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From theory to practice: Students' perceptions of co-operative construction education experiences

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Abstract

This article reports on the findings of a study that examined the attitudes of students at higher education institutions regarding their experiences of transferring theory to the workplace. Employers in the construction industry contend that present construction-related academic programs inadequately prepare students for their future careers in the industry. It is argued that higher education institutions have given students too little that will be of real value beyond a credential that will help them get their first jobs. The opinions of first year students were surveyed before, and third and final year students after, their practical periods of employment in construction. The study concludes that all the co-operative part-ners in co-operative education can do much more to improve this approach to construction education in job-training.

Keywords: Cooperative education, experiential training, practical experience, on-the-job training.

VAN TEORIE TOT PRAKTYK: STUDENTE SE PERSEPSIES VAN HUL ERVARING VAN KOÖPERATIEWE KONSTRUKSIE-ONDERRIG

In dié artikel word die bevindinge van navorsing oor die houdings van studente jeens hoëronderwysinrigtings weergegee, veral ten opsigte van hul ervaring van die oordrag van teorie na die werkplek. Werkgewers in die konstruksiebedryf wys daarop dat die huidige konstruksie-verwante akademiese programme die studente nie voldoende voorberei vir hul toekomstige loopbane in die bedryf nie. Daar word van die standpunt uitgegaan dat hoëronderwysinstellings studente nie voorsien van dít wat werklik van waarde is nie, buiten as 'n toegang tot die eerste werksgeleenthede. Die menings van eerstejaar-studente is éérs bekom en daar-na dié van derdejaar- en finalejaarstudente, ná 'n praktiese dienstydperk in die bedryf. Die gevolgtrekking word gemaak dat alle deelnemende partye op die gebied van opvoedkundige samewerking heelwat meer kan doen om hierdie benadering tot konstruksie-onderrig te verbeter.

Sleutelwoorde: Opvoedkundige samewerking, praktyk-gerigte onderrig, praktiese ervaring.

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Introduction

Education has been described as all the ways in which people train and develop to fulfil their potential as a result of acquiring skills, attitudes, and values which reflect the social, cultural, and physical environments in which they live (Guillaud & Garnier, 2001). Higher education has as one of its objectives the preparation of persons to address emerging societal problems. Institutions of higher education have a major role to play in providing the technological and business capability to underpin modern industrial and services development (Frain, 1992). While maintaining the commitment to high academic standards, they also need to be committed to responding to the needs of industry both in course content and research. However, for some time academics and practitioners have recognized the need to balance the relationship between theory as taught in the classroom, and practice in the field or in the industry (Ross & Elechi, 2002). Several authors have highlighted that apart from course content relevant to job-related situations, there is the need for an appropriate teaching approach that bridges the perceived gap between formal academic instruction and on-the-job training (Kim, Williams & Dattilo, 2002; Sanyal, 1991; Ellington, Gordon & Fowlie, 1998; Schaafsma, 1996). This gap between what is taught in classrooms and what is needed in the workplace is well illustrated in *Table 1* adapted from Cook and Cook (1998).

Table 1: Traditional education versus workplace

	Traditional education	Workplace
Requirements	Facts	Problem solving
	Individual effort	Team skills
	Passing a test	Learning how to learn
	Achieving a grade	Continuous improvement
	Individual courses	Interdisciplinary knowledge
	Receive information	Interact and process information
	Teaching separate from learning	Technology

Source: Cook & Cook, 1998

Rather than relating the theory to the application that reinforces the basic concepts as taught in the classroom, the separation between practical and academic work results in a division in the mind of students. There are few studies, if any, that evaluate the relationship between construction theory as taught in the classroom and construction practice in the field from students' perspectives. In particular, there is very little published research on the effectiveness of the latter aspect. In attempting to respond to the concerns of whether students in the disciplines of construction management and quantity surveying are adequately

prepared for their future careers, this article reports on the findings of a study that examined the attitudes of students at higher education institutions regarding their experiences of transferring theory to the workplace.

Co-operative education

Co-operative education[1] is an educational model designed to achieve the objective of bridging the gap between the classroom and the workplace by incorporating productive work experiences into the curriculum as an integral and regular element of a higher education program. As such it involves three co-operative partners, namely the academic institution, the student, and the employer (Smith, 2000). It has been described as an instructional method that links classroom instruction and work for the purpose of enhancing the total educational program of students (Schaafsma, 1996). It is therefore evident that the co-operative education experience comprises two components, namely an academic component and an experiential learning component. During the latter component students experience a range of learning (knowledge, skills and attributes) that is a direct outcome from linking the specific experience in the workplace with the course content provided at a higher education institution. According to the School-to-Work (STW) Opportunities Act of 1994 in the United States, three components make up the STW experience. These are the school-based learning component (academic), the work-based learning component (practical) and the connecting activities component that facilitates effective relations between the academic institution and employers. The work-based learning component is also known as industrial placement or work placement. It is described as a period of time when students are located in workplaces with the purpose of learning on the job and might either be paid or unpaid (Schaafsma, 1996). As such it provides the underpinning knowledge and attributes of competence needed for the job as a whole, such as workplace culture, work norms and values. This particular approach provides opportunities for students to have direct hands-on experience as part of their course of study. In this way students are prepared for their future careers. They acquire valuable and specialized knowledge and skills by learning from experience and reflecting on that experience while becoming acquainted with the work processes (Hicks, 1996; Rainsbury *et al.*, 1998).

This form of experiential learning (L) may be expressed as the combination of three elements as follows:

$$P + Q + ER = L$$

[1] Also known as 'school-to-work', 'workbased learning', 'experiential learning', 'fieldwork', and 'practicum'.

Where P represents "programmed learning" or material presented in structured settings or programs such as the classroom; Q represents "questioning learning" or knowledge and skills gained via questioning, investigation and research; and ER represents "one's own experience" reflected upon and revised (Hicks, 1996).

Apart from co-operative education contributing to more effective learn-ing (Schaafsma, 1996) it also has the potential to be mutually beneficial to both students and employers (Frain, 1992). Employers benefit from having a significant influence on course design and content by ensuring that industry-specific knowledge, awareness and values are integrated into the higher education process. Students benefit from working as they experience at firsthand and come to understand the requirements of their chosen career. As they engage in the actual activities in the workplace they gain appreciation for the challenges of their particular job (Ross & Elechi, 2002). They are consequently better able to make informed decisions on their career choices. They also develop enhanced appreciation of concepts learnt in the classroom after applying knowledge in a professional setting (Gordon, Hage & McBride, 2001). This working or in-service period is often the students' first opportunity to apply theoretical, classroom-based knowledge in a practical work situation. They gain a more realistic view of how the work-ing world operates. Work experience is often a strong determining factor in whether or not students find employment. Co-operative education provides the opportunity for students to enhance their prospects of employment once they graduate (Frain, 1992). They are given the opportunity to demonstrate their abilities to prospective employers. Through this approach, they already have work experience at the moment of academic graduation. Students are introduced to the work ethic, and gain insight into the interpersonal skills needed to survive in the working world (Schaafsma, 1996). They see the opportunities for career development and personal growth that are open to them in their field of study.

The academic institution evaluates both components using feedback from students through academic evaluation programs, and feedback from employers through records of employment activities. Several authors have argued for a more inclusive and participatory approach to evaluation that includes the academic institution, the employer and the student (Hicks, 1996; Rainsbury *et al.*, 1998). The collaboration between the academic institution and employers emphasizes the connection between academic preparation and job requirements. It is argued that such a co-operative approach offers greater opportunities to blend academic and practical skills. A broad range of activities is required, therefore, to connect academic institutions and the modern

working environment. These activities provide program co-ordination and integration of the worlds of school and work.

Problem statement

Although students are expected to build connections between the theoretical knowledge they acquire in the classroom and the situation where they are to apply this knowledge (Kim, Williams & Dattilo, 2002), they are unfortunately not applying much of the knowledge they have gained to real world job-related situations. Consequently, their acquired knowledge may be inert and unavailable for use (Jonassen, Campbell & Davidson, 1994). Higher education institutions have given them too little that will be of real value beyond a credential that will help them get their first jobs (Boyer Commission, 1998).

Research

In South Africa, technikons offer programs in the disciplines of construction management and quantity surveying on the basis of co-operative education. The four-year Bachelor of Technology program is made up of three academic years spent full-time at the institution, with the second year spent working full-time in industry. During this 'experiential year' students complete projects in 3 subjects, namely Construction Management 2, Construction Technology 2 and Quantity Surveying 2. Students are also required to keep a logbook of all their work activities on a monthly basis. The logbook sets out the required activities that students are expected to experience. In order to return to the institution to complete the remaining two years, students have to obtain passing grades in each of these subjects as well as submit a duly completed logbook.

Sample selection

Between September and October 2002 students at the two technikons in the Western Cape province in the construction management and quantity surveying programs, namely Cape Technikon and Peninsula Technikon, were surveyed. A total of 107 first-year students and 66 third- and final-year students participated in the survey. The questionnaires were administered at the respective institutions during sessions when the students were receiving instruction. Consequently, the response rate was 100%. The responses to the questionnaires were analysed using the Statistical Program for the Social Services (SPSS).

Survey instrument

Two short questionnaires were developed, namely one for students in their first year who were about to work in industry during their next year,

and the other for returning students who had completed their "experiential year". The objective of the first-year questionnaire was to measure the attitude of students about the content of the first-year subject offerings and their relevance to their experiential year. It also sought to establish their expectations before the experiential year commenced. The objective of the other questionnaire was to obtain the opinions of students after the experiential year. The questionnaires comprised ten and 16 open and close-ended ('yes', 'no' and 'not sure') questions respectively. Some questions used a 5-point Likert scale to determine the degree of sentiment expressed in the response. The strength of close-ended questions is that they foster uniformity in response due to the limitation of the number of possible responses. On the other hand, open-ended questions provide the possibility of rich contextual information being collected in a manner not possible with close-ended questions (Fellows & Liu, 1997).

Findings

The responses to each questionnaire are reported for the entire sample and per discipline.

First-year students survey

The sample comprised 107 first year students, namely 60 (56,1%) from Cape Technikon and 47 (43,9%) from Peninsula Technikon. Of those who responded, there were 59 (60,2%) students studying quantity surveying (QS), and 39 (39,8%) studying construction management (CM) – 9 students failed to respond to this question.

First-year course content expectations

There was generally a favourable attitude towards the first-year course content. From *Table 2*, it is evident that 80 students (75,5%) felt that the first-year course content was what they expected it to be when they applied for admission; fifteen students (14,2%) felt that it was not, and the remaining eleven students (10,3%) were not sure.

Table 2: Expectations of first-year course content

Answers	Frequency	Valid percentage
Yes	80	75,5
No	15	14,2
Not sure	11	10,4
Total	**106**	**100,0**

Table 3: Cross tabulation of expectations of first-year course content

Response		CM	QS
Yes	Is the course content what you expect it to be when you applied for admission?	43,8%	56,2%
	% within discipline	84,2%	69,5%
	% of total	33,0%	42,3%
No	Is the course content what you expected it to be when you applied for admission?	15,4%	84,6%
	% within discipline	5,3%	18,6%
	% of total	2,1%	11,3%
Not sure	Is the course content what you expected it to be when you applied for admission?	36,4%	63,6%
	% within discipline	10,5%	11,9%
	% of total	4,1%	7,2%

Table 3 shows the split between the quantity surveying and construction management disciplines.Of those who felt that the content of the first-year program was what they expected it to be, 43,8% were studying CM and 56,2% were studying QS. Of those studying construction management 84,2% felt the course content was what they expected. On the other hand, 69,5% of those studying quantity surveying felt this way. Reasons given why students felt that the course content was what they expected included:

- Subjects were based on and related to industry (17,3%)
- Knew and expected course to be intense, tough and relevant (10,2%)
- Had worked in and knew construction and therefore knew what to expect (7,1%)
- Researched program before starting studies (15,3%), and
- Provided information as expected (13,3%).

Reasons why they thought the course content was not what they expected included:

- Not all subjects were what I expected or relevant (9,2%)
- Thought it would be simple and not so difficult (7,1%)
- Expected more practicals (3,1%), and
- I did not expect it to be so academic (1,0%).

Relevance and responsiveness of first-year courses to industry needs

Most students had a favourable attitude about both the relevance of the subjects offered for the course as well as their responsiveness to the needs of the construction industry. It is evident from the data in *Table 4* that 96 students (90,6%) believed that the subjects offered were relevant and responsive to the needs of the industry.

Table 4: Relevance and responsiveness of course

Answers	Frequency	Valid percentage
Yes	96	90,6
No	5	4,7
Not sure	5	4,7
Total	**106**	**100,0**

The data in *Table 5* shows the responses per discipline. Of those who felt that the subjects offered were relevant and responsive, 41,4% were studying CM and 58,6% were studying QS. Of the CM students, 94,7% and of the QS students, 86,4% had favourable attitudes.

Table 5: Cross tabulation of relevance and responsiveness of course per discipline

Response		CM	QS
Yes	Do you think the subjects offered for the course are relevant and responsive to the needs of the construction industry?	41,4%	58,6%
	% within discipline	94,7%	86,4%
	% of total	37,1%	52,6%
No	Do you think the subjects offered for the course are relevant and responsive to the needs of the construction industry?	-	100,0%
	% within discipline	-	8,5%
	% of total	-	5,2%
Not sure	Do you think the subjects offered for the course are relevant and responsive to the needs of the construction industry?	40,0%	60,0%
	% within discipline	5,3%	5,1%
	% of total	2,1%	3,1%

Reasons given why students felt that the course content was relevant and responsive to the needs of construction included:

- Subjects provide insight into the industry (9,3%)
- Class work relates to the industry (55,7%)
- Subjects are adequate at year 1 and basic and relevant to the industry (13,4%)
- Worked in industry before studying (2,1%).

Reasons why they thought the course content was not relevant and responsive included:

- Some subjects were either irrelevant or needed more time and/or better teaching (12,4%), and
- Some more subjects needed to be added to improve the course (2,1%).

Satisfaction regarding subjects offered for the course

The majority of students expressed satisfaction with the subjects that they had been offered during their first year. From *Table 6* it is evident that 74 students (69,2%) were satisfied with the subjects offered while 21 students (19,6%) were not.

Table 6: Satisfaction regarding subjects offered during first year

Answers	Frequency	Valid percentage
Yes	74	69,2
No	21	19,6
Not sure	12	11,2
Total	**107**	**100,0**

Of those who were satisfied with the subjects offered during first year, 37,9% was studying CM and 62,1% was studying QS. Of the CM students, 64,1%, and of the QS students, 69,5%, had favourable attitudes, suggesting that a significant number of students in each discipline were either not satisfied with the offerings or were not sure. The responses are shown in *Table 7*.

Table 7: Cross-tabulation of satisfaction regarding subjects offered per discipline

Response		CM	QS
Yes	Are you satisfied with the subjects you have been offered for the course?	37,9%	62,1%
	% within discipline	64,1%	69,5%
	% of total	25,5%	41,8%
No	Are you satisfied with the subjects you have been offered for the course?	42,9%	57,1%
	% within discipline	23,1%	20,3%
	% of total	9,2%	12,2%
Not sure	Are you satisfied with the subjects you have been offered for the course?	45,5%	54,5%
	% within discipline	12,8%	10,2%
	% of total	5,1%	6,1%

Reasons given why students were satisfied with the subjects offered during first year:

- Based on experience (of first year) subjects are OK and relevant (34,8%)
- Challenging but fair (4,3%)
- Lots of practical exposure provided (2,2%)
- Increases understanding of the industry (3,3%)
- Something I just needed to do (2,2%)
- Beneficial for future profession (7,6%).

Reasons why students were not satisfied with the subjects offered during first year included:

- Not all subjects are relevant; some were disorganized and others needed more [instruction] time (22,8%), and
- Subjects are fine but lecturers are not (5,4%).

Those students who were not sure about whether they were satisfied or not with the subjects offered indicated that they:

- (Were) not sure of what to expect on site (2,2%)
- Could not comment/not sure (4,3%).

Course as preparation for year 2

Most students felt that the first-year course prepared them sufficiently for year 2. The data in *Table 8* indicate that 72 students (68,6%) thought that the course prepared them adequately for their second year – the experiential/in-service year. On the other hand, 20 students (19,0%) were not sure whether this was so or not.

Table 8: Course as preparation for year 2

Answers	Frequency	Valid percentage
Yes	72	68,6
No	13	12,4
Not sure	20	19,0
Total	**105**	**100,0**

Of those who felt that the first-year course prepared them adequately for year two, 33,8% were studying CM, and 66,2% were studying QS. Of the CM students, 57, 9% and of the QS students, 74, 1% had favourable attitudes, suggesting that a significant number of students in each discipline were either not satisfied with the offerings or were not sure. The responses are shown in *Table 9*.

Reasons given why students thought the first year course prepared them sufficiently for year 2:

- Theory prepares one for practical (51, 1 %)
- Provides [the] basics for industry experience [although] the industry is broad (10,2%)
- Provided you worked throughout the year (1, 1 %).

Reasons why students thought the first-year course did not prepare them sufficiently for year 2:

- Some subjects don't have assignments/practicals (10,2%)
- Year 1 too short (2,3%)
- Need to work with real materials in workshop sessions (2,3%)
- Some lecturers do not know their subjects [well enough] to prepare us (3,4%).

Table 9: Cross tabulation of course as preparation for year 2 per discipline

Response		CM	QS
Yes	Do you think the course is preparing you sufficiently for year 2?	33,8%	66,2%
	% within discipline	57,9%	74,1%
	% of total	22,9%	44,8%
No	Do you think the course is preparing you sufficiently for year 2?	50,0%	50,0%
	% within discipline	15,8%	10,3%
	% of total	6,3%	6,3%
Not sure	Do you think the course is preparing you sufficiently for year 2?	52,6%	47,4%
	% within discipline	26,3%	15,5%
	% of total	10,4%	9,4%

Those students who were not sure whether the first year course prepared them sufficiently for year 2 or not indicated that they:

- Did not know what to expect from in-service training (11,4%), and
- Did not understand initially and might not be ready (2,3%).

Academic or practical nature of first-year course

Opinions were more divided with respect to whether students felt that the course was too academic and less practical. From *Table 10* it is evident that 39 students (38,2%) thought that the course was too academic while 51 students (50,0%) did not think so. The remaining 12 students (11,8%) were not sure.

Table 10: Academic or practical nature of course

Answers	Frequency	Valid percentage
Yes	39	38,2
No	51	50,0
Not sure	12	11,8
Total	**102**	**100,0**

Of those who felt that the first-year course was too academic and less practical, 41, 7% were studying CM and 58,3% were studying QS. Of the CM students, 39,5%, and of the QS students, 38,2%, thought that the course was too academic, suggesting that a significant number of students in each discipline were either not satisfied with the offerings or were not sure. Of those who felt that the first-year course was not too academic, 40% were studying CM, and 60% were studying QS. Of the CM students, 47,4%, and of the QS students, 49, 1%, thought the course was not too academic. Clearly, more students regarded the course as not being too academic than those who did. These responses are shown in *Table 11*.

Reasons why students thought the first year course was too academic and less practical included:

- Practical work more emphasis (37,4%)
- More practicals [and] site visits (13,2%)
- I wanted a more practical course (4,4%)
- Course seems more practical (5,5%).

Table 11: Cross tabulation of academic or practical nature of course per discipline

Response		CM	QS
Yes	Do you think the course is too academic and less practical?	41,7%	58,3%
	% within discipline	39,5%	38,2%
	% of total	16,1%	22,6%
No	Do you think the course is too academic and less practical?	40%	60,0%
	% within discipline	47,4%	49,1%
	% of total	19,4%	29,0%
Not sure	Do you think the course is too academic and less practical?	41,7%	58,3%
	% within discipline	13,2%	12,7%
	% of total	5,4%	7,5%

Reasons why students thought the first year course was not too academic and less practical included:

- Balanced approach (33,0%), and
- Academic side is very important (3,3%).

Senior students survey

The sample comprised 66 students, namely 24 (36,4%) from Cape Technikon and 42 (63,6%) from Peninsula Technikon. Of those who responded, there were 37 (60%) students studying quantity surveying, and 26 (40%) studying construction management – 3 students failed to respond to this question. With respect to the year of study, 59 students (89,4%) were in their third year and 7 students (1 0,6%) were in their final (4th) year.

Year 2 experiential training

Almost all these students (62 students – 95,4%) had some experiential training during year 2 as part of the workplace placement and work-place-learning component of their programs. Of the students studying CM, 96,2% had some experiential training while 91,9% of students studying QS had such training. The data in *Table 12* show the distribution of the types of enterprises students worked at. As expected most of the students worked for either construction companies (61, 7%) or quantity surveying practices (18,3%). The students studying QS, however, worked for a much wider range of enterprises. For example, 44, 1 % of QS students worked for construction companies whereas no CM students worked for QS firms. Other enterprises QS students worked for included municipalities, consultants, suppliers, community organizations, developers and sub-contractors.

Length of employment

The length of time that students were employed ranged from 6 months to 5 years. Most students (52,4%) were employed for the prescribed 12 months. The mean period of employment was 1, 16 years.

Table 12: Types of enterprises worked at

Type	Sample		QS		CM	
	Frequency	Valid percentage	Frequency	Valid percentage	Frequency	Valid percentage
Municipality	1	1,7	1	2,9	-	-
Construction company	37	63,8	15	44,1	22	91,7
Cosultants	2	3,4	2	5,4	-	-
QS firm	11	19,0	11	32,4	-	-
Supplier	1	1,7	1	2,9	-	-
Community organisation	1	1,7	1	2,9	-	-
Developer	1	1,7	1	2,9	-	-
Project managers	1	1,7	-	-	1	4,2
Sub-contractor	3	5,1	2	5,9	1	4,2
Total	**58**	**100,0**	**34**	**100,0**	**24**	**100,0**

Most students studying QS (57,1%) and 44,0% of students studying CM had been employed for the prescribed 1-year period. The mean period of employment for QS students was 1,14 years and for CM students it was 1,13 years. These results are shown in *Table 13*.

Table 13: Length of employment before year 3

Years	Sample		QS		CM	
	Frequency	Valid percentage	Frequency	Valid percentage	Frequency	Valid percentage
0,50	3	4,8	1	2,9	2	8,0
0,58	1	1,6	1	2,9	-	-
0,67	2	3,2	1	2,9	1	4,0
0,75	1	1,6	1	2,9	-	-
0,83	4	6,3	3	8,6	1	4,0
0,92	4	6,3	1	2,9	3	12,0
1,00	33	52,4	20	57,1	11	44,0
1,08	3	4,8	2	5,7	1	4,0
1,17	2	3,2	1	2,9	1	4,0
1,33	1	1,6	-	-	1	4,0
1,50	4	6,3	1	2,9	3	12,0
2,00	1	1,6	1	2,9	-	-
2,25	1	1,6	1	2,9	-	-
3,00	1	1,6	-	-	-	-
4,00	1	1,6	-	-	1	4,0
5,00	1	1,6	1	2,9	-	-
Total	**63**	**100,0**	**35**	**100,0**	**25**	**100,0**

Satisfaction regarding placement

Both technikons endeavour to place their first-year students with prospective employers for their second year. Students had favourable attitudes towards the manner in which their placement was handled. This finding is confirmed by the mean of the responses to this question being 3,62 on a Likert scale of 1 to 5, and the median and mode being 4.0. Most students were either satisfied (37,7%) or very satisfied (26,2%). This result is shown in *Table 14*.

Similarly, most CM students were either satisfied (36,0%) or very satisfied (24,0%), while most QS students were either satisfied (35,3%) or very satisfied (29,4%). Students studying QS were more satisfied with their year 2 placement (mean = 3,68) than were those studying CM (mean = 3,52).

Satisfaction regarding monitoring

Each institution monitors the progress of its second-year students during their experiential learning period of employment. The students are generally visited at their place of work. Students were satisfied with the way their experiential learning was monitored. This finding is confirmed by the mean of 3,59 and the median and mode of 4,0. Most students again were either satisfied (32,8%) or very satisfied (24,6%). A significant number of students (26,2%) had neutral attitudes about the monitoring of their experiential training. This result is shown in *Table 15*.

In the same way, most CM students were either satisfied (37,5%) or very satisfied (20,8%), while most QS students were either satisfied (29,4%) or very satisfied (26,5%). 29,4% QS students had neutral attitudes as opposed to 20,8% of CM students, suggesting that QS students felt more neutral about their monitoring than did their CM counterparts. Students studying QS were more satisfied with their year 2 monitoring (mean = 3,65) than were those studying CM (mean = 3,46).

Table 14: Satisfaction regarding aspects of in-service training

Aspect	Very dissatisfied 1	Not satisfied 2	Neither satisfied nor dissatisfied 3	Satisfied 4	Very satisfied 5	Total
Placement	4 6,6%	9 14,8%	9 14,8%	23 37,7%	16 26,2%	61 100,0%
Monitoring	4 6,6%	6 9,8%	16 26,2%	20 32,8%	15 24,6%	61 100,0%
Supervision	4 6,6%	3 4,8%	17 27,4%	19 30,6%	19 30,6%	62 100,0%
Experience	4 3,2%	8 12,7%	8 12,7%	24 38,1%	21 33,3%	63 100,0%

Satisfaction regarding supervision

Employers supervise second year students during their experiential learning period of employment. Students were satisfied with the way their experiential learning was supervised. This finding is confirmed by the mean of 3,74 and the median and mode of 4,0. Most students again were either satisfied (30,6%) or very satisfied (30,6%). A significant number of students (27,4%) had neutral attitudes about the monitoring of their experiential training. This result is shown in *Table 14*.

Similarly, most CM students were either satisfied (28,0%) or very satisfied (28,0%) while most QS students were either satisfied (32,4%) or very satisfied (35,3%). Students studying QS were more satisfied with their year 2 supervision (mean = 3,88) than those studying CM (mean = 3,60).

Satisfaction regarding experience gained

Students were even more satisfied with the experience they had gained during their period of experiential learning. This finding is confirmed by the mean of 3,86 and the median and mode of 4,0. Most students again were either satisfied (30,6%) or very satisfied (30,6%). This result is shown in *Table 14*.

Similarly, most CM students were either satisfied (44,0%) or very satisfied (24,0%), while most QS students were either satisfied (37, 1 %) or very satisfied (40,0%). Students studying QS were more satisfied with the experience gained during year 2 (mean = 4,06) than were those studying CM (mean = 3, 72).

Satisfaction regarding aspects of year 2 experience

By analysing the means of the responses of students regarding their experience during year 2, the various aspects were ranked with respect to the degree of satisfaction they felt. This result is shown in *Table 15*.

Table 15: Satisfaction regarding aspects of year 2

Aspect	Ranking by means		
	Sample	QS	CM
Placement	3,62 (3)	3,68 (3)	3,52 (3)
Monitoring	3,59 (4)	3,65 (4)	3,46 (4)
Supervision	3,74 (2)	3,88 (2)	3,60 (2)
Experience gained	3,86 (1)	4,06 (1)	3,72 (1)

Irrespective of discipline, students expressed the highest level of satisfaction regarding the experience they gained during year 2, followed by the supervision they received from their respective employers.

They were least satisfied with the level of monitoring they received from their respective institutions.

Adequacy of year 1 as preparation for year 2

From *Table 16* it is evident that most of the students (44,6%) regarded the adequacy of the year 1 academic courses as "average" with respect to preparation for the practical year 2. Only 15,4% of students regarded the year 1 courses as "very good". The mean of responses was 3,29 and the median and mode were 3,0.

Similarly, 24,0% of CM students regarded the year 1 course as "good" and 20,0% as "very good", while 13,5% each of QS students regarded the year 1 course either as "good" or "very good". However, 32,0% of CM students and 54, 1% of QS students had neutral attitudes towards the adequacy of year 1 as preparation for year 2. Students studying CM (mean = 3,36) were more satisfied with the adequacy of the year 1 course than were those studying QS (mean = 3,22).

Table 16: Adequacy of year 1 as preparation for year 2

Very poor	Poor	Average	Good	Very good	Total
1 1,5%	12 18,5%	29 44,6%	13 20,0%	10 15,4%	65 100,0%

Table 17 presents the reasons that students gave for their responses about the adequacy of the year 1 course. Most of the students (34,6%) who regarded the course as inadequate to prepare them for year 2 indicated that "much of year 1 was irrelevant in the field".

Most of the students (19,2%) who felt that the course was adequate "knew enough to be able to start work".

Table 17: Reasons for the responses regarding adequacy of first year courses

Reason	Frequency	Valid percentage
Much of year 1 was irrelevant in the field	18	34,6
Average	3	5,8
Understood some terminology & some work was familiar	3	5,8
I worked hard and enjoyed the course	2	3,8
Needed some other skills not taught in year 1	5	9,6
Knew enough to be able to start work	10	19,2
Needed more site visits; too theoretical	3	5,8
Had previous conrstruction experience	1	1,9
What is done in industry is different from what is taught Do	1	1,9
in-service training in year 3 only	1	1,9
Used 1st year in year 2	1	1,9
Prepared me well for year 2	2	3,8
Lecturers need to be more up to date	1	1,9
Well structured program	1	1,9
Total	**52**	**100,0**

Adequacy of experiential training in year 2 in preparation for year 3

From *Table 18*, it is evident that most students thought the experiential training during year 2 was adequate preparation for year 3. Almost half of the students (47,6%) regarded the training as "good" and 19,0% regarded the training as "very good." The mean of responses was 3,71 and the median and mode were 4,0.

Table 18: Experiential training in year 2 as preparation for year 3

Very poor	Poor	Average	Good	Very good	Total
2 3,2%	5 7,9%	14 22,2%	30 47,6%	12 19,0%	63 100,0%

Similarly, 56,0% of CM students regarded the experiential training in year 2 as "good" and 16,0% as "very good" while 37, 1% of QS students regarded the experiential training in year 2 as "good" and 22, 9% as "very good". However, 31 ,4 % of QS students had neutral attitudes towards the adequacy of the experiential training in year 2 as preparation for year 3. The mean of responses of CM students was 3,64 and the median and mode were 4,0. Similarly, the mean of responses of QS students was 3, 7 4 and the median and mode were 4,0. Students studying QS were more satisfied with the adequacy of year 2 than were those studying CM.

Table 19 presents the reasons that students gave for their responses about the adequacy of the experiential training during year 2 as preparation for year 3. Most of the students (35,8%) who regarded the course as adequate to prepare them for year 2, indicated that "the work in year 3 was more familiar". They (20,8%) also opined that they had "gained experience and confidence". Most of the students (17,0%) who felt that year 2 was inadequate "did not gain much experience". They (5, 7%) also thought that they did not have as "much site experience as I would've liked".

Table 19: Reasons about the adequacy of experiential training as preparation for year 3

Reason	Frequency	Valid percentage
The work in year 3 was more familiar	19	35,8
Gained experience and confidence	11	20,8
Enabled me to cope better with the workload	3	5,7
Could apply some knowledge gained in industry	3	5,7
Not as much site experience as I would've liked	3	5,7
Did not gain much experience	9	17,0
Period of in-service training too short	1	1,9
Need closer monitoring by tech.	1	1,9
Training was good	1	1,9
Not always relevant to what year 3 requires	2	3,8
Total	**53**	**100,0**

Relevance of subjects offered to the work situation

The data in *Table 20* indicate that most students felt that the subjects offered in the present course were relevant to the work situation, with 40,3% thinking that the subjects were relevant and 29,0% that the subjects were very relevant. The mean of responses was 3,92 and the median and mode were 4,0.

Similarly, 20,8% of CM students regarded the subjects offered as relevant to the work situation and 33,3% as very relevant, while 51,4% of QS students regarded the subjects offered as relevant, to the work situation and 28,6% as very relevant. However, 37,5% of CM students and 20,0% of QS had neutral attitudes towards the relevance of subjects offered to the work situation. Students studying QS (mean = 4,09) were more satisfied with the relevance of subjects than were those studying CM (mean = 3,71).

Table 20: Relevance of subjects presently offered to the work situation

Very irrelevant	Irrelevant	Average	Relevant	Very relevant	Total
2 3,2	- -	17 27,4%	25 40,3%	18 29,0%	62 100,0%

Table 21 presents the reasons that students gave for their responses about the relevance of the subjects presently offered to the work situation. Most of the students (27,8%) who regarded the subjects as relevant, indicated, that "everything done at work [was] being taught this year". They (1 1, 1 %) also opined that the "work was similar".

Most of the students (22,2%) who thought the subjects were irrelevant, suggested that the "work at tech does not always relate to what is done at work". They (1 9,4%) also indicated, that "only some subjects are relevant".

Nature of course

The data in *Table 22* indicate that most of the students regarded the course as more academic than practical. The mean of responses about the academic nature was 3,57 and the median and mode were 4,0. On the issue of the academic nature of the course QS students (mean = 3,3) regarded the course as more academic than did their CM counterparts (mean = 3,42).

Table 21: Reasons for responses regarding relevance of subjects to the work situation

Reason	Frequency	Valid percentage
At work I needed to do everything I learnt	1	2,8
Not all subjects were irrelevant	1	2,8
Work was similar	4	11,1
Work at tech does not always relate to what is done at work	8	22,2
Provided some idea of what to expect	2	5,6
Everything done at work is being taught this year	10	27,8
Only some subjects are relevant	7	19,4
Year 1 subjects could be done more in-depth	1	2,,8
Average	1	2,8
Need industry involvement in program	1	2,8
Total	**36**	**100,0**

The mean of responses about the practicality of the course was 3,28 and the median and mode were 3,0. Similarly, QS students (mean = 3,35) regarded the course as more practical than did their CM counterparts (mean = 3,08). However, when comparing the means of the responses to the aspects of practicality and academic nature of the course, irrespective of discipline, students regarded the course as more academic than practical.

Table 22: Nature of program

Nature	1	2	3	4	5	Total
Academic	2	3	23	24	9	61
	3,3%	4,9%	37,7%	39,3%	14,8%	100,0%
Practical	4	7	25	18	7	61
	6,6%	11,5%	41,0%	29,5%	11,5%	100,0%

The reasons that students gave for their responses about the academic nature of the course are shown in *Table 23*.

Table 23: Reasons regarding the academic nature of the program

Reason	Frequency	Valid percentage
Covers most of the theory needed for the job	1	4,3
Provides some understanding of the industry	3	13,0
Needs improvement/more practicals	11	47,8
Need theory before practice	3	13,0
Average	2	8,7
Too practical	1	4,3
Well covered	1	4,3
Does not get to grips with the needs of the industry	1	4,3
Total	**23**	**100,0**

Students who thought the course was too academic opined as follows:

- Needs improvement/more practicals (47,8%), and
- Does not get to grips with industry needs.

Those who thought that the course was not too academic responded as follows:

- Need theory before practice (13,0%)
- Provides some understanding of the industry (13,0%)
- Covers most of the theory needed for the job (4,3%).

The reasons that students gave for their responses about the practical nature of the course are shown in *Table 24*.

Table 24: Reasons regarding the practical nature of the program

Reason	Frequency	Valid percentage
Covers a lot of technology	1	5,0
Needs more effort into practicals	3	15,0
Work at tech too theoretical; more site visits	10	50,0
Need to find good company to work for 2 years	1	5,0
Practical aspects important and enjoyable	3	15,0
Balanced approach	2	10,0
Total	**20**	**100,0**

Socio-economic and political relevance and responsiveness of course

Most students regarded the program as relevant and responsive to the economic, social and political needs of South Africa. The mean of their responses was 3,68 and the median and mode were 4,0. However, a significant number of students (40,4%) had neutral feelings about this aspect of the program. This result is shown in *Table 25*. Similarly, 40,9% of CM students and 43,8% of QS students were neutral about this issue. However, QS students (mean = 3,50) regarded the course as more relevant and responsive than did their CM counterparts (mean = 3,08).

Table 25: Relevance and responsiveness of program to economic, social and political needs of South Africa

1	2	3	4	5	Total
1	-	23	25	8	57
1,8%	-	40,4%	43,9%	14,0%	100,0%

Some of the reasons students gave for their responses relative to whether the program was relevant and responsive to the socio-economic and political needs of the country included:

- Allows for affirmative action to become reality
- Important to economy to have the best QS's available
- Equips us to contribute to infrastructure/economic development
- Average and needs improvement
- Exposed to what is needed internationally
- Too irrelevant to express an opinion, and
- Upgrading content of courses will improve contribution.

Discussion

There are real concerns in the construction industry about whether construction-related curricula adequately prepare students for their future careers in the industry. This is particularly true of students studying construction management and quantity surveying. This research project sought to determine from students' perspectives whether they perceived a disjunction between theory and practice. As Ross and Elechi (2002) pointed out in their study, it might be questionable to expect students to determine with validity the disjunction between theory and practice. However, as previously stated, students are one of the three co-operative partners in the co-operative education model. This particular study sought, therefore, to examine the attitudes of CM and QS students concerning their own learning experiences relative to their career preparation. The author concurs with Ross and Elechi (2002) that, as the main clients of higher education institutions, students are in the best position to assess whether they were educationally prepared for their practical year in industry and whether this year prepared them for the remainder of their program. As such their views are important.

The results of the surveys of students' attitudes regarding their co-operative education experiences confirm in the main the findings in the literature on this educational approach.

Generally, first year students had favourable attitudes towards the course content of the year preceding their practical year. This attitude was influenced by their perception that the subjects offered in the classroom situation were directly based on and related to the construction industry. Almost all students, irrespective of discipline, thought that these subjects were relevant and responsive to the needs of the industry. While senior students also agreed with this finding, a large number of them in

each discipline had neutral feelings about the relevance of the program to the work situation. These students contended that work at the education institution did not "relate to what is done at work". However, in addressing this perceived shortcoming, caution needs to be exercised that the cooperative curriculum does not become too narrow, resulting in an unbalanced approach that makes workplace training suit only the demands of the construction industry. Rather students should be equipped to tackle the workplace and wider socio-civic issues and problems (Wraga, 1998).

Further, irrespective of discipline, the majority of students expressed satisfaction with the subjects that made up the first year course. However, there was also a sizable dissatisfaction factor, with a significant number of students in each discipline either being dissatisfied outright with first-year subjects or not being sure. There is probably a need for a simple conceptual model that integrates course objectives with work-based outcomes, preferably around a specific project or set of competencies (Schaafsma, 1996). Students, faculty members and employers can work together to create practical educational problems that narrow the gap between the needs and expectations of the academic institution and the industry (Smith, 2000).

Most students thought that the first-year course prepared them sufficiently for their practical stint in industry. Students recognized the link between theory and practice and they opined that: "Theory prepares one for practical". A larger proportion of QS students than their CM counterparts had favorable attitudes. Those who disagreed suggested that they needed to "work with real materials" during their workshop and/or laboratory sessions at the technikon. The large proportion of students who expressed that they did not "know what to expect from in-service training", suggests a need for comprehensive briefing sessions before industry placement. In his study Schaafsma (1996) supports this finding by recommending that a set of guidelines for briefing and debriefing sessions are necessary to prepare students to provide evidence of measurable learning outcomes from sources such as log-books and project reports. Contrary to the opinions of first-year students, senior students who had been working in industry regarded the adequacy of the first-year course as average with respect to whether it prepared them sufficiently for their practical year in industry. This response was prompted by "much of year 1 being irrelevant in the field" and workplace. Furthermore, a large number of students in each discipline had neutral attitudes about this aspect of their program. A possible explanation is that first-year students provided their opinions based on their expectations before they had gone into industry. The senior students provided more reflective responses.

Irrespective of discipline, most first year students thought the course was not too academic. Those who thought it were suggested that practical aspects and site visits needed more emphasis. Senior students disagreed with this sentiment in that most of them regarded the course as more academic than practical. They agreed that 'more practicals' had to be included in the academic component. This finding is supported by Smith (2000: 243), who suggested that:

> Learner-centered methods of teaching help students understand work related problems and also develop a range of solutions that can be tested before trying to use them at work.

Most of the senior (third-and fourth-year) students had the prescribed 12-month period of experiential training. An interesting finding was that a much wider range of employers employed students studying quantity surveying than those studying CM. Employers not only included QS firms, but also contractors, municipalities, consultants, suppliers, community organizations, developers and subcontractors. QS firms did not employ any CM students.

The findings suggest that employers were fulfilling their role as one of the partners in the cooperative education model by providing valuable industry experience and supervision in the workplace. On the other hand, the academic institutions need to revisit their monitoring and placement roles to ensure a greater degree of:

- Satisfaction by students regarding their cooperative experience; and
- Employability and resilience of students to workplace and work force changes (Smith, 2000).

Of concern is the large number of students in each discipline who had neutral attitudes about the relevance and responsiveness of the program to the economic, social and political needs of South Africa.

Conclusion

This study sought to validate from student perceptions whether higher education institutions were fulfilling their objectives relative to construction-related programs, namely, the preparation of persons to address emerging societal problems; whether their co-operative education experience fostered and promoted the connection between academic preparation and job requirements; whether the present programs enhanced appreciation of the concepts learnt in the classroom after their application in the field, and whether the students' direct hands-on experience prepared them for their future careers.

The findings of the study suggest that much more needs to be done to ensure that students are adequately prepared, not only in the confines of a narrow curriculum, to address the socio-civic needs of South African society. Similarly, while the cooperative experience of students con-firmed that employers were fulfilling their role by supervising them and ensuring that they gained adequate practical and meaningful experience, higher education institutions needed to do more to close the gap between academic preparation and job requirements. It is possible to achieve this objective through more effective place-ments and monitoring during students' periods in employment. Returning students confirmed that their practical period in industry enhanced their understanding of concepts in the classroom during their third and final years of study. However, it was inconclusive whether their direct hands-on experience had prepared them for their future careers in construction.

While junior and senior students had different opinions about the disjunction between classroom learning and workplace experience, it is evident that all the cooperative partners, namely academic institution, student and employer, need to narrow the gap even further between the academic and experiential learning components. Presently a study is concluded of the attitudes of employers concerning co-operative construction education at higher education institutions.

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