AN ASSESSMENT OF THE EMOTIONAL INTELLIGENCE OF CONSTRUCTION STUDENTS: AN EMPIRICAL INVESTIGATION

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Concerns have been expressed as to the appropriateness of the skills and abilities of construction graduates since late 1980's. In particular, employers have raised concerns about the extent to which non-technical or "soft" skills, such as communication, leadership, teamwork and management, are exhibited by graduates. Many of these behaviours comprise components of Emotional Intelligence (EI), high levels of which have been correlated with superior performance, leadership behaviour and success across a variety of professions. This paper investigates the EI level of almost 200 undergraduates from a range of construction disciplines. It investigates the extent to which construction educational programmes develop students' EI and puts forward recommendations as to how EI can be integrated into future construction curriculum. The results reveal that, whilst there is no significant relationship between the types of programme and the EI levels of students, construction students possess lower levels of EI relative to other professions and societal groups. It is suggested that a better understanding of students' EI levels could enhance educational programmes in line with future requirements of the construction industry. Tentative recommendations for improving the EI of students on built environment educational programmes have been put forward.

Keywords: emotional intelligence, construction education, undergraduates, leadership skills.

INTRODUCTION

Construction education has traditionally concentrated on preparing students with strong technical, analytical and management skills for professional careers in the construction industry. However, those hiring construction graduates in the late 1980s began to voice their dissatisfaction with the skill levels of their new employees. They complained about a lack of *non-technical* skills such as communication, teamwork, creative problems solving and flexibility (Bakos 1997; Davies 1998; Jagger and Connor 1998). More recently, the American Accreditation Board of Engineering and Technology Criteria (ABET 2005) has also generated eleven learning outcomes for engineering graduating students in order to cover the gap between today's graduates capabilities and the future needs of the construction industry. In recent years there has been increased recognition of the equally important impact that "soft" skills such as interpersonal skills, management of oneself and others, emotional awareness, stress tolerance and communication abilities, can have on the overall career success and technical competence of construction professionals (Hecker 1997; Shirazi and Hampson 1998; Butler and Chinowsky 2006; Songer and Walker 2004; Dainty *et al.*

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Mo, Y, Dainty, A and Price, A (2007) An assessment of the emotional intelligence of construction students: an empirical investigation. *In:* Boyd, D (Ed) *Procs 23rd Annual ARCOM Conference,* 3-5 September 2007, Belfast, UK, Association of Researchers in Construction Management, 325-334.

2004). Many of these 'soft' skills can be categorized as different 'emotional' competencies, known collectively as 'Emotional Intelligence'.

Emotional Intelligence (EI) refers an individual's ability to identify emotions in oneself and others and to exhibit appropriate responses to environmental stimuli (Songer and Walker 2004). It covers a range of "soft" and social skills, including leadership, communication, conflict management, teamwork, negotiation and collaboration etc., all of which have been identified as the crucial factors that can affect project success. Previous research has demonstrated that EI is a strong predictor of superior work performance and success (Goleman 1995; 1998). EI has also been found to greatly impact on leadership style (Butler and Chinowsky 2006; Gardner and Stough 2002; Cherniss 2001); job performance (Fredrickson 2003; Sy *et al.* 2005); team performance (Jordan *et al.* 2002); and academic success (Schutte *et al.* 1998; Petrides *et al.* 2004). Given the growing importance of EI in all aspects of life, and shortages exhibited in construction graduates, it is important to develop solutions to improve the situation by first evaluating the EI level of students and this requires the assessment of an emotional intelligence inventory.

The research reported in this paper relates to the initial phase of doctoral research aimed at investing the EI level of undergraduates from several construction undergraduate programmes, including Civil Engineering (CE), Construction Engineering Management (CEM), Architectural Engineering and Design Management (AEDM) and Commercial Management and Quantity Surveying (CMQS). These four programmes are generally pursued by individuals who want to seek professional engineering careers in the construction industry (Abudayyeh *et al.* 2000). A better understanding of students' EI levels and the ability of such programmes to influence students' EI development may help to improve the programmes thus producing graduates that better meet the future requirements of the construction industry.

EMOTIONAL INTELLIGENCE

The concept of Emotional Intelligence (EI) has a long history in the psychology field. Emotional Intelligence was initially proposed by Mayer and Salovey (1990) as set of social skills and abilities akin to, but distinct from intellectual intelligence. Mayer and Salovey (1990) defined EI as "*the ability to monitor one's own and others' feelings and emotions, to discriminate among them and to use this information to guide one's thinking and actions.*"(P.189). Landy (2006) argued that the roots of EI are in a comment made by Thorndike (1920) about the possibility of a form of intelligence termed "social intelligence", which was distinct from abstract or academic intelligence. After that, social intelligence was the term used for many decades to represent what has come to be known as Emotional Intelligence. In 1983, Gardner included the concept of "social intelligence" as one of seven intelligences in his proposed "Theory of Multiple Intelligences", and further decomposed social intelligence as two parts, intrapersonal and interpersonal intelligence. The former relates to the ability to understand one's own self, including one's feeling and motives, and the latter concerns the ability to understand others, including their moods and intentions. Scheusner (2002) argued that the distinction between Gardner's inter and intrapersonal intelligence contributes to the foundation of emotional intelligence theory. Until 1990, the first formal definition of EI along with the first model, appeared in Mayer and Salovey' article. Since then, many theorists have generated several distinct EI models. However, all these EI models share a common core of

basic concepts. Emotional Intelligence, at the most general level, refers to *the abilities to recognize and regulate emotions in ourselves and in others* (Goleman 2001).

Emotional Intelligence has gained widespread public attention over the past decade because of its powerful claims to determine managerial effectiveness. For example, EI has been shown to highly influence: work performance and life success (Goleman 1995); teamwork (Druskat and Wolff 2001; Elfenbein 2006; Jordan and Ashkanasy 2006); and a broad array of behavioural problems (Gillis 2004). In fact, Stein and Book (2000) in their book entitled *The EQ Edge,* which draws on research across 30 professional and managerial career fields, revealed that anywhere from 47 percent to 56 percent of work/life success is the result of EI, with the range being related to job type (Stein and Book 2000). Furthermore, Goleman (1995) argued that EI, unlike academic intelligence, is highly malleable, so that individuals who have generally low emotional competencies may be able to improve their overall abilities to identify, express, and regulate emotion. This statement was supported in the research conducted by Sala (2000), and the results show an improvement in EI level of the individuals who participated in EI training programmes.

THE IMPORTANCE OF EI IN CONSTRUCTION

Before exploring how construction programmes develop students' Emotional Intelligence (EI), it is important to first discuss the relevance of EI to construction and review this in relation to the characteristics and EI skills required by the construction industry.

The construction industry remains one of the most labour-intensive project-based industries in the UK, and contributes significantly to the economy (Chan and Kara 2007). The project-based nature of the industry has resulted in diverse groups of people, with often very different priorities and goals, being brought together for short-term periods of time to work together. They frequently need to rapidly establish co-operative working relationships whilst being employed by different organization on different conditions of contract (Dainty *et al.* 2007). To successfully manage and coordinate these competing individual interests and goals with those of central to the project, it is essential that construction project mangers possess the higher levels of intelligence, personal characteristics, interpersonal skills and leadership qualities (Shirazi and Hampson 1998). All of these are important components of the EI construct.

Butler and Chinowsky (2006) have extensively investigated the relevance of EI to the construction sector. They demonstrated the positive impact that EI can have on construction executives' leadership behaviour and suggested that construction organizations should recognize the value of EI given its significance to their managers' performance. The importance of EI in the sector is by no means restricted to executives, for example, Shirazi and Hampson (1998) suggested that building project managers will require a more integrated blend of both hard and soft skills in the future. This requirement is beginning to be reflected in the typical EI attributes required by employers in their person specifications. A survey conducted by Jagger and Connor (1998: 463) demonstrated that employers look for particular softer skills among graduates such as: interpersonal skills; communication skills; business awareness; flexibility/versatility; team working; and initiative/proactively. Another survey developed by Davis (1996) claimed that employers want candidates with strong interpersonal skills; team players who can also lead a team; good commercial

awareness; language ability and problem-solving skills. More recently, ABET (2005) set forth the attributes needed for the engineering graduates of 2020 as being: strong analytical skills, creativity, ingenuity, professionalism and leadership. Katehi (2005) also stated future engineers need to know how to replenish their knowledge by self-motivated, self-initiated learning as well as how to communicate effectively and think globally. These surveys provided prima facie evidence of the importance of EI in the context of the construction industry. There is a clear need for built environment educational programmes to develop such competencies through their curricula. However, the extent to which construction courses develop such competencies remains unclear.

METHODOLOGY

The research presented in this paper investigated the EI of a range of first year undergraduate students studying on built environment courses at Loughborough University. The method adopted was to distribute an Emotional Intelligence questionnaire (SSRI - the Schutte Self-Report Inventory; Schutte *et al.* 1998) amongst undergraduate students. The results were used to give an initial understanding of the EI level of construction undergraduates who might want to seek a professional career in the construction industry.

Many instruments have been developed to measure EI during the past two decades, which vary widely in both their content and their method of assessment (e.g., Goleman 1995; Bar-On 1997, Sala 2002). Four of these measurement tools are used with the highest frequency in research studies: The Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT), The Emotional Competence Inventory (ECI) 360, The Bar-on EQ Inventory (EQ-i) and the Schutte Self-Report Inventory (SSRI). Each of these EI assessment tools have been well researched and statistically validated. In this paper, SSRI was selected as the instrument to measure the EI level of construction undergraduates.

The Self-Report questionnaire developed by Schutte *et al.* (1998) is derived from a formulation (Salovey and Mayer, 1990) containing components of appraisal, expression, regulation and utilization of emotion. The test comprises 33 self-referencing statements, three of which are reverse-scored. It requires subjects to rate the extent to which they agree or disagree with a set of statements measured on a five-point Likert scale (1=strongly disagree; 5=strongly agree). The SSRI has been found to be the most frequently used in related research studies (Van Rooy and Viswesvaran 2004) and consistently measures the aspects of personality relevant to EI (Schutte *et al.* 1998; Brackett and Mayer 2003; Saklofske *et al.* 2003). The SSRI also has a good validity of 0.23, which was larger than several other measures assessed, good internal reliability ($\alpha = .78$) as well as high consistency ($\alpha = .90$) when compared to other tools (Schutte *et al.* 1998).

In total, 184 first year undergraduate students responded to the questionnaire, including 77 MEng Civil Engineering students (CE), 30 from the BSc Construction Engineering Management (CEM), 39 students from BSc Architectural Engineering and Design Management (AEDM) and 30 students from BSc Commercial Management and Quantity Survey (CMQS). A brief introduction of EI and the purpose of this research were given to inform the participants before they undertook the test. The participants were instructed to complete the questionnaire and were informed that the data would keep in anonymous and completely confidential.

RESULTS AND DISCUSSION

Table 1 shows the average EI score of students from the CE, CEM, AEDM and CMQS programmes. The results revealed that AEDM students scored the highest EI in comparison to those on the other programmes. They scored an average of 124 with a standard deviation of 17, while CMQS students show the lowest EI score, which scored an average of 116 with a standard deviation of 16. The CE and CEM students both averaged a similar score of 120 (S.D. =12) and 119 (S.D. =14) respectively. In order to further explore whether there was statistically significant correlation between EI and participating construction programmes, a series of Pearson correlation coefficients were calculated with each of the programmes as the dependent variable (see Table 2). These results suggest that the correlations between students' EI and construction educational programmes were either low or non-significant. Therefore, there is no significant difference between the types of programme and the EI levels of students.

Table 1: EI Descriptive Statistics Across Programmes

Module Programme	N	Range	Min	Max	Mean	Std. Deviation
MEng Civil Engineering	77	81	74	155	120	12
BSc Construction Engineering Management	30	73	69	142	119	14
BSc Architectural Engineering and Design Management	39	78	82	160	124	17
BSc Commercial Management and Quantity Survey	38	93	51	144	116	16

Table 2: Correlations for Different Construction Programmes with Total Emotional Intelligence

Variables	CE	CEM	CMQS	AEDM	Total Score
CE	--	-3.74**	-.433**	-.440**	0.19
CEM	--	--	-.225**	-.229**	-.022
CMQS	--	--	--	-.265**	-.139
AEDM	--	--	--	--	.135
Total Score	--	--	--	--	--

** Correlation is significant at the 0.01 level (2-tailed).

a. Listwise N=184

As the SSRI questionnaire does not have a norm or international benchmark, it is not possible to state how 'high' and 'low' level of EI of construction students obtained in the UK. However, by comparing these scores with the findings of previous EI research which also adopted SSRI measure, this provides a relative indication of the EI level of the participating construction students. In previous studies, the SSRI have been used for measuring EI of diverse group of people, including therapists, prisoners, clients in a substance abuse treatment programme, adolescents and construction management postgraduates etc (see Schutte *et al.* 1998; Petrides and Furnham 2000; Ciarrochi *et al.* 2001; Zeidner *et al.* 2005; Mo and Dainty 2007). The average score obtained from these previous studies range from 120 (S.D. = 18) for prisoners to 135 (S.D. = 20) for therapists. Women are generally found to score significantly higher (M= 131, S.D. = 15) than men (M= 125, S.D. = 17). Based on this dataset, it could be tentatively suggested that UK construction students' EI is not well developed in comparison to other professional and societal groups, as the average EI score of the participating students were close to the minimum EI scores obtained from these previous studies. This result is consistent with previous research by Chinowsky and Brown (2004), who investigated the EI of US civil engineering students. They found

that the EI development of civil engineering students lags well behind their comparison sample (liberal arts students).

The results also suggest that there is a relationship between EI score and different construction disciplines although the differences are not statistically significant (see Table 2). For example, students who study in AEDM are apparently have higher EI score (M= 124; S.D. =17) than those students under the CMQS programmes (M= 116; S.D. =16). A possible explanation may be the nature of the modules studied on each of these programmes. For example, the AEDM programme is primarily focused on the building design process and includes modules such as architectural drawing and representation, building design, building services and construction technology; as well as construction project activities such as management, contract administration and construction economics. These arts-related and management-oriented modules arguably provide students with more emotional competency input. For example, they need to consider both aesthetic and human factors when they design the building, which may indirectly develop their emotional awareness. The CMQS contains a primarily technology and construction law and commercial management focused curriculum. The technology and law modules both have been shown not to promote EI development amongst construction postgraduates (Mo and Dainty, 2007).

It is notable and somewhat surprising that both CE and CEM students reveal the same EI score. From the programme structure point of view, the CEM curricula combine engineering, technology, construction techniques and management modules. It aims to strike a balance between the engineering and management/business aspects of the industry. And the management curricula, generally containing more EI components, are found to have a positive impact on students' EI enhancement (Mo and Dainty 2007). The CE programmes are based on a foundation of mathematic and science and contain little in the way of managerial input. Indeed, it has been noted by others that civil engineering has traditionally developed students with strong technical and analytical skill, but less attention has been paid to their soft skill development (Bakos 1997; Hecker 1997). Although reasons for this phenomenon are unclear, it would be beneficial to explore the factors that affect the EI growth in order to understand why such different programmes yield such similar outcomes.

WHAT DOES THIS MEAN FOR CONSTRUCTION EDUCATION?

The results have revealed that, whilst educational programmes do not seem to have a significant influence on the EI of construction undergraduates, the overall EI levels of such students is lower in comparison to other professions and societal groups. There is thus a clear need to improve construction undergraduates' EI in order to prepare the next generation of students for effective engagement in the construction profession in the today, or in the near future. Chinowsky and Brown (2004) suggested that a lack of EI growth would directly affect educational development and professional preparedness. They especially pointed out that students with inadequately developed EI will lack of problem solving capabilities as well as other professional attributes such as leadership, communication skills, creativity and an understanding of the external variables impacting upon their business. More recently, the Engineering Accreditation Criteria by ABET (ABET 2005) and the Report for Engineer of 2020 (NAE 2005) also reflected a desire to produce engineers not only with technical competence but also a broader array of professional skills than the traditional curricula seek to develop. Theses skills include an ability to think across disciplines; team working; and social and environmental awareness.

Addressing the low levels of EI relies upon integrating EI enhancing modules into construction education from the beginning. Proponents of EI claim that, unlike academic intelligence, EI is highly malleable. This means individuals who have generally low emotional competencies are able to train to have higher "EQs" (Goleman 1995; Sala 2000). Given the trainability of EI, many corporations are selecting managers based on their EI quotient (Goleman 1998; Matthews *et al.* 2006). Hence, it would be highly beneficial for both educators and students to aware of the importance of EI and to systematic take plan to develop students or themselves with sufficient EI. However, as Chinowsky and Brown (2004) suggested, introducing EI into construction education too late could result in graduates' ability to draw on alternative intelligences being hampered by previously developed problem solving patterns based on a highly analytical focus.

Industry involvement can be an effective way to enhance graduates' EI by inviting construction professionals to guest lecture on the areas of how to make good use of EI skills in their workplace. By allowing the industry speaker to discuss how they develop and apply their emotional competencies into real case studies, students could gain better insights into the challenges that they would face in the future and identify possible solutions to such problems. Such inputs effectively provide students with an opportunity to reassess the professional skills they possess now and to identify their strength and weakness in order to fully prepare to enter their future professions. Another good way to improve students' EI is to provide work opportunities for students, so that they will personally experience the emotional problems that could happen in the workplace and gain more hands-on experiences. Industrial placements are thus excellent mechanisms that can enable students to hone their EI skills. As Sternberg (1997) indicated, when students are challenged to achieve outside of their established foundations, then their interest and curiosity will be enhanced which, in turn, improves their emotional intelligence.

CONCLUSIONS AND FURTHER RESEARCH

Over the last decade, construction education has been subject to continuous calls for change and reform. A number of reports and studies have made recommendations as to how it might respond to the needs of industry (e.g. NSF 1995; ABET 2005; NAE 2005). Construction education currently faces many challenges to expand their role to provide both technical learning as well as training to its students in EI skills. There is increasing acknowledgement that EI is crucial to both construction education and construction professional's future effectiveness and success. This paper has examined the concept of Emotional Intelligence and investigated the EI level of large cohort of undergraduates from a range of construction disciplines, including CE, CEM, AEDM and CMQS. The results reveal that, although there are not significant differences between the various cohorts of students, the current construction education does not currently develop students' EI to a high level relative to other professions. Some feasible recommendations have been put forward regarding to enhance students' EI in the future. These include integrating EI into construction education from the outset of construction programmes; encouraging construction industry involvement in construction education and encouraging students active undertake work placement to get hands-on EI experience.

The research presented in this paper is based on the early stages of a larger research project investigating how well construction education programmes develop students' Emotional Intelligence and how these competencies are employed in their early

careers in the industry. Later stages of this research will involve investigating the impact that EI has on both students' and construction professionals' performance and behaviours in terms of their different roles, positions and work experience. These insights will provide in-depth knowledge on the impacts of various stages of the education process (especially the industrial placement period) and the practical application of EI in the construction industry.

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