

PRELIMINARY FINDINGS OF SOUTH AFRICAN CONSTRUCTION INDUSTRY-ACADEMIA SURVEY:

PART 2

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1. Introduction

This paper presents the final set of preliminary findings of the survey, namely responses to education and training issues. As stated in the previous paper a much broader based survey is presently underway using these initial responses. The findings are presented under the following headings, namely

- Student issues – 20 statements;
- Curriculum and curriculum related issues – 23 statements;
- Staffing and resourcing issues – 10 statements;
- Industry involvement and co-operative education – 18 statements; and
- General issues – 4 statements.

2. Survey findings

The Cronbach α score of reliability for the scaled responses to these 75 issues was 0.95 suggesting that the findings were significantly reliable when compared with the rule of thumb of 0.7 and that the closer the score is to 1.0 the greater the reliability of the scale. Participants were asked to respond to each issue statement by indicating as follows:

- Level of agreement on a 5-point Likert scale where 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, and 5=strongly agree; and
- Which of industry, academia or both should be responsible for addressing each issue.

a. Student issues

Responses to the 20 statements that addressed student specific issues are presented in Tables 1 and 2. The Cronbach α score of reliability for the scaled responses to these 20 issues was 0.89 suggesting that the findings were significantly reliable. From Table 1 it is evident that by ranking the means of the responses of survey participants that they tended to strongly agree that

- Graduate students had unrealistic expectations when commencing full-time employment; and
- The entrance requirements for new students were not stringent enough.

Further, they tended to agree that

- The standard of secondary education and entry level quality of students were poor;
- Students did not want to identify with practical aspects of construction such as the trades and crafts;
- There was a shortage of skilled and competent graduates;
- The communication skills of students were inadequate; and

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- Students lacked both setting out and measuring [taking-off] skills.

They tended to be neutral about the remaining issue statements given that means ranged between 3.43 and 2.64.

Table 1. Student specific issues: Levels of agreement

Statement/Issue	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	Mean	S.D.
Graduate students usually have unrealistic expectations when they start full-time employment	-	-	28.6	21.4	50.0	4.21	0.89
The entrance requirements for new students are not sufficiently stringent	-	14.3	21.4	57.1	42.9	4.07	1.07
The standard of secondary education is poor	7.1	-	21.4	28.6	42.9	4.00	1.18
The entry level quality of students is poor	-	14.3	14.3	35.7	35.7	3.93	1.07
Students do not want to be identified with 'trades'	7.1	-	28.6	21.4	42.9	3.93	1.21
There is a shortage of skilled and competent graduates	-	7.1	28.6	42.9	21.4	3.79	0.89
The communication skills of students are inadequate	-	14.3	14.3	50.0	21.4	3.79	0.97
Students lack setting out skills	-	14.3	28.6	35.7	21.4	3.64	1.01
Students lack measuring skills	-	21.4	28.6	28.6	21.4	3.50	1.09
Many students currently in academic programs should not be there	14.3	7.1	28.6	21.4	28.6	3.43	1.40
Standards at universities are dropping	14.3	14.3	14.3	28.6	28.6	3.43	1.45
Students produced by universities lack fundamentals	21.4	7.1	14.3	28.6	28.6	3.36	1.55
Students at high school should be streamed into technical vs academic streams	21.4	14.3	7.1	21.4	35.7	3.36	1.65
Students are unable to integrate knowledge/material/skills	15.4	15.4	7.7	46.2	15.4	3.31	1.38
Students should work in industry for a year after high school before studying	28.6	-	21.4	35.7	14.3	3.07	1.49
Periods of industry experience by students are required before registering at university	28.6	14.3	7.1	28.6	21.4	3.00	1.62
Students cannot cope with demands of industry	14.3	28.6	14.3	35.7	7.1	2.93	1.27
The industry cannot use students after 3 years at university	7.7	30.8	38.5	15.4	7.7	2.85	1.07
Throughput rate at academic institutions is not accurate	21.4	7.1	57.1	14.3	-	2.64	1.01
Students from universities of technology are preferred to students from traditional universities	28.6	-	50.0	21.4	-	2.64	1.15

Given the nature of the issues being raised, it is evident from Table 2 that there were limited suggestions for joint responsibility. These included, for example, joint responsibility to address

- The shortage of skilled and competent graduates;
- Preference for graduates from universities of technology rather than traditional universities;

- The unrealistic expectations of graduate when they started full-time employment; and
- The reluctance of students to be identified with 'trades.'

Academic institutions were regarded as predominantly responsible for

- Increasing the stringency of entrance qualifications of new students;
- Improving the setting out and measuring [taking-off] skills of students;
- Improving the ability of students to integrate knowledge and skills; and
- Addressing the lack of fundamentals of graduates.

Table 2. Student specific issues: Agency responsible for action

Statement/Issue	I (%)	A (%)	J (%)
There is a shortage of skilled and competent graduates	11.1	11.1	77.8
Students from universities of technology are preferred to students from traditional universities	-	27.3	72.7
Graduate students usually have unrealistic expectations when they start full-time employment	20.0	10.0	70.0
Students do not want to be identified with 'trades'	10.0	30.0	60.0
Periods of industry experience by students are required before registering at university	8.3	33.3	58.3
The industry cannot use students after 3 years at university	27.3	18.2	54.5
The standard of secondary education is poor	-	45.5	54.5
Students cannot cope with demands of industry	10.0	40.0	50.0
Students at high school should be streamed into technical vs academic streams	-	50.0	50.0
Students should work in industry for a year after high school before studying	25.0	33.3	41.7
Standards at universities are dropping	-	63.6	36.4
Throughput rate at academic institutions is not accurate	-	72.7	27.3
Many students currently in academic programs should not be there	-	75.0	25.0
The communication skills of students are inadequate	-	75.0	25.0
Students are unable to integrate knowledge/material/skills	-	75.0	25.0
Students produced by universities lack fundamentals	-	75.0	25.0
The entry level quality of students is poor	16.7	66.7	16.7
Students lack setting out skills	10.0	80.0	10.0
Students lack measuring skills	10.0	80.0	10.0
The entrance requirements for new students are not sufficiently stringent	-	100.0	-

b. Curriculum and curriculum related issues

Responses to the 23 statements are presented in Tables 3 and 4. The Cronbach α score of reliability for the scaled responses to these 23 issues was 0.86 suggesting that the findings were significantly reliable.

Table 3. Curriculum issues: Levels of agreement

Statement/Issue	1	2	3	4	5	Mean	S.D.
A common final project that integrates the various disciplines is essential	-	-	35.7	28.6	35.7	4.00	0.88
A 'capstone' course that integrates all knowledge and experience areas is essential	-	-	35.7	35.7	28.6	3.93	0.83
Integrated projects are needed in every year of study	-	7.1	21.4	42.9	28.6	3.93	0.92
A 'mix' is important and graduates must present a basket of skills	-	14.3	-	64.3	21.4	3.93	0.92
"Technical' and 'research' streaming are required in curriculums	7.1	7.1	14.3	50.0	21.4	3.71	1.14
Current programs at universities of technology are adequate	7.1	-	35.7	42.9	14.3	3.57	1.01
The content of subjects are not regularly reviewed with industry	14.3	-	14.3	57.1	14.3	3.57	1.22
Capstone courses must be multi-disciplinary	-	-	64.3	21.4	14.3	3.50	0.76
Current programs at traditional universities are adequate	8.3	-	41.7	41.7	8.3	3.42	1.00
Too many institutions offer BTech qualifications	7.1	14.3	28.6	28.6	21.4	3.43	1.22
Too many qualifications are being offered that no one knows what matches what	-	42.9	21.4	-	35.7	3.29	1.38
The mastery level (passing grade) of the capstone program must be 80%	15.4	7.7	46.2	7.7	23.1	3.15	1.34
Not enough short courses are offered	14.3	14.3	14.3	57.1	-	3.14	1.17
Integrated curriculums are resource intensive	7.1	14.3	42.9	35.7	-	3.07	0.92
There is too much emphasis on management than technology	14.3	21.4	21.4	28.6	14.3	3.07	1.33
Consolidated programs namely CM/QS do not develop a construction management identity	21.4	7.1	35.7	14.3	21.4	3.07	1.44
Academic courses and programs should be standardized	35.7	7.1	-	28.6	28.6	3.07	1.77
The Universities of Technology are not involved enough in curriculum design	14.3	21.4	28.6	21.4	14.3	3.00	1.30
Courses should be semesterized (blocks)	14.3	21.4	35.7	7.1	21.4	3.00	1.36
Universities should abandon silos and offer an integrated curriculum	14.3	14.3	50.0	14.3	7.1	2.85	1.10
There is a lack of options to specialize in either CM or QS	14.3	35.7	28.6	7.1	14.3	2.71	1.27
Universities should offer courses that produce foremen/supervisors	28.6	21.4	21.4	14.3	14.3	2.65	1.45
Technikon vs University is the preferred model	28.6	7.1	42.9	14.3	7.1	2.64	1.28

From Table 3, it appears that by ranking the means of the responses of survey respondents that they tended to agree that

- A common final project and capstone course that integrated the various disciplines was essential;
- Integrated projects were required in each year of study;
- Graduates needed to present a basket of 'mixed' skills;

- ‘technical’ and ‘research’ streaming was desirable; and
- Current university of technology programs were adequate but content of subjects were not regularly reviewed with industry.

They tended to be neutral about the remaining issue statements with means ranging from 3.50 to 2.64.

Table 4 suggests that relative to curriculum issues the joint efforts of both industry and academia are necessary to address

- Universities offering courses that produced foremen and supervisors;
- Reviewing of subject content regularly;
- Ensuring that programs adopted features of the former technikon programs; and
- Making capstone courses multi-disciplinary to ensure better integration.

Table 4. Curriculum issues: Agency responsible for action

Statement/Issue	I (%)	A (%)	J (%)
Universities should offer courses that produce foremen/supervisors	11.1	22.2	66.7
The content of subjects are not regularly reviewed with industry	8.3	25.0	66.7
Technikon vs University is the preferred model	10.0	30.0	60.0
Capstone courses must be multi-disciplinary	-	40.0	60.0
A ‘capstone’ course that integrates all knowledge and experience areas is essential	-	58.3	41.7
The mastery level (passing grade) of the capstone program must be 80%	9.1	36.4	54.5
There is too much emphasis on management than technology	-	45.5	54.4
A common final project that integrates the various disciplines is essential	-	63.6	36.4
Not enough short courses are offered	-	63.6	36.4
Current programs at universities of technology are adequate	-	72.7	27.3
Universities should abandon silos and offer an integrated curriculum	-	72.7	27.3
There is a lack of options to specialize in either CM or QS	-	72.7	27.3
‘Technical’ and ‘research’ streaming are required in curriculums	-	72.7	27.3
Consolidated programs namely CM/QS do not develop a construction management identity	16.7	58.3	25.0
A ‘mix’ is important and graduates must present a basket of skills	8.3	66.7	25.0
Academic courses and programs should be standardized	-	75.0	25.0
Integrated projects are needed in every year of study	-	75.0	25.0
Current programs at traditional universities are adequate	-	77.8	22.2
Integrated curriculums are resource intensive	-	81.8	18.2
Too many institutions offer BTech qualifications	-	83.3	16.7
Too many qualifications are being offered that no one knows what matches what	9.1	81.8	9.1
Courses should be semesterized (blocks)	-	90.9	9.1
The Universities of Technology are not involved enough in curriculum design	-	100.0	-

However, academic institutions should, predictably, predominantly drive

- The lack of involvement by universities of technology in curriculum development;
- Semesterization and standardization of courses;
- Streamlining of the myriad existing qualifications;
- Inclusion of integrated projects in each year of study;
- Reduction of the number of BTech qualifications offered [probably in favour of diplomas]; and
- Balancing resources for integrated curriculums and adequacy of university programs.

c. **Staffing and resourcing**

Responses to the 10 statements are presented in Tables 5 and 6. Given that there were only 10 scaled items the Cronbach α was 0.57 which is acceptable for a small number of scaled items given the general rule of thumb of 0.70 for large numbers of scaled items. Table 5 indicates that respondents tended to strongly agree on matters of staffing and resourcing that

- The industry should be more involved as part-time lecturers; and
- The salaries of lecturers was too low.

Table 5. Staffing and resourcing issues: Levels of agreement

Statement/Issue	1	2	3	4	5	Mean	S.D.
The industry should be more involved as part-time lecturers	-	-	14.3	28.6	57.1	4.43	0.76
The salaries of lecturers are too low	-	14.3	21.4	7.1	57.1	4.07	1.21
There is a lack of suitably qualified and experienced lecturing staff at academic institutions	-	21.4	14.3	21.4	42.9	3.86	1.23
Universities do not make sufficient use of guest lecturers from industry	-	14.3	14.3	64.3	7.1	3.64	0.84
Industry should sponsor lecturers and/or chairs at universities	14.3	14.3	7.1	28.6	35.7	3.57	1.50
Universities should appoint professors from industry	14.3	-	35.7	28.6	21.4	3.42	1.28
The physical facilities at academic institutions are inadequate	7.1	21.4	28.6	14.3	28.6	3.36	1.34
The minimum higher qualifications for academics contribute to the shortage of lecturers	14.3	-	42.9	28.6	14.3	3.29	1.20
Staff adequacies are greater for integrated curriculums	-	14.3	50.0	35.7	-	3.21	0.70
Lecturers do not engage in industry exchanges	-	35.7	21.4	35.7	7.1	3.14	1.03

They tended to agree that

- There was a lack of suitably qualified and experienced lecturing staff at academic institutions;
- Universities did not make sufficient use of guest lecturers from industry; and
- Industry should sponsor lecturers and/or chairs at universities.

Given the range of means from 3.42 to 3.14, there tended to be feelings of neutrality about the remaining issue statements.

Table 6. Staffing and resourcing issues: Agency responsible for action

Statement/Issue	I (%)	A (%)	J (%)
Lecturers do not engage in industry exchanges	9.1	27.3	63.6
Universities should appoint professors from industry	-	45.5	54.4
There is a lack of suitably qualified and experienced lecturing staff at academic institutions	8.3	41.7	50.0
Universities do not make sufficient use of guest lecturers from industry	-	50.0	50.0
The physical facilities at academic institutions are inadequate	10.0	50.0	40.0
The industry should be more involved as part-time lecturers	41.7	25.0	33.3
The salaries of lecturers are too low	10.0	60.0	30.0
Staff adequacies are greater for integrated curriculums	-	75.0	25.0
Industry should sponsor lecturers and/or chairs at universities	83.3	-	16.7
The minimum higher qualifications for academics contribute to the shortage of lecturers	-	83.3	16.7

Relative to working together to resolve staffing and resourcing issues respondents suggested as shown in table 6 that the issue of lecturers not engaging in industry exchanges could be jointly addressed. Industry should predominantly drive the sponsorship of lecturers and/or chairs at universities. Academic institutions should similarly drive the improvement of staff adequacies and the minimum qualifications required of lecturers to reduce the current shortages.

d. Industry involvement and co-operative education

Responses to the 18 statements are presented in Tables 7 and 8. The Cronbach α score of reliability for the scaled responses to these 18 issues was 0.82 suggesting that the findings were significantly reliable. It is evident that the means of responses that respondents strongly agreed that

- The high salaries offered by industry to students encouraged job hopping resulting in a lack of company loyalty; and
- Vacation work for students was essential.

They tended to agree that

- Industry should sponsor students to attend university;
- Students could not be expected to gain all competencies from assigned projects;
- Vacation work and internship programs should be structured and mandatory for all academic programs;
- Universities had difficulty in placing students for vacation work and internships;
- Universities needed to consider adjusting their academic calendars to accommodate industry experience by students;
- A Habitat for Humanity type project was necessary for students to be exposed to both technical and management aspects of construction;
- Industry needed to be involved in the design and evaluation of capstone programs; and
- Academic institutions needed to create partnerships with both the MBSA and SAFCEC.

Similarly, respondents tended to be neutral about the remaining issues given that the means ranged from 3.50 to 3.00. Respondents tended to disagree that students should not be paid while working on a site for their projects.

Table 7. Industry involvement and co-operative education: Levels of agreement

Statement/Issue	1	2	3	4	5	Mean	S.D.
The high salaries offered encourage job hopping resulting in lack of loyalty	-	7.1	7.1	42.9	42.9	4.21	0.89
Vacation work is essential	-	-	21.4	42.9	35.7	4.14	0.77
Industry should sponsor students to attend university	7.1	7.1	21.4	14.3	50.0	3.93	1.33
Vacation work/internships program should be structured and mandatory for all academic programs	14.3	-	7.1	42.9	35.7	3.86	1.35
Industry must be involved in design of the capstone program and evaluation	-	-	35.7	50.0	14.3	3.79	0.70
Universities must consider adjusting their academic calendars to accommodate industry experience	14.3	7.1	14.3	14.3	50.0	3.79	1.53
Students cannot expect to gain all competencies by means of a project	7.1	7.1	21.4	35.7	28.6	3.71	1.20
Universities have difficulty in placing students for internships/vacation work	-	28.6	7.1	28.6	35.7	3.71	1.27
A Habitat for Humanity type project is needed to expose students to both technical and management aspects	-	-	57.1	21.4	21.4	3.64	0.84
Academia must create partnerships that involve both the MBSA and SAFCEC	7.7	-	38.5	38.5	15.4	3.54	1.05
Academic programs at Honors level are not well subscribed due to high salary offers after completion of first degree	-	16.7	41.7	50.0	8.3	3.50	0.90
Construction management students must mandatorily adopt a site and generate regular reports on the site that are evaluated	-	28.6	14.3	42.9	14.3	3.43	1.09
Students at smaller companies have greater exposure to the industry	-	42.9	7.1	42.9	7.1	3.14	1.10
Students should have periods of industry experience before commencing each successive year of study	14.3	14.3	35.7	14.3	21.4	3.14	1.35
Only major construction companies do training	-	42.9	14.3	35.7	7.1	3.07	1.07
Students have enough labwork/workshops/practicals in their academic programs	-	35.7	28.6	35.7	-	3.00	0.88
Students do not receive practical experience as part of the academic experience	14.3	21.4	35.7	7.1	21.4	3.00	1.36
Students should not receive payment while working on a site for their projects	14.3	50.0	14.3	21.4	-	2.43	1.01

From Table 8, it is evident that industry and academia should assume joint responsibility for dealing with the following issues, namely

- Industry being involved in the design and evaluation of the capstone program;
- Universities having difficulty in placing their students for internships and vacation work given that it is an essential requirement;
- A Habitat for Humanity type project to expose students to both technical and management aspects of construction; and
- Students possibly not receiving payment while working on a site for their projects.

Table 8. Industry involvement and co-operative education: Agency responsible for action

Statement/Issue	I (%)	A (%)	J (%)
Universities have difficulty in placing students for internships/vacation work	-	9.1	90.9
Industry must be involved in design of the capstone program and evaluation	16.7	8.3	75.0
Students should not receive payment while working on a site for their projects	16.7	8.3	75.0
Vacation work is essential	9.1	18.2	72.7
A Habitat for Humanity type project is needed to expose students to both technical and management aspects	-	36.4	63.6
Students cannot expect to gain all competencies by means of a project	11.1	33.3	55.6
Students should have periods of industry experience before commencing each successive year of study	9.1	36.4	54.5
The high salaries offered encourage job hopping resulting in lack of loyalty	50.0	-	50.0
Students do not receive practical experience as part of the academic experience	27.3	27.3	45.5
Academic programs at Honors level are not well subscribed due to high salary offers after completion of first degree	25.0	33.3	41.7
Only major construction companies do training	60.0	-	40.0
Academia must create partnerships that involve both the MBSA and SAFCEC	-	60.0	40.0
Students at smaller companies have greater exposure to the industry	45.5	18.2	36.4
Students have enough labwork/workshops/practicals in their academic programs	-	63.6	36.4
Industry should sponsor students to attend university	66.7	-	33.3
Universities must consider adjusting their academic calendars to accommodate industry experience	-	72.7	27.3
Vacation work/internships program should be structured and mandatory for all academic programs	8.3	66.7	25.0
Construction management students must mandatorily adopt a site and generate regular reports on the site that are evaluated	16.7	58.3	25.0

Industry should address the issues of

- Only major construction companies doing training; and
- Sponsorship of students at university.

On the other hand, academic institutions should predominantly address

- The creation of partnerships with the MBSA and SAFCEC;
- Inclusion of adequate labwork, workshops and practicals in academic programs; and
- Adjustment of academic calendars to accommodate mandatory student industry experience using a structured approach.

e. **General issues**

Responses to the 4 statements are presented in Tables 9 and 10. Because there were only 4 scaled items the Cronbach α score of reliability for the scaled responses to these issues was low. The findings presented in Table 9 suggest that respondents tended to agree strongly that bursary funds were required and prospective bursary candidates needed to be screened by both industry and academic institutions and include training type testing. They tended to agree that there were too few construction management students at universities. However, they tended to disagree that learnerships were preferable to apprenticeships.

Table 9. General issues: Levels of agreement

Statement/Issue	1	2	3	4	5	Mean	S.D.
Prospective bursary candidates should be screened by both industry and academia and include trainability type tests	-	-	30.8	30.8	38.5	4.08	0.86
A bursary fund is needed	-	-	23.1	53.8	23.1	4.00	0.71
There are too few CM students at universities	-	14.3	28.6	35.7	21.4	3.65	1.01
Learnerships are preferred to apprenticeships	50.0	-	42.9	7.1	-	2.07	1.14

From Table 10 it appears that industry and academia jointly should be responsible for addressing the screening and testing of prospective bursary students and preference for apprenticeships rather than learnerships. Academic institutions needed to address the shortage of construction management students at universities.

Table 10. General issues: Agency responsible for action

Statement/Issue	I (%)	A (%)	J (%)
Prospective bursary candidates should be screened by both industry and academia and include trainability type tests	-	8.3	91.7
A bursary fund is needed	9.1	27.3	63.6
There are too few CM students at universities	27.3	18.2	54.5
Learnerships are preferred to apprenticeships	8.3	58.3	33.3

3. **Conclusion**

As evidenced in the previous paper, the preliminary findings of the industry-academia survey with respect to education and training issues suggest multiple opportunities for joint action by academia facilitated by ASOCSA and the construction industry facilitated by the MBSA. These include, *inter alia*, the following:

- Student issues: shortage of skilled and competent graduates; current preference for graduates from universities of technology rather than traditional university programs; unrealistic expectations of new graduates when they start full-time employment; and the reluctance of students to be identified with 'trades.'
- Curriculum and curricula issues: universities offering courses that produce foremen and supervisors; reviewing of course content more regularly; ensuring that programs adopted some of the features of the former technikons; and making capstone courses multi-disciplinary to ensure better integration.
- Staffing and resourcing issues: lecturers not engaging in industry exchanges.
- Industry involvement and co-operative education; industry being involved in the design and evaluation of the capstone program; universities having difficulty in placing their students for internships and vacation work given that it is an essential requirement; a Habitat for Humanity type project to expose students to both technical and management aspects of construction; and students possibly not receiving payment while working on a site for their projects.
- General issues: screening and testing of prospective bursary candidates and preference for apprenticeships rather than learnerships.

4. **Recommendation**

As previously stated in part 1 of the preliminary findings, it is recommended that a high level meeting between ASOCSA and the MBSA, and possibly SAFCEC be arranged to develop an agenda and accompanying action plan to address the issues that have been identified on a structured basis and bring about incremental improvement.

5. **Acknowledgement**

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