

THE INTEGRATION OF DIPLOMATS AND GRADUATES INTO THE CONSTRUCTION INDUSTRY: A PILOT SOUTH AFRICAN STUDY

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Tertiary construction management programmes are challenged in terms of producing diplomates, and graduates that are deemed suitable by employers and the built environment in general. However, employers and the built environment are also challenged as they have a complementary role to play. Tertiary education transfers knowledge and develops skills to a degree. Experiential training, internship, and the education of diplomates and graduates further develop skills. Consequently, employers fulfil a critical role and need to mentor, and integrate students, diplomates, and graduates into their organisations and the overall built environment. A study currently being conducted among members of a regional employer association to determine perceptions, and to provide feedback relative to diplomates and graduates, provides the basis for the paper. The following are reported on: the importance of competencies relative to subject streams and the rating of diplomates and graduates relative thereto; the importance of competencies relative to the nine functions in an organisation and the rating of diplomates and graduates relative thereto; and the importance of competencies relative to the functions of management work and the rating of diplomates and graduates relative thereto.

Keywords: **construction management, diplomates, employers, graduates, South Africa**

BACKGROUND

The Confederation of British Industry (CBI) (2008) states that when considering graduates for employment, employers seek a positive attitude, and wider employability skills needed in the workplace. The report reveals that executives rank positive attitude and employability skills at the top of their demands. These employability skills, *inter-alia*, include:

- Self-management - readiness to accept responsibility and improve performance, flexibility, time management;

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- Team working - respecting others, co-operating, persuading, and contributing to discussions;
- Business and customer awareness – a basic understanding of the key drivers for business success and the need to satisfy the customer, and
- Problem solving – analysing facts, issues, and applying creative thinking to develop appropriate solutions.

This report therefore reinforced the significance of surface competencies in the form of knowledge and skills with respect to the practice of construction management. Smallwood (2006) contends that subject areas in the construction management domain reflect the focus at three respective levels of management: top, which is the management of the business of construction; middle, which is the management of a number of projects, and operational, which is the management of specific projects. As a result, tertiary construction management programmes are tailored to produce diplomates and graduates that are deemed suitable by employers and the built environment in general.

However, the education of students has continued to challenge both academia and the industry. The need to address aspects of these challenges in the South African context forms the basis of this paper. More so, Scott and Fortune (2009) reveal that there is a growing interest in the quality of students' learning experience, as there appears to be willingness to effect changes to current approaches. The overall objective of this study was therefore to ascertain the perceptions related to the performance of diplomates and graduates that are produced by a South African university for the benefit of the industry locally, and beyond. The initiative was embarked upon in order to secure responses to the following questions:

- Why diplomates are more highly regarded than graduates by employers?
- How long employers have worked with diplomates and graduates?
- What are the employers' defining experiences when working with diplomates and graduates?
- Is the balance between education / training of diplomates and graduates a key factor responsible for their performance in the work place?

Skills Required for the Practice of Construction Management

Given that the environment within which construction management is practiced is not stagnant, the debate about the content of construction management programmes and employers' expectations of construction graduates' performance has been ongoing for a while. In 1999, Davies, Csete and Poon (1999) published the findings of an empirical study conducted among construction graduates of The Hong Kong Polytechnic University and their employers. The empirical study was quantitative in nature because the use of a questionnaire described the development and testing of a paired graduate and employers' satisfaction in order to determine the development of general skills by graduates from professionally accredited construction degree programmes.

The survey revealed that graduates and employers from the population surveyed largely agreed on the importance of a set of general skills required by graduates. Such skills include computer literacy, collect and interpret information, lead others effectively, accept responsibility, recognise and respond to environmental concerns, exercise professional judgement, possess professional knowledge, and cope with

changing work environment, among others (Davies *et al.* 1999). However, comments from the employers and graduates indicated the need for additional skills in the form of problem solving skills, specialist technical skills, and the ability to conduct 'hands-on' training.

Furthermore, a survey conducted among graduates of the civil engineering programme at the Zagreb University, Croatia, between 1955 and 1985, determined the most important knowledge and skills for a construction manager (Katavic, Matic and Ceric, 2005). These include: command of technical knowledge and professional skills; responsibility towards the employees and the organisation; ability to organise and coordinate work; ability to establish good interpersonal relations; ability to contract work; ability to ensure quality control; ability to forecast; knowledge of economic business analyses; ability to manage employees; and ability to control cost (Katavic *et al.* 2005).

The nine recognised functions in an organisation thus provide further insight with respect to the knowledge and skills required by construction managers. According to Smallwood (2006), the nine functions may not be limited to general management; production; procurement; marketing; financial; human resources; public relations; legal, and administration as well as information technology. Because the organisational structures of contracting firms and related entities depend on these functions, it can be argued that successful management of the business of construction, which is not unrelated to the management of projects, is dependent upon the effective integration of these functions (Smallwood, 2006).

Also important in terms of the practice of construction management is the ability to execute projects using the functions of management work. The functions of management work in the form of planning, organising, leading, and controlling are vital for the ability to develop forecasting, programming and scheduling competencies, ability to delegate and develop relationships, communication and decision making abilities; and performance evaluation competencies (Allen, 1973 cited in Smallwood, 2006).

A Brief History of Construction Management Education in South Africa

In South Africa, degree courses in building management commenced in 1962 following the efforts of far sighted construction industry personalities. Foreseeing the future demands that the South African construction industry would be subjected as a result of increasing complexities pertaining to technology and business practices, the National Development Fund for the building industry was established in order to facilitate the start-up of degree programmes in South Africa. Administered by the Building Industries Federation South Africa (BIFSA), the fund assisted in establishing construction management university degree courses and also provided bursaries for students. Today, Chartered Institute of Building (CIOB) accredited BSc construction management programmes are offered at the University of Cape Town, the Nelson Mandela Metropolitan University, University of Pretoria, University of the Free State, and the University of the Witwatersrand.

RESEARCH METHOD

The sample stratum was purposively compiled. Purposive sampling refers to a non probabilistic or random selection of respondents for a study (Springer, 2010). The general contractors (GCs) surveyed were members of a regional employer association – East Cape Master Builders Association (ECMBA). The ECMBA was chosen as the

sampling population because of the role the association played when the programmes commenced at the then Port Elizabeth Technikon and the University of Port Elizabeth, but now collectively the Nelson Mandela Metropolitan University. As the primary employer association in the region, the association has continued to play important advisory roles pertaining to module development and other aspects at the department in Port Elizabeth.

The GCs that were contacted had employed construction management diplomates, and / or graduates at one time or the other. Given the relative small size of the city, only nine (9) GCs were eligible to take part in the pilot study. The GCs were surveyed per e-mail using a structured questionnaire consisting of seven principal questions and a number of sub-questions. The seven questions were close ended. Six of the seven close ended questions were five-point Likert scale type questions, which also included an 'unsure' as well as a 'not applicable' response option. The 9 responses were included in the analysis of the data using MS Excel to compute descriptive statistics, namely a measure of central tendency in the form of a mean score (MS).

The aforementioned explanations suggest that although the research design was qualitative, the primary data was collected quantitatively. This was in line with the intent of the pilot study, which was to reveal perceptions relative to diplomates and graduates produced by a particular university for the benefit of the members of a regional employer association. In effect, the findings of this preliminary study can be considered to be limited by the sample size and the number of respondents.

RESULTS

Respondents that took part in the study indicate that 6 firms have employed, while 2 firms are currently employing National Diploma Building diplomates from the university. 5 of the GCs also affirmed their willingness to employ diplomates from the institution. However, none of the firms were willing to employ BSc (Construction Studies) graduates from the university. Perhaps, this is because none of the GC firms has a BSc graduate in its employ, or because only 2 firms have employed them in the past.

It can also be observed that 4 respondents were willing to employ BTech Construction Management graduates from the university, while 3 of the firms had employed such graduates in the past, although only 1 firm is currently employing a BTech graduate from the university. It is notable that only 1 of the GCs had previously employed a BSc (Hons) Construction Management graduate from the university, while none of them is either currently or willing to employ BSc (Hons) graduates in their firms.

When asked to rate how important subject streams / subjects such as construction business environment, construction economics, construction law, construction science, construction technology, management practices, among others are for diplomates and graduates of the programmes listed in Table 2 based on a 5 point Likert scale, the respondents generally indicate 'a more than important' level for the subjects. Given that the scale ranged from 1 (not important); 2 (less than important); 3 (important); 4 (more than important), to 5 (very important), mean scores were computed for each subject stream / subject.

Concerning the National Diploma Building programme, the respondents rated the importance of construction technology as well as management principles, theories and practices more important than the other listed subject streams. The respondents also rated construction technology, management principles, theories, and practices,

construction science and construction law, to be more than important or very important for the BTech Construction Management programme. With the exception of research methodology, the ratings of subject streams indicated by the GCs concerning the BSc programmes seem to be more than important / very important. Furthermore, it is notable that with the exception of construction science, construction technology, and research methodology, the mean scores relative to the BSc programmes are higher than those for the Diploma / BTech programmes.

Table 1: Diplomates and Graduates in the employ of the respondents

Programme	Response (No.)								
	Has			Currently			Willing		
	Unsure	No	Yes	Unsure	No	Yes	Unsure	No	Yes
Diploma / BTech programmes:									
ND (Building)	0	2	6	0	5	2	1	2	5
BTech (Constr Man)	0	3	3	0	5	1	0	2	4
BSc programmes:									
BSc (Constr Studies)	0	3	2	0	5	0	1	4	0
BSc (Hons) (Constr Man)	0	4	1	0	5	0	1	4	0

Table 2 Respondents' ratings of the importance of subject streams / subjects

Programme	Subject stream / Subject (Mean score)							
	Construction business environment	Construction economics	Construction law	Construction science	Construction technology	Management principles & practices	Project management	Research methodology
Diploma / BTech programmes:								
ND (Building)	3.63	3.28	3.13	3.88	4.60	4.00	3.88	2.29
BTech (Constr Man)	3.83	3.71	4.14	4.43	4.71	4.57	3.86	2.67
BSc programmes:								
BSc (Constr Studies)	4.25	4.50	4.50	5.00	5.00	4.75	3.75	3.25
BSc (Hons) (Constr Man)	5.00	5.00	5.00	4.00	4.00	5.00	4.75	3.25

The GCs were then requested to rate the adequacy of diplomates and graduates from the programmes in terms of the adequacy of their preparation by tertiary education relative to the listed subject streams. The GCs were asked to make use of a scale of: 1 (most inadequate); 2 (inadequate); 3 (near adequate); 4 (adequate), and 5 (most

adequate). They were equally given the option of selecting an ‘unsure’ or ‘not applicable’. N/R in the table indicates a ‘no response.’

In this context, Table 3 shows that only construction technology, construction science and research methodology were perceived to be near adequate or adequate by the GCs concerning the National Diploma Building programme. However, in the BTech programme, the GCs were of the opinion that construction technology, research methodology, management principles, theories and practice, construction science, construction law, and project management can be considered to be near adequate or adequate. It is notable that majority of the GCs failed to indicate their perceptions concerning the adequacy of BSc programmes.

Perhaps, this may be as a result of the fact that they do not have such graduates in their employ as indicated in Table 1. However, the few GCs that expressed their opinions indicate that construction technology and construction science may be deemed adequate. The importance of required knowledge and skills to the accomplishment of both project and business objectives for GCs cannot be overemphasised. Therefore, the GCs were requested to rate ‘how important’ competencies related to knowledge and skills are, in terms of functions in a contracting organisation for construction management diplomates and graduates. The scale used in the questioned ranged from: 1 (not important); 2 (less than important); 3 (important); 4 (more than important), and 5 (very important). The ‘unsure and not applicable’ options were provided in the scale of measurement.

Table 3 Respondents’ ratings of the adequacy of diplomates and graduates relative to subject streams / subjects

Programme	Subject stream / Subject (Mean score)							
	Construction business environment	Construction economics	Construction law	Construction science	Construction technology	Management principles & practices	Project management	Research methodology
Diploma / BTech programmes:								
ND (Bdg)	2.67	2.86	2.29	3.00	3.29	2.71	3.17	3.00
BTech (Constr Man)	2.33	2.75	3.50	3.67	4.00	3.75	3.25	4.00
BSc programmes:								
BSc (Constr Studies)	2.00	3.50	4.00	4.00	4.00	3.50	3.50	N/R
BSc (Hons) (Constr Man)	N/R	4.00	4.00	N/R	4.00	4.00	N/R	N/R

In Table 4 it can be observed that the GCs opined that production, purchasing and general management constitute the functions that can be deemed to be either important or more than important for Building diplomates; while all the functions, apart from marketing and public relations were perceived to be important for BTech graduates. In the BSc programmes, the GCs ratings ranged from important to very important for both programmes.

Using a scale of: 1 (very poor); 2 (poor); 3 (average); 4 (good), and 5 (excellent), the GCs were then asked to rate diplomates and graduates of the construction management programmes in terms of their competencies (knowledge and skills) when engaged in contracting organisational functions (Table 5).

Table 4 Respondents' ratings of the importance of organisational functions

Programme	Function (Mean score)								
	General management	Administration and IT	Financial	Human resources	Legal	Marketing	Production	Public relations	Purchasing
Diploma / BTech programmes:									
ND (Building)	4.00	3.67	3.56	3.33	3.33	2.33	4.44	3.33	4.11
BTech (Constr Man)	4.29	4.00	4.14	4.14	4.14	3.14	4.29	3.86	4.43
BSc programmes:									
BSc (Constr Studies)	4.40	4.40	4.40	4.20	4.40	3.80	4.20	4.40	4.60
BSc (Hons) (Constr Man)	4.60	4.80	4.80	4.40	4.80	4.40	4.00	4.80	4.60

'Unsure' and 'not applicable' options were also provided in this instance. The GCs rated the competencies of the diplomates when fulfilling organisational functions lower than that of graduates. In particular, their rating of the competencies of BSc programme graduates was between average and good for the honours programme and average for the BSc (Construction Studies) programme. The GCs' rating apportioned to the general management competency of BTech graduates predominated among the ratings related to the diploma and BTech programmes.

Table 5 Ratings of the competencies of diplomates and graduates relative to organisational functions

Programme	Organisation function (Mean score)								
	General management	Administration and IT	Financial	Human resources	Legal	Marketing	Production	Public relations	Purchasing
Diploma / BTech programmes:									
ND (Bdg)	2.71	3.00	2.43	2.50	2.43	2.14	3.14	3.00	2.71
BTech (Constr Man)	3.50	3.00	3.00	3.00	2.75	2.25	3.25	2.75	2.75
BSc programmes:									
BSc (Constr Studies)	4.00	3.50	3.50	3.50	3.50	3.00	3.50	3.00	4.00
BSc (Hons) (Constr Man)	4.00	3.00	4.00	4.00	4.00	4.00	4.00	N/R	3.00

In addition, using a scale of: 1 (not important); 2 (less than important); 3 (important); 4 (more than important), and 5 (very important), the GCs were asked to rate ‘how important’ skills relative to the five functions of management work (planning, organising, leading, controlling and coordinating) are in terms of the overall management of standard resources in construction in the form of finance, information, labour, materials, plant and equipment, and subcontractors for diplomates and graduates of the construction management programmes. As indicated in Table 6, the GCs were of the opinion that the principal functions of management work in the form of planning, organising, leading, controlling and coordinating are either more than important or very important to the programmes. It is notable that the BSc programmes did not record a MS less than 4.20, which indicates a more than important / very important rating. However, the ratings of skills of diplomates and BTech graduates did not mirror the importance levels attached to these functions as indicated in Table 7. Table 7 indicates how the GCs rated diplomates and graduates of the construction management programmes in terms of their skills relative to the respective functions of management work concerning their overall management of standard resources in construction. The ratings, which are based on a scale of: 1 (very poor); 2 (poor); 3 (average); 4 (good), and 5 (excellent), suggest that the skills of graduates of BSc programmes were perceived to be either average or good, while that of diploma / BTech programmes were perceived to be either average or poor.

Table 6 Ratings of the importance of the functions of management work

Programme	Function of management work (Mean score)				
	Planning	Organising	Leading	Controlling	Coordinating
Diploma / BTech programmes:					
ND (Building)	4.44	4.22	4.33	4.44	4.11
BTech (Constr Man)	4.71	4.57	4.11	4.43	4.57
BSc programmes:					
BSc (Constr Studies)	5.00	4.83	4.83	4.83	4.67
BSc (Hons) (Constr Man)	5.00	4.83	4.83	4.83	4.67

Table 7 Ratings of skills relative to the respective functions of management work

Programme	Function of management work (Mean score)				
	Planning	Organising	Leading	Controlling	Coordinating
Diploma / BTech programmes:					
ND (Building)	2.86	3.00	3.00	3.14	2.57
BTech (Constr Man)	3.00	2.75	3.00	3.00	3.25
BSc programmes:					
BSc (Constr Studies)	3.50	3.50	3.50	3.50	4.00
BSc (Hons) (Constr Man)	4.00	4.00	4.00	4.00	4.00

DISCUSSION

It can be observed that the 9 GCs have employed diplomates, while only 3 of them employed BSc graduates from the university in the past. In addition, while none of the GCs are currently employing or willing to employ BSc graduates, all of the GCs were willing to employ diplomates from the university. Clearly, it can be argued that the perceptions of the respondents related to diplomates can be regarded as credible, while those pertaining to graduates may be less credible. In this context, the findings amplify the importance of certain subject streams in construction management education concerning diplomates. It can be observed that the respondents' ratings revolved around subject streams that include construction technology, construction

science, and management principles, theories, and practice. However, there appears to be a noticeable gap between the importance and the adequacy expressed by the GCs.

It is vital to address this perceived gap, since the industry opinion is that the performance of construction management graduates is inadequate in almost every learning outcome in comparison to the importance thereof (Rawlins and Marasini, 2011). The gap analysis between importance and performance of learning outcomes includes, *inter-alia*: demonstrate a critical approach to project and site management; knowledge and skills relating to construction technology; knowledge of the importance of key issues in construction; and knowledge of key concepts and theory, show that communication, management of relationships (people skills), leadership, evaluative judgements (problem solving), and team work, are the areas with the biggest gap. Even in the Alaskan construction industry in the United States of America (USA), the top construction management skills required pertain to oral and written communication; planning and scheduling; estimating; project administration and management; and decision making abilities in terms of alternatives, cost / benefit ratio, return on investment and net present value (Gunderson, Ra, Schroeder and Holland, 2002).

Therefore, it can be argued that the findings of the study pertaining to diplomates are not at variance with the findings of the study conducted in the UK by Rawlins and Marasini (2011). In effect, it would seem that the performance of construction management diplomates is not satisfactory to industry stakeholders in terms of knowledge and skills. As indicated in Table 4 and Table 5, there is a manifest gap between importance and performance of diplomates in terms of the ability to make use of learning outcomes in fulfilling functions in a contracting organisation. The human resources, legal, marketing, and public relations functions have the biggest gap. Because skills such as negotiation, leadership, teamwork, business writing and communication remain a priority among employers in the local and global contexts (Souder and Dennis, 2006), it is pertinent for the university to address the abovementioned gaps.

CONCLUSIONS

Because tertiary construction management programmes are challenged in terms of producing diplomates, and graduates that are deemed suitable by employers and the built environment in general, this study was initiated in order to determine perceptions, and to provide feedback relative to the performance of diplomates and graduates of a South African university in the work place.

Although the GCs that were purposively surveyed indicated that subject streams / subjects that constitute part of the construction management curricula in the four programmes offered at the university are important for diplomates and graduates, they however differ on the adequacy of the subjects. In particular, the GCs were of the opinion that there is major scope for improving the competencies of diploma and BTech programme graduates with respect to the ability to carry out the function of a contracting organisation. The GCs also observed that the skills of diploma and BTech graduates in terms of the planning, organising, leading, controlling, and coordinating functions of management work should be improved. Perhaps, their perceptions were focused on the diplomates because the surveyed GCs can be said to have not interacted with graduates of the BSc programmes from the university. Essentially, the

findings of the study can be regarded as a starting point for an in-depth study that should include a detailed list of employers of the construction management graduates from the university nationally and internationally.

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