	-1.73	-0.87
Clarity[1]	-2.27	212.03	0.024	-0.46	0.20	-0.87	-0.06
Repair[1]	-2.78	238.58	0.006	-0.49	0.17	-0.85	-0.14
Intra[1]	1.70	190.47	0.09	0.33	0.19	-0.05	0.73
Inter[1]	-3.06	160.78	0.003	-0.42	0.13	-0.69	-0.15
Adaptability[1]	-5.23	239.33	0.000	-0.71	0.13	-0.99	-0.44
Stress mgmt[1]	-7.63	245.98	0.000	-1.16	0.15	-1.47	-0.86
Mood[1]	-1.40	223.21	0.162	-0.20	0.14	-0.48	0.08
Neuro[1]	13.54	238.78	0.000	2.03	0.15	1.73	2.33
Extroversion[1]	3.41	185.26	0.001	0.60	0.17	0.25	0.96
Openness[1]	-8.23	207.77	0.000	-1.34	0.16	-1.66	-1.02
Agreeableness[1]	1.52	162.49	0.13	0.29	0.19	-0.08	0.67
Conscientiousness[1]	-8.36	224.00	0.000	-1.32	0.15	-1.64	-1.01

1 Equal variance is not assumed

In the level test, it was observed that differences existed between the means obtained for students and professionals for the emotional variables ($F = 44.65$; $p = .000$; η^2partial $= .16$).

The *t*-test for the means differences in independent groups (Table 4) revealed significant differences in 10 of the 13 variables. The greatest difference found between students and professionals was in the variable 'neuroticism'. Another finding worth highlighting is that the students only obtained scores above the level indicated as necessary by professionals in neuroticism and extroversion. For the remaining variables presenting significant differences, students always obtained scores below the level indicated by the professionals as necessary. The greatest differences were found for openness, conscientiousness, attention to one's own emotions and stress management.

Comparison of the profiles of teacher training students and professional teachers

Table 5 shows the means and standard deviations obtained for teacher training students and professional teachers. As with the previous groups, the mean values obtained were high for the majority of the variables, and the students obtained lower scores than the professionals (except in the case of neuroticism).

Box's M test did not confirm homogeneity of the variance–covariance matrices ($F(91,222797) = 3.502$, $p = .000$); and Mauchly's test gave a low value, $W = .200$, $\chi^2 = 1022.28$, $df = 77$, $p = .000$, and thus the assumption of sphericity of the DV matrix was not fulfilled. However, the groups were of approximately the same size and the greatest ratio of variance between the groups was 1:3.48.

Table 5. Descriptive statistics, means and standard deviations for teacher training students and professionals.

	Student			Professional			Total		
	N	$\bar{x}$	*s*	*N*	$\bar{x}$	*s*	*N*	$\bar{x}$	*s*
Attention	133	6.81	1.43	146	6.87	2.67	279	6.84	2.16
Clarity	133	6.85	1.43	145	7.84	1.84	278	7.37	1.72
Repair	133	6.91	1.42	144	8.30	1.31	277	7.63	1.53
Intrapersonal Skills	138	7.51	1.15	146	8.43	1.27	284	7.99	1.30
Interpersonal Skills	138	8.84	.73	146	9.25	.90	284	9.05	.84
Adaptability	138	7.60	1.06	145	8.85	.92	283	8.24	1.17
Stress Management	138	7.44	1.22	145	8.84	.94	283	8.15	1.29
General Mood	138	7.89	1.09	145	8.92	1.00	283	8.42	1.16
Neuroticism	138	5.34	1.31	145	2.12	.94	283	3.69	1.97
Extroversion	138	7.71	1.08	142	7.94	1.30	280	7.83	1.20
Openness to Experience	138	6.99	1.00	145	8.53	1.07	283	7.77	1.29
Agreeableness	138	7.55	.83	144	8.51	1.11	282	8.04	1.09
Conscientiousness	138	7.55	.98	143	8.38	1.19	281	7.98	1.17

The within-subjects tests for the effects of flatness and parallelism were conducted with degrees of freedom corrected with Epsilon correction values. Once these corrections had been made, the F ratios in all cases were significant, both for within-subjects effect and for the interaction effect. In the flatness test, $F = 68.80$, $p < .001$, η^2partial $= .20$, and in the parallelism test, $F = 34.88$, $p < .001$, η^2partial $= .11$. These profiles are presented graphically in Figure 3.

In the level test, a considerable difference between the means obtained for students and professionals was observed: $F = 182.00$, $p = .000$, η^2partial $= .40$.

The test of mean differences for independent groups (Table 6) revealed statistically significant differences between the groups for all of the variables except for attention and extroversion. Furthermore, as remarked above, the students obtained scores below the level indicated by professionals as necessary, except in the case of neuroticism.

Discussion and conclusions

The results indicated slight differences between the emotional intelligence and personality profile of computer engineering and teacher training students, with the latter being observed to have slightly higher levels of emotional intelligence than computer engineering students.

These results were as anticipated, since teacher training students were expected to possess a higher level of emotional skills than students in other fields (Byron 2001; Extremera and Fernández-Berrocal 2004; Hargreaves 1998). Nevertheless, this finding may also have been affected by the different male/female ratios in the sample of teacher training and computer engineering students, since the percentage of females on the teacher training degree course was much higher, and several studies have shown that females score slightly higher than males for emotional intelligence (Van Rooy, Alonso, and Viswesvaran 2004).

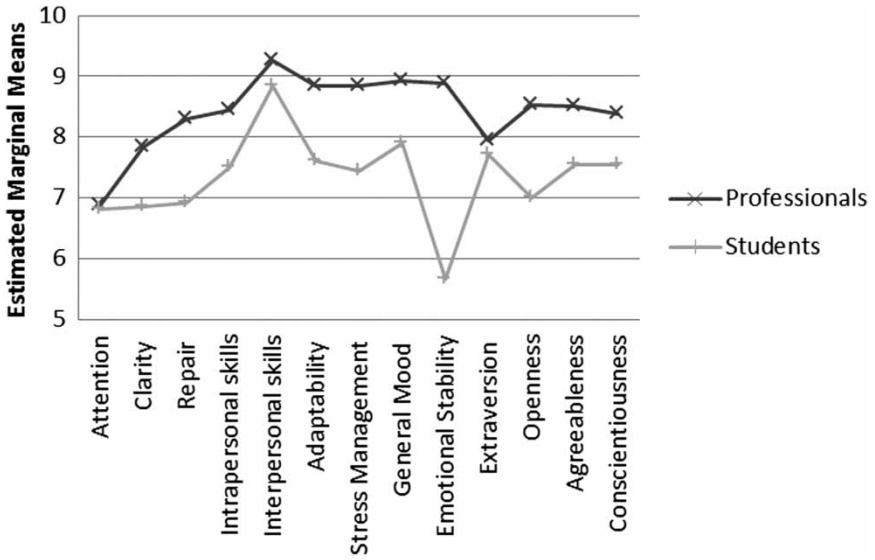

Figure 3. Emotional intelligence profiles for teacher training students and professional teachers.

Table 6. Test of independent samples between teacher training students and professional teachers.

	t-test for equality of means						
						95% confidence interval for the difference	
	t	gl	Sig. (bilateral)	Mean difference	Standard dev. of the difference	Higher	Lower
Attention[1]	-.23	226.02	.815	-.05	.25	-.55	.44
Clarity[1]	-5.00	269.26	.000	-.98	.19	-1.37	-.59
Repair[1]	-8.42	267.75	.000	-1.39	.16	-1.71	-1.06
Intra[1]	-6.39	281.40	.000	-.92	.14	-1.20	-.63
Inter[1]	-4.27	276.39	.000	-.41	.09	-.60	-.22
Adaptability[1]	-10.45	271.46	.000	-1.24	.11	-1.47	-1.00
Stress mgmt[1]	-10.76	257.31	.000	-1.39	.13	-1.65	-1.14
Mood[1]	-8.22	276.27	.000	-1.03	.12	-1.27	- .78
Neuroticism[1]	23.52	247.02	.000	3.21	.13	2.94	3.48
Extroversion[1]	-1.63	271.79	.104	-.23	.14	-.51	.04
Openness[1]	-12.48	280.92	.000	-1.54	.12	-1.78	-1.29
Agreeableness[1]	-8.18	265.07	.000	-.95	.11	-1.18	-.72
Conscientiousness[1]	-6.35	271.79	.000	-.82	.13	-1.08	-.57

[1] Equal variance is not assumed

Teachers indicated interpersonal skills and mood as being of the most importance, and these were also the dimensions where the students scored highest, although significant differences existed between the means obtained for the students (lower) and those obtained for the professionals. The variables for which the greatest differences were found were emotional stability, openness, repair, stress management, mood, clarity, agreeableness, intrapersonal skills and conscientiousness. In studies which attempted to characterise the emotional intelligence skills evidenced by effective teachers, it was found that professional teachers presented higher levels of interpersonal competence, emotional clarity, personal adaptation, intrapersonal intelligence and stress management (Brackett and Katulak 2006).

According to the computer engineering professionals, conscientiousness, stress management, adaptability and interpersonal skills were the most necessary skills. Among students, the principal deficiencies were observed for emotional stability, openness to experience, conscientiousness, attention and stress management, in that order. The same professionals also considered that students required higher levels of personal, social and emotional competencies than those which they possessed.

These results are consistent with those obtained for professional competencies in the REFLEX project (National Agency for Quality Assessment and Accreditation 2007), where it was concluded that employers demanded more competencies than those acquired by graduates. The project thus highlighted the difference between the level of competencies reported by professionals and the level of competencies shown by higher education students enrolled on different university degree courses.

Although some emotional skills are considered fundamental to professional success (Ayers and Stone 1999), the students were not sufficiently skilled in those which the experts expected them to have, and these abilities do not form part of the majority of university curricula (Boyatzis, Cowan, and Kolb 1995). Whilst professional practice cannot be predicted or explained entirely on the basis of these abilities (Schmidt and Hunter 1998), emotional and personality traits do seem to possess an explanatory power beyond that of other variables (Caruso and Wolfe 2001; Goleman 2001). This study has revealed a discrepancy between the demands made in professional practice and university education provision in terms of emotional abilities and personality. It can therefore be inferred that students are not equipped for successful workforce entry.

These findings regarding the difference between the students' personal, social and emotional competency profiles, and the skills that the professionals deemed necessary for workforce entry and professional practice, indicate the need to help students acquire these skills as part of their higher education. This has been proposed both in the field of teacher training (Brackett and Katulak 2006; Extremera and Fernández-Berrocal 2004) and in computer engineering degrees (de Oliveira and Lopez-Souto 2007; Pertegal-Felices, Castejón-Costa, and Jimeno-Morenilla 2010). These authors have indicated the need to develop emotional intelligence from the outset of their training, as part of the generic competencies established by the European Higher Education Area.

Various initiatives have been taken in the field of incorporating generic emotional competencies into the university curriculum (Fallows and Stevens 2000; Jaeger 2003). However, very few educational institutions have established specific programmes which promote these skills. These kinds of ability should be integrated into the standard academic curriculum and consolidated through extra-curricular activities. Similarly, such integration ought to be considered at university, departmental and subject level.

In conclusion, the main findings of this study indicate that:

(1) There were slight differences between the personal, social and emotional profiles of computer engineering and teacher training students, with the latter showing a higher level of interpersonal skills, extroversion and agreeableness.
(2) High levels in most of the personal, social and emotional skills assessed were considered necessary by professionals in the fields of computer engineering and teaching.
(3) For most of the personal, social and emotional competencies analysed, differences were found between the skills computer engineering students possessed and the competences indicated by the professional engineers as necessary, with the students obtaining scores below the levels indicated by the professionals, especially in emotional repair, interpersonal skills, adaptability, stress management, openness and conscientiousness.
(4) For most of the personal, social and emotional competencies analysed, differences were found between the skills teacher training students evidenced and the competences indicated by the professional teachers as necessary, with the students obtaining scores below the levels indicated by the professionals for all personal, social and emotional variables with the exception of extroversion and emotional attention.
(5) There was a considerable discrepancy between the level of competencies evidenced by university degree students and those deemed necessary by professionals for professional practice in the fields of computer engineering and education, particularly in the case of the latter.
(6) There is a need to incorporate personal, social and emotional skills into university programmes, within the Framework of the European Higher Education Area, in order to equip students with the skills necessary for workforce entry and professional practice.

Note

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Appendix. Questionnaire on emotional skills for practicing professionals

Table A1.

Competence	*Question*
Attention	How much attention should you (computer engineers/teachers) pay to your mood, personal problems, concerns, etc.?
Clarity	To what extent do people's perceptions and assessments of your emotions affect your work?
Repair	What is your belief or opinion of your ability to stop and prevent negative thoughts and promote positive thoughts?
Intrapersonal skills	To what extent should you be aware of your emotions, and be able to express your feelings and communicate your needs to others?
Interpersonal skills	What skill do you need to establish cooperative, constructive and satisfactory relationships with other people? (be good listeners, capable of understanding and empathising with the feelings of others)
Adaptability	To what extent is it necessary for you to handle change well and be able to solve daily problems by coping with them in a positive manner?
Stress management	To what extent is it necessary for you to control your impulses and work well under pressure by managing stress?
Humour	To what extent is it necessary for you to be happy and optimistic, energetic and able to motivate yourself?
Emotional stability*	To what extent is emotional stability and the ability to keep calm and control your feelings necessary in stressful situations?
Extroversion	To what extent is it necessary to be energetic and active, unreserved and assertive? (the extreme opposite would be to be calm, reserved, with a tendency towards solitude)
Openness	What level of originality, imagination and an interest in new ideas and unconventional values is necessary to carry out your work successfully?
Agreeableness	What level of altruism, generosity, trust and solidarity is necessary to carry out your work successfully? (the extreme opposite would be scepticism and critical thought)
Conscientiousness	To what extent do you need to be methodical, organised and meticulous in your professional life?

*The variable neuroticism was changed for its opposite, emotional stability, for the sake of clarity.