

## CHAPTER 4: PRESENTATION OF FINDINGS

### 4.1 Introduction

In this chapter I present the findings from all the processes and procedures described in the previous chapter that I engaged in in the field to generate and collect data central to my study. The guiding procedures of the industry-based learning is premised on university regulations as found in the university yearbook and discussed briefly in Chapter 1. Respondents in this research were therefore expected to be familiar with the principles and the procedures of the exercise to be able to give informed analytic and critical views grounded on the said regulations.

### 4.2 Findings and their Importance

The ‘new’ and ‘elaborated’ issues emerging as the study progresses are synthesised in light of the current literature and living examples, particularly in comparison with successes experienced in industrialised, semi-industrialised and other developing countries. One of the primary expectations of the study is that its contributions will highlight the need for appropriate transformation at the levels of the individual higher education practitioner as community engagement practitioner, the organisation and the nation as a whole, as concerns about home-grown solutions to academic and economic issues take prime position in many development-centred discourses. It is hoped that all stakeholders will view the practice of engagement between universities and local communities, not only as a formality but an underutilised avenue for deep learning inclined towards sustainable social change. It is hoped that this study will open up thoughts to promote further research, debate and action for relevant and tangible development.

### 4.3 Findings from Interview Data

The qualitative data in this study comprises interviews and open-ended items in the questionnaire. In this section I discuss the findings from the interviews beginning with the response rates of chosen participants, moving to the emerging themes from the respondents’ answers to questions posed to them. Participants’ own voices feature prominently in the description of the themes.

### 4.3.1 Participation and response rate in interviews

The response rate to my requests for interviews with various selected participants was fairly encouraging. Within the university the proposed number of participants was almost achieved, with the exception that more department chairpersons were found willing and available to be interviewed than had been planned, while a fewer number of non-chairperson lecturers participated than originally proposed. Among the industry supervisors only two out of the five proposed were eventually interviewed in the circumstances. From other universities the number of actual respondents doubled the number proposed. This was because one university (a private one) was so enthusiastic to participate in the study that the management insisted and provided me support to interview as many of their staff members as possible, mainly heads of departments, and I managed to interview five of them. This was a helpful case within a case study because the various interviewees came from different faculties and departments and they practised somewhat different modes of industry-based learning. Another university availed to me two respondents. Table 4.1 below shows the summary of the actual participants against my proposed samples and the estimated populations in the three categories of respondents. In total, twenty-four interviews were conducted against the intended twenty-five.

**Table 4.1: Proposed and Actual Interview Participants and Respondents**

Location	Designation/Office	Estimated Population	Proposed Sample	Actual Responses
NUST	<b>Management</b>			
	Director Technopark	1	1	1
	Industrial Liaison Officer	1	1	-
	Director R&I Office	1	1	1
	Deans of Faculties	5	2	1
	<b>Practitioners</b>			
	Department Chairpersons	30	5	7
Lecturers	140	5	2	
Industry	<b>Industry Supervisors</b>	300	5	2
Other Universities	<b>Manager/Practitioner/Coordinator</b>	22		
	State university #1		1	1
	State university #2		1	1
	State university #3		1	1
	State university #4		1	2
	Private university		1	5
<b>TOTAL</b>			<b>25</b>	<b>24</b>

Access to the respondents and reception at the permitted sites met with varied responses. Generally the gate-keeping officials at some universities gave me a warm welcome and

provided me with all the support I needed and even more, while at others they indicated levels of reluctance and uncertainty at how to deal with me. Through the bureaucracy that ensued, it was prudent for me to move on to the next agreeable organisation.

#### ***4.3.2 Interview data: emerging themes***

The content and thematic analysis that I performed on the interview manuscripts yielded fourteen themes discussed below. It will be found that there are overlaps between some of the themes. All the themes are discussed in three categories of respondents, i.e. NUST staff (both management and lecturers), industry supervisors and respondents from other universities.

##### ***4.3.2.1 Quality Issues in Academic Practices***

In replying to my open-ended interview questions, respondents offered their views liberally and some of these views touched on their interpretation or encounter with incidences of quality in their prior practice of industry-based learning.

- ***NUST Management and Lecturing Staff***

The management staff at NUST indicated awareness and concern for general quality issues in various aspects of the industry-based learning programme. First, several views were expressed on the quality of student assessment. One respondent (#NM02) was particularly keen on adherence to comprehensive processes in the assessment of engineering students, noting that students had to pass through a series of assessment procedures including on-site observations by qualified industrial assessors. He described the processes carried out in his faculty as follows:

... (for student assessment), the company is requested to set up a panel usually consisting of the engineer to whom the student reported during the training, actually the mentor of the student, and maybe the foremen; that engineer can choose any number of foremen of the departments through which the student went [Respondent #NM02].

Some respondents thought that the ideal supervision of students had not been occurring at the university in the last few years, compromising the quality of student written reports and oral presentations that form part of the overall portfolio of student assessments of their industry-based learning experience. An engineering lecturer (#NL06) concurred on how his department had taken to using strict measures in ensuring that student supervision and assessment were of standards acceptable to newly instituted external watchdog bodies and legislation that control the accreditation

processes for degree programmes. His department had to follow up on the students and ensure that they were being supervised by:

... professional engineers, people that have registered with the Engineering Council of Zimbabwe. So as an engineering department, we are forced, starting from this year, because the Act was put in place last year. So ... it's one of the area[s] which I think you need to check, because [in comparison] in South Africa they have ECSA [Engineering Council of South Africa] (Respondent #NL06).

The issue of sub-standard written reports is picked up by another management team member (#NM03) who laments the general decline in the quality of most of the literary skills of today's university students' that are necessary for the accurate and attractive reporting needed to capture the students' industrial experiences. Noting that apart from perceived teaching inadequacies, there existed gaps in the provision and availability of information for students who wanted to engage in serious study. He thought that as a result of deteriorating library services and scant information technology resources and their accessibility, there had been a gradual decline in the quality of the student, not necessarily in ability or enthusiasm but in productivity due most probably to insufficient or diminished scholarly guidance:

So generally productivity has declined but not due to their own fault necessarily. But there is one thing that is worrying, and that is writing skills have declined tremendously (Respondent #NM03).

The above comment underscores the learned abilities of students coming into degree programmes, and touches on the need expressed by other respondents to introduce supporting communication and professional writing short courses to assist many university students to reach the required minimum level of academic scholarship. The need for suitable facilitators and mentors, both at university and in industry, who would go on to provide qualified and professional supervision and assessment of the students' abilities and experiences while doing workplace-based learning, is brought into the spotlight by some practitioners. One lecturer (#NL04) observes that the brain and skills drain that had swept the country in the past decade had led to the erosion of the student supervisory mechanism, leaving the students to make do with only second best supervision and assessment processes:

[This] has created a problem for our industrial attachment programme because we find now it's difficult to get qualified industrial supervisors for our students. And that now compromises our industrial attachment (Respondent #NL04).

The same respondent goes on to lament the tendency in recent years to rely on young and less experienced lecturers who themselves have little or no industrial experience. These are shortcomings of lecturers that also reflect on quality teaching and learning as it manifests in the way they present subject content and conduct classroom activities.

Another lecturer concurs:

Most of the time we talk about theories, even if we try to give examples, because the bulk of the lecturers have not ... worked in an industrial setup, their examples still largely become textbook examples. So when students ... do attachment, they then begin to see the difference between theory and practice (#NL10).

Another consequence of the country's severe economic situation is that some university departments, perhaps in the name of improvisation, had devised convenient methods of coming up with assessment marks and grades for students, this time summoning students to the university instead of visiting them:

.... They [departments] are calling students to come over, and then they give [their] industrial attachment report, their log books, and then there is a panel that now sits down there and interviews them as if it's a PhD viva. Industrial attachment, I feel should be assessed on the spot. ... That's a financial challenge which we have allowed to continue because we feel it's convenient, but it compromises on quality (Respondent #NL04).

Normally in workplaces new graduates are taken up so as to occupy, or be groomed to occupy, senior management and leadership positions over other workers in the company. Industry-based learning rightly attempts to initiate the process of leadership professional development, but this requires quality processes that promote efficiency and effectiveness. The prevailing economic situation is blamed once more for putting students in a position where they are forced to learn leadership of companies and processes in unsystematic ways. This happens when students on industry-based learning are prematurely put in positions of leadership without the accompanying requisite mentorship and are expected to learn the ropes by trial and error. One lecturer noted:

And you might also appreciate that with the great exodus of trained manpower, industry always takes it as an advantage to have some of these students as qualified personnel. They always find themselves being thrown at the deep end of things actually. ... Instead of being supervised they find themselves supervising (Respondent #NL05).

It might be argued that these students were being thrown at the deep end to help them acquire required skills intuitively, but such a technique would yield better results if suitable supervisors were eventually available to appraise them in the end.

- *Industry Supervisors*

This group of respondents did not voluntarily raise any notable issues on quality academic practices, perhaps because they are removed physically from the university classroom environment.

- *Other Universities*

There is generally a large measure of concurrence between NUST staff and colleagues from the other universities surveyed on several quality issues. On quality in curriculum development and delivery the argument is raised by one management respondent from a state university who speaks about the effect of industrial attachment of students on their lecturers. He points out that lecturers who are keen on accepting and documenting experiences of their students have better opportunities to integrate ideas from field experiences into their curriculum, and are able to use pertinent knowledge in their learning opportunities and to spur their research interests. He said the following:

So the lecturers themselves become proactive rather than just waiting for students' feedback... They will now come and use that [knowledge] in their curriculum. So that helps. And also when they do their research they tend to focus on some of the new areas. It will mean when they prepare for their lectures, they now want to bring in those new areas they have not been doing. So basically, I would say, it improves the quality of [the] curriculum, and even the teaching itself because you want to be relevant. And when students come back [from attachment], they are sometimes more informed in certain areas, and so lecturers tend to really sharpen up, because they want to continue to be ahead of the students (Respondent #OUMA01).

In answer to the question on quality assurance, the above management officer pointed out measures taken by his university to engage consultative processes through an advisory board with a specific mandate to monitor and direct the goings-on of the process of industry-based learning. The board is made up of the deans and people from industry. These are the people who 'use their experience in trying to assist us in running work-related learning' (Respondent #OUMA01).

But this particular university already has its own local quality control measures in the involvement of dedicated staff and substantial resources for the efficient administration of industry-based learning. The establishment of the office of Work-related Learning, with three full time staff members, and provided with four all-terrain motor vehicles, speaks well of an institution anxious to maximise and explore the practice of workplace-based learning, taking it to greater heights. In the academic departments the use of coordinators is prioritised, where it is reported that 'our office deals with each

coordinator ... in each department, and these coordinators have specific functions to influence and assist the operations of the work-related learning' (#OUMA01).

#### 4.3.2.2 *The research function and industry-based learning*

I approached this sub-topic from the concept of the interplay between research and learning: research-driven learning and learning-focused research. The respondents generally had less to say about research probably because of its high-end characteristics.

- *NUST staff*

The management staff, generally the more senior members of the university community, purported that there were opportunities for research, but were adamant about whether these opportunities were actually taken up on the ground. One of them expressed the following opinions:

The staff (lecturers) benefit a lot because (they) actually get to know what is happening in industry ... problems that are happening in industry, and that actually becomes a springboard for staff here to come up with research projects of their own that are, in other words, application-related (Respondent #NM01).

Alluding to the requirements that undergraduate students should carry out some research or problem-solving projects, preferably industry-related and picked from their industrial attachment workplaces as part of their degree programmes, another respondent observed that academic staff stood ready to do cutting edge research in collaboration with industry partners:

The same applies to lecturers although lecturers haven't quite done that yet, to identify projects they can do with companies. Contract research is a big possibility. But maybe as you are aware, lecturers are overloaded with teaching to move in that direction, although the benefits of doing such a thing would be very large and they are aware of that, [and] unfortunately it hasn't happened. We are hoping that it will happen. ... This is where I was saying, you can conduct contract research for the companies. You can actually also conduct your own academic research especially if the things that you are doing are not things that may be secrets to the company. So you can publish your work from the company. That can happen. That actually does happen (Respondent #NM02).

The above is a commonly expressed point about the teaching load always eclipsing the research function of most academics, but the respondent goes on to link the amount and nature of contract or academic research possible for academic staff but performed in conjunction with industry to the financial support that is expected to come from the side of industry, noting that if industry did not provide financial support, this dented the efforts at sustained collaborative research activity by the university.

One lecturer respondent (#NL12) asked about whether undergraduates can and should do any significant research at all. But one management staff member considered some of the undergraduate student projects as worthy research, saying:

... but the important thing that comes on is that industry was actually getting some of its research needs answered almost for free, because you had a scientist working for you on industrial attachment doing the regular work but in addition also doing a tiny bit of research on your behalf ... what's of interest to you, so that it helped industry to... I think if that component could be cultivated to say that more and more people, not just merely say, well do your project and come back with the results ... (Respondent #NM03).

This is a proposition for a synergy in various complementary units of the university, wherein a division of labour between them is planned and carried out, so as to maximise the holistic goal of community engagement between the university and its communities:

[T]here is need for a greater interface between the two, the Research and Innovation office as well as Technopark, so that the Research and Innovation (Office) has a handle on the researchers, Technopark has a handle on the industry. And if we could look for opportunities when we could bring people together, beyond the IA, it could be for postgraduate research as well, so that you might find that during your visit for IA you could actually identify opportunities for postgraduate research projects ... (Respondent #NM03).

The possibility of postgraduate research is an interesting point and for a university of science and technology, most of its research is better off linked to industry, commerce and related workplaces.

Lecturers as the key university practitioners were more sceptical and uncertain in their reference to the success of collaborative research between the university and industry facilitated by the platform of industry-based learning. One respondent noted that industry had not been forthcoming in supporting research in his department. There are years when he had proposed projects to solve a problem. Industry would promise equipment and other assistance, only to renege at a later stage. 'So we end up doing that project [on our own]. It's still applying to them, but they don't ... take it further to a [point] where you are talking about maybe ... patenting levels ...' (Respondent #NL06). Another respondent highlighted the uneven playing field between the functions and priorities of the university and industry, and observed the following:

We need the help of ... industry. Obviously they don't need ours, but we need theirs. Maybe they do [need ours too]. But ... they don't know exactly what we do. They probably think we are some school ... Our research is in very bad shape. ... really (Respondent #NL08).

The point raised here is that the university's defined mission and determination regarding industrial attachment makes it desperate to secure whatever assistance it may get from industry. However, industry has its mission and goals, implying that industrial attachment is a mere add-on function that they can easily do without. A respondent from a different department thinks and knows otherwise, agreeing with some of the sentiments expressed by management staff members above. She says that industrial attachment is vital in that:

... it also helps staff when they want to do some research work with industry, it's easy for them to collaborate with them for networking purposes. It has actually helped the staff to network with industry and other institutions. And also they have been able to get consultancy through that, because as they go, they go and network, and when there is some consultancy which is needed, there is no way to get specialists in that area (Respondent #NL09).

The generality of responses from the lecturers echo what has been said by management staff above, particularly that 'very little research is taking place, but the opportunities are there, (although) they are not being fully exploited ... lecturers learn more about companies than they possibly would have learnt without industrial attachment' (#NL10), and 'If the student has taken as a research project some of the aspects within that company, we also share the notes at the end, they get a copy of our dissertation, and that improves quality' (#NL10). It is of value to note the comments by another respondent who said that because of the diversity and the wide spectrum of their stakeholders in industry, there was much that they learned 'in terms of the activities that these industries go into. And also we exchange information, in terms of what our research interests are' (Respondent #NL11). Some of the tangible outcomes of a good undergraduate degree programme and the research projects by both staff and students are hailed below:

... I would like to indicate that because of the high quality of our research projects and the high quality of the students that we churn out [that graduate from this particular department], we have had a number of the students actually being enrolled for higher degrees internationally and regionally (Respondent #NL11).

From the above responses from all the NUST staff members interviewed, we find a realisation of the vast opportunity for research emanating from the university's industrial attachment programme; these opportunities are currently largely under-exploited.

- *Industry Supervisors*

The impression I got about this category of respondents was that research was not high on their agenda. It would only be considered if the lecturers brought it up to them and it made good business sense. On the frequency of interactions between the relevant university department and the company hosting its students, one of the industry respondents indicated that there was very little happening beyond the students' IA programme. Asked if university lecturers were making use of their student supervision visits to pursue other avenues of university-industry collaboration, the reply was:

Unfortunately on that note, not much, because we only see them when they come for industrial attachment, the visits, when they come to assess the students who are on internship. That's when you see them, probably twice the whole calendar year (Respondent #IND02).

This respondent assured me that if called upon to do so, her company would gladly and gratefully welcome university lecturers coming in to spend time with them and to discuss issues raised by students such as the development of new products or solutions to problems, which could lead to identification of collaborative research engagements.

- *Other Universities*

The grain of thought in this category does not differ markedly from that of NUST. Lamenting the handicap of lecturers and academics in going full out into research, one management officer (#OUMC03) at a state university reiterated the lack of senior research staff at their young university at the time they were also experiencing a significant brain drain. The predominantly young academics often got so imbued into the teaching function that they could hardly find time, let alone motivation, to engage in research. Moreover, they generally had no substantial research professional development, and support for research in the current situation was not inspiring even to the experienced and determined researcher. The lengthy response below explains how lecturers find it difficult to pursue the academic function of research:

So there is some limitation [as] to [lecturers'] contribution to research work which is aligned or linked to industry and commerce. But what we have observed is that when they go out to, say, visit the students, there are things that they observe, there are challenges that they meet, there are things that they, probably I would say, they look into in conjunction with the students. Probably it's also which comes when a student has got a challenge, he's doing a project, whatever. They immerse themselves in these particular issues, and thereby what comes out of it is an appreciation of the particular challenges that industry is facing, and then an opportunity to research. So it's neither here [n]or there to say which of our academics would then say, 'I am going to take this up and research on it' (Respondent #OUMC03).

This same respondent complained that industry does not seem to come out openly on offering the university chances to engage in collaborative research with them.

Then the other side of the coin is that ... it would be good if industry would actually say, 'Look, we've got a problem here, we've got a challenge here. Now you have your student here but we would look at you being the best to resolve this. So ..., would you probably undertake that particular thing (task) ...' [Respondent #OUMC03].

Thus the lecturers of other universities indicated a clear awareness of the role and need for research as a requisite academic function, but with a realisation that research is not easily carried out. There were other responses from both the state universities and the private university that gave the impression that no research was taking place at all and that plans were under way to engage in research in future.

#### *4.3.2.3 Academic Improvement: Value-addition and Curriculum Integration*

The contributions of industry-based learning to lecture room and board room processes and discourses of the university, or vice versa, must be regarded as crucial in justifying the continuance of the demanding programme and in ascribing quality to it. They signify integration of diverse but complementary functions for a desired goal.

- *NUST Staff*

One of the key points raised by NUST staff was that industry-based learning was a means to get students to handle and practise with scientific, technical and other equipment that is either lacking or in short supply at the university. The university laboratories, as in a typical developing country, and in a harsh economic environment, were scantily equipped to enable students to grasp the concepts that they were intended to master to get effectively technically prepared for the world of work.

Answering a question on whether graduates with industry-based learning experience would be suitable workers, leaders and innovators for a developing country, one management staff member (#NM01) noted that with a low national technological base, the universities would only be able to produce graduates who would need substantial re-training if they were to go to a developed country, or to enter the world of work in a world-class organisation.

[Graduates] are definitely suitable for a developing country rather than advanced country. We don't have the equipment here, which would prepare or rather make people be better inclined towards an advanced economy. Our teaching equipment is at the level of a developing country at best (Respondent #NM01).

The suitability of a developing country mentioned above needs to be interrogated since it might imply that in developing countries, inadequacies and inefficiencies are permissible. Whereas the value of industry-based learning is realised in bringing the student to familiarity with relevant equipment, it is also important what the nature of the equipment is. Selected respondents were in agreement that equipment for teaching and learning, whether at university or in industry, must be modern and be in line with international technological trends. It was brought out clearly that in other countries, particularly in the developed world, equipment was not a problem and thus there was no need for extended periods of IA for university students. This point, pursued later, underscores the expressed rationale for industry-based learning in a contemporary university in a developing country compared to a developed country where prolonged industrial attachment is not a component of degree programmes:

And why it doesn't have the industrial component [is], you find that their laboratories are well-equipped ... such that most of the practicals that we here depend on industry for students to do, you can actually do most of them there. And some universities actually even have better equipment than what you find in industry (#NL04).

A further clarification on the qualitative use of equipment was given in response to my question whether their departments were able to carry out the required degree-specific laboratory practical activities on campus:

... [Y]es our students do [carry out] some practicals but not as we would like to have. You might find [actually] at certain instances the students may be too many in a group, which is not good because [some] students end up being observers only, and not participants, so that is a situation whereby we keep on purchasing new equipment so that when we are giving students practically orientated tasks, they will be few in a group so that everyone ... participates (#NL05).

Turning to student research learning, the link between IA is reportedly demonstrated more through the final year project. This project allows students to bring problems, knowledge and experiences from the workplace and use those at the university to design and carry out a manageable problem-solving or innovative undertaking.

... [I]t is advisable that they [initiate] the final year project at places of attachment. And again, because of the problems that I described earlier, sometimes they are attached at very small companies, [where it] is difficult to come up with ... a final year project ... (#NM02).

The above might indicate that an impoverished workplace such as a small company would be poor also in affording opportunities for student research education as characterised by identification of a project topic or substance of study.

The quality of education received by students to become managers and leaders in industry is enhanced in those organisations that have policies or a history as well as the capacity for customised professional development programmes for the student. One respondent lecturer explains this point below:

... [T]here are companies that have been involved [in] the training of students, training of manpower, over quite a good number of years. And as such they know the shortfalls of the students, and in most cases they will be having training programmes. So ... you find actually a student would be able to move through a training programme before actually he can be given ... some tasks to complete ... on his own (#NL05).

Any programme worth sustaining has to be monitored and evaluated to incorporate change and to embark on continuous improvement, and the industrial attachment programme at NUST is no exception:

You cannot expect yourself to do the same thing over and over again. Just visiting students, seeing what they are doing and coming out. Obviously you want at least that attachment to create a possibility of having collaborative researches and other things that... are there in terms of relationships that you find outside the country because attaching, yes, for basic training, it's OK, but ... we need a case ... beyond ... where students now afterwards can go further .... (#NL06).

The industry-based learning adds value to lecturers' knowledge in more ways than just pointing them towards research opportunities. This respondent said that the programme has given them the opportunity to see what is happening next door:

I always use the term 'espionage'. I mean [in] espionage you find that you can get technologies across different industries that you cannot get if you are basically stuck in one industry. So that has helped academia basically to be up to scratch in terms of knowing what is happening out there ... but obviously there is room for improvement where we can send, if possible, members of staff to be housed there for maybe two weeks or, a month, [that] kind of setup (#NL06).

Regarding the effect of industry-based learning on student attitudes, motivation and readiness to learning, the industrial attachment is commended for preparing students for real life working environments, something which laboratory experiments do not accomplish:

No, they prepare academically and also they prepare for the work environment. But having said that, I don't think there is anything that can substitute work-based learning

because there you are in the real world, whereas when you are in the laboratory sometimes you might be simulating these things (#NL04).

On the possible learning styles of students as they integrate industry-based learning with the totality of their university studies and experiences, one respondent had this to say:

The way our students learn generally I think ... first it's from lectures, then from practicals. We have design and project subjects where they ... are given a topic, they need to do a research, produce experiments. So that enhances their learning style to understand. My main point in teaching is that whatever they are learning [they must] understand ... not memorising it. For quite a few of them it turns out the best way of presenting their knowledge is just [to] memorise it, and during tests or exams or whatever forum of examination [there is], to give it exactly as it is in the notes (#NL08).

Acknowledging that learning practices that involve laboratory practical activities are both motivational and effective for the grasping of content with electronic engineering students, one lecturer respondent noted that the students needed to develop skills of self-organisation and self-regulation progressively in controlled stages, starting with prescribed and closely monitored activities.

It goes by stage(s). Part I, Part II [it is] are prescribed. They need to follow instructions, and practically be told this, this and that. It's not entirely mechanical, and point[ed] out to them, now measuring this point, measuring this one. .... This is how it works. If you measure here you will obtain this. And they need to [however] think, summarise results, and express what they have learnt, what those results mean for them. [In] later stages, Part II, Part III, it's more creative. They are given sets of instructions, some order, some main points that they have to follow and cover, but more or less they are on their own (#NL08).

Regarding the integration of learning that is facilitated between the classroom and industry, measures were taken to assist the student to quantify and reflect on the knowledge learnt and its follow-up application, as is the case where one department reportedly made use of the following:

...a questionnaire [in] ... which one of the aspects we want to know is, Has the student made any practical input, or has the student made any application of the knowledge that they have gained at university? And that actually enables us also to look at our curriculum, vis-à-vis our clientele, who are the industrialists, and hoping that if they don't, we will find out why haven't they been able to utilise the knowledge of the past two years in that working environment (#NL11).

In response to the possible effect of industrial attachment on the quality of teaching and learning, one lecturer (#NL12) could not see the link because, from his own experience, he didn't 'gear any of [his] teaching towards thinking about industrial attachment'. But, he noted, industrial attachment had changed the students' way of thinking:

That's what I have particularly enjoyed about industrial attachment. I never did it when I was a student. I never heard about it till I came here. And because it's such a good system,

this is why everybody is copying it. And all we are doing is having those two years beforehand, put in some appropriate topics, with us it will be research methods (#NL12).

This lecturer regretted that he took ‘more of a didactic approach’ when dealing with his students, and realised this could harm self-regulated learning, explaining:

I just say, this is the way I understand knowledge, let’s go, this is what we gonna do. I notice eventually the slow student or two ... So I am trying to do it also as an adult process, a two-way process, and to go back to one of your earlier questions. I’m therefore not trying to stuff it down their throats’ (#NL12).

- *Industry*

The single point raised by one industry supervisor on learning and teaching and value addition concerns the relevance of certain background knowledge and techniques required to make students industry-ready, i.e. to get enough preparation during the pre-industrial attachment period at the university. The respondent expected students to bring some basic knowledge of the equipment used in industry, ‘... but you find that most of the times it’s the stuff that they are going to do when they get back to college ... in Part IV. ... So you really have [now] then to start from the very basics ...’ (#IND02).

- *Other Universities*

The value of industry-based learning in improving teaching and learning is addressed by respondents from other universities in much the same way as at NUST. Take the issue of holistic student development raised by one management staff member at a state university:

... we also believe that exposure will develop personal and social aspects so that through that there is improvement of interpersonal skills, presentation skills, self-confidence, taking initiative, teamwork, and all these will increase their confidence when they finally complete their degrees (#OUMA01).

The interplay between industry experiences and classroom learning, and the contribution thereof to curriculum development are realised through feedback from the students, who bring ‘problems that they have faced, challenges that they think we should address, issues that they think we should discuss with the employers to the curriculum, areas they have been faced with, which they have never faced, they have no idea what they have covered, so that we can readjust our curriculum since we are preparing these students for industry’ (#OUMA01).

Somehow, it seems industry-based learning has benefits that accrue to the university:

The first part of it is that it is an evaluation of our curriculum. It's like front-end analysis of our curriculum. The students go in and come back to say, This is not relevant, it's no longer functional in industry or These are new dimensions in industry, like tax, for instance, once they introduce new tax, the students go there and say, Oh they have now introduced [a] new tax system. So that again will mean we change our tax system and work with that industry. It also benefits the university in the sense that the lecturers themselves become aware of the need to be relevant and so they get in touch with industry first, as they go into any particular [field].... it might be marketing, or accounts (#OUMA01).

A management staff member from another state university agrees that industry-based learning 'does inform those who are responsible for curriculum development because there are lessons learnt when students are on industrial attachment' [#OUMB02]. Apart from reporting on student progress and finding out the expectations of industry, another pedagogical benefit is the opportunity to develop course outlines from an informed position for the benefit of both the student and industry.

Regarding students learning to practise the culture of the organisation in which they will be attached, it emerges that students stand to benefit in that once in the company they move from one department to another, appreciating the job requirements and gaining relevant knowledge and experience. Furthermore, in consolidation of earlier views on the input of industry-based learning on curriculum development, it is observed that a lot would be coming from the experiences of the academic staff in departments who will probably be saying, 'We think that this particular component probably should be embedded or should be put in the curriculum' (#OUMC03).

In response to the varied experiences that students get from being placed in different organisations and the impact of this on fairness and comparability of their assessment, compounded by the different standards of the assessors, one lecturer respondent (#OULD05) from a state university said that 'some employers will go an extra mile to assist the student in terms of the learning experience' while others do not bother about how useful the industrial experience should be to the student. She explains that the quality of the experiences the students gets are not guaranteed for all students, and exposes the problem encountered below:

... I think [really] the problem is ... we cannot really force employers to do what we want, you know, we can only negotiate. We can end at that level. We can only negotiate to a certain level but we cannot make them change the way they operate. So it will always

remain a challenge. But as a university we also try to make sure that we make them understand what we want to bring out in the student... (#OULD05).

However, at the same university, when negotiation and common sense fail, other measures according to this respondent:

[D]uring the first month when they have been attached, if there is a report that really, really things are not going so well, we encourage them ... to look for alternative employment, or we assist them to look for it ... because we know that will jeopardise the mark that they might get at the end of the day, or they might not really accomplish what they want to. So we encourage them to leave such an organisation ... (#OULD05).

Industry-based learning is viewed as adding value to the students and their institution in terms of building a character that society values. Such a character is ‘a good citizen, ... academically upright, ... versatile...’ (#OULD05). Such a character also keeps employers asking for more similar students annually, giving a good name to the university, and assisting the university to model its programmes around what industry requires. A respondent from the private university agreed on this and others’ views about the input of industry-based learning in the curriculum, and added a caution:

That information that comes from out there has always been useful in shaping bulletins that we change after every two years, and when you are changing the curriculum ... the course content [is] revised based on what feedback we get from those attachment places. But ... we also need to be careful as we are trying to change because sometimes we end up training people for one company, instead of actually training people who are more versatile, who can move ... So we apply it carefully, without training them for specific jobs (#OULE08).

The fact that it is possible to take advice from one or two vocal participants at the expense of many others calls for wide consultations before decisions are made.

#### *4.3.2.4 Holistic engagement with industry*

The diversity of industrial and commercial concerns and workplaces puts a big question on the nature of experiences that students go through when each one stays in one organisation for the whole year as has been discussed above. The varied experiences are seen to affect the ultimate assessment grades of students. The focus of this section is on how the university views workplaces, mainly industry and commerce, as contributors to economic development in the country. Does the university value industry-based learning that includes various sectors of the economy, namely large-scale enterprises (LSEs), small and medium-scale enterprises and even the informal employment sector? What are the motivations for the university’s chosen engagement pattern? These are the views sought from respondents and reported in the sub-sections below. My specific objective

was to determine the university's involvement in small- and medium-scale enterprises (SMEs) as compared to the LSEs.

- *NUST staff*

My observations over the years have been that when our university talked about industry in terms of industry-based learning, they very often were referring to large-scale, high-end and well endowed organisations found in the country. And this is confirmed by most of the respondents. Implying that NUST had not hitherto taken serious thought on the question, my first management staff respondent (#NM01) observed:

Yes ... we should begin to prepare our students for working with small- and medium-scale enterprises, ... (which are) on a growth curve, ... so that if [students] don't get taken up by established companies they should be able to go and work with SMEs. And it's also an opportunity for knowledge, skill and technology transfer to the SMEs'.

A fellow management staff member (#NM02) pointed out that most departments in his faculty were not involving SMEs in their industrial attachment programme for the reason that SMEs did not provide the desired learning environment to provide essential experiences for engineering students:

But we want an environment where the student will go through the various departments that are covered by the programme. You know an SME usually is small. They may have only a few operations that take place there ... they may not even have stores [departments]. So those processes, the inventory side of issues ... don't happen. And all the other things, the marketing side. The marketing may be there. The design side may actually be [missing] (#NM02).

He further indicates that the doors are not closed for him to consider involving the SMEs on condition that they provide adequate challenges and opportunities for students' intellectual growth, so that in cases where the number of key processes is below expectations, they would happily attach the student, because:

sometimes you can't get everything in one house..., and the advantage of attaching them there ... is that students usually ... notice the things that are missing, [and] they may contribute to the growth of the SME or its profitability (#NM02).

The views of the first lecturer respondent (#NL04) are similar to those above in acknowledging that although not pursued before there is some justification for industrial attachment in SMEs. He explains the fears that instead of them learning, students become the source of learning, and:

instead of being an electrical engineer, or a textile person, you end up being the manager, the human resources [officer] and everything else wrapped into one. ... but the SME

might give you an opportunity so that you can now expand your knowledge on other things but now the core business of what you are trained for might suffer (#NL04).

Sentiments from other NUST lecturers reiterate the thoughts above, noting that SMEs tend to rely too much on the student for leadership and knowledge (#NL05) and have no capital to sustain student learning (#NL07). Other views embrace the involvement of SMEs by university departments on various levels:

We have made a deliberate move as a department to allow students to be attached in SMEs. And what we do is we follow them up closely, because you find out maybe the size is a bit small, the equipment is a bit small. So ... we now need a little bit of ... boosting to the student for them to be able to see opportunities which the SMEs [provide] .... But ... the benefit is this, the student is basically .... like a freelance, with a lot of innovation, a lot of challenges, you know, a lot of design of new things. So that gives us a ... new plan ... a new calibre of students that can possibly start their own thing because they've seen an example, you know, from the people that are running the SMEs (#NL06).

Another view is that smaller companies sometimes provide better IA than big companies, in that in the big companies everything is already established, routine, procedures and equipment. Smaller companies on the other hand struggle to survive, securing projects as they go. 'So ... in such case[s] our students can be involved in several projects during their industrial attachment, and get lots of knowledge. .... (#NL08). Some university departments that started off without involving SMEs have now cautiously incorporated them:

Ah ... At first we were really sceptical about small industries because the challenge was [that] they [the students] might not get the required experience which we are looking for. Then we had to put in other criteria[s] for them to be able to go in there, like we need a person who will be supervising them to have a minimum of a degree in accounting ... Yes we have students who are being attached to new companies, but before they get a place to be attached, we try by all means to communicate with the person who is going to supervise them, and we tell them our expectations, and if they need any help in their setting up the accounting systems, we are willing to help them. Yes, as a social responsibility (#NL09).

In another department it is desirable to include industrial attachment in SMEs because:

... one of the courses we actually teach is Entrepreneurship, and we have said several times to students, in an economic setup like the one that we have, they should not expect to get employed. They should eventually think of creating employment. So at least if students get attached to SMEs it gives them the opportunity to try out ideas. In any case those organisations would not have fully-fledged marketing departments, fully-fledged human resources departments. So they become the experts when they get there, and that gives them the opportunity to actually try [out] their skills (#NL10).

To one department the size of the attaching company did not matter, as they just looked at the appropriateness of the industry to their core business, wildlife and forestry

resources management in the particular case, stating that, “Our guiding principle is the type of industry, .... not necessarily the size” (#NL11).

Finally, SMEs give students ‘more scope’, students ‘experience everything within a small company’, students get better supervision because they ‘can become more intimate with the company, with the people in it, and a lot of our students do get offered jobs by those small companies after [the industrial attachment]’ (#NL12).

- *Industry*

My interviews were conducted with respondents from large-scale companies because that is where most of our students were attached and those were the ones that responded to my request for interviews. Their views on whether the same facility of workplace-based learning could be fully and liberally extended to SMEs are more on the sceptical and cautious side. They warn that attaching students in SMEs can be detrimental also to the students concerned because they will never learn anything basically in terms of how to run a successful business. What the students may grasp may not be the acceptable practice, and ‘... if ... they are not given that room to do [the acceptable practice] it means that whatever they have they can’t put it into practice ...’ (#IND01).

This respondent agreed that SMEs were on a learning and growth curve themselves, but were often deficient on staff, providing diverse job-descriptions to students. The other industry respondent harped on the same view, stating that enterprises must have systems, such as those in her department, incorporating a quality management system for all activities, and ‘I’m saying as long as the SMEs also have those systems in place, then to me it would be OK’ (#IND02).

- *Other universities*

One state university management respondent divulged that their university was not only keen to involve SMEs but was making efforts to create such organisations to be run under the ambit of the university. He said:

... I’ve introduced what we call entrepreneurship skill work-related learning. This is a scheme where students who want to start their own businesses, we challenge them to come up with proposals and then we have a committee, Quality Control Committee. They go through this proposal, and then [for] those that are approved we look for money from SEDCO (Small Enterprises Development Cooperative) (#OUMA01).

The success of this scheme apparently was still to be appraised as it was in its infancy stages. The management officer from another state university echoed the sentiments alluded to earlier on entrepreneurship education rather than straight industrial attachment in SMEs, saying, ‘... it’s mandatory [for our students] to take up a technopreneurship course ... We want them to do the high-tech, but they will obviously start at the lower level where they will get to form these SMEs and grow up and have [these] high-tech’. The lecturer at the same institution indicated that his department did send students to SMEs, adding, ‘We have one radio and installation company, and their staff turnover is just about ten if not less. But they do excellent telecommunications jobs and we send our student there.’ At the private university, one respondent revealed that their students go ‘everywhere, ... small, big, and mines, ... you-name-it’ (#OULE09).

#### *4.3.2.5 Relevance of the industrial attachment programme and graduates*

One aspect of a worthwhile learning programme is its relevance to the intended purpose or situation. The NUST industrial attachment programme, as an integral part of all degree programmes run at the university, purports to fulfil specific slots in the job market in Zimbabwe, particularly senior positions in a developing country economy. The relevance of the programme defines also the relevance of the graduate, and my contention is that relevance should be defined holistically to encompass broader needs of the country.

- *NUST staff*

Management staff at NUST have a great passion for industrial attachment as it is one of the defining features of the university and at one point was dubbed its ‘USA’ or ‘unique selling advantage’. My first management respondent lauded the relevance of the programme for its role in producing business leadership and participation in company management:

Our graduates are already running ... all the major companies in this country, ... both in the mining field as well as in the manufacturing sector. ... It is NUST graduates who are running these sectors ... all the major companies in this country now, this moment, including the banking sector are run by NUST graduates (#NM01).

A point that is widely raised as proof that NUST graduates are useful, relevant and likeable in industry is that they get offered employment at the companies of their attachment even before they finish their degree programmes, where companies say, ‘Look, go and finish your Part V [Final year at university] and come back and start

work' (#NM02). Asked whether the students are adequately educated to developing Zimbabwe and its unique socio-economic needs, the response was:

They certainly are. ... [A]ctually as we teach them, we teach them the technology that is available here, and the technology that is available across there in the developed countries. Although in a number of cases we don't actually have the technology, [but] we have textbooks that describe these things and they also see these things on TV. The whole idea is that we must have this skill base in an economy... (#NM02).

The question that remained unanswered was whether it could be stated as the responsibility of graduates to lift the country up from the low level of economic development, i.e. from poverty. King (1986) observes that education systems are intended almost exclusively to prepare people to serve in their own country and are managed almost exclusively in national terms by sometimes insular administrators. The colleague who had started working as a university lecturer well before the establishment of NUST and had seen the transition from the traditional mode of running degree programmes, shared some of his experiences as he underwent a paradigm shift:

But with time what I began to realise is that industrial attachment is an important component, especially if you are trying to meet the needs of industry and deploy manpower for development in the manufacturing, commercial and other sectors. And when you think about it carefully it's not very different from those practical subjects or degree programmes such as medicine and engineering (#NM03).

He went further to express satisfaction at the relevance and impact of the industry-based learning model when compared to traditional formats of degree programmes, noting the route NUST had chosen was turning out to be the following:

... more popular, at least in case of Zimbabwe's needs, where other universities ... have begun to implement this industrial attachment as part of their degree programmes. ... My understanding is to say that you have the ivory-towered graduate that came [from] the University of Zimbabwe. I will take the example of biochemistry, the department which I was in. We would have graduates taught in high-powered techniques, molecular biology, cloning et cetera, and that was not at all used in industry in Zimbabwe at the time, unless they went on to do a Master's or a PhD (#NM03).

He stated that some of his reservations on his observation that what the university wanted to teach may not always be what industry wanted. He thought that the various departmental industrial liaison boards needed to be more proactive and be strengthened in order to make industrial attachment worthwhile, concluding that, 'otherwise it's going to stagnate and with time decline because it's going to be irrelevant' (#NM03). The comparison of the industrial attachment model to other forms of preparing manpower needs of the country is insinuated in one lecturer's (#NL04) response who compared it to the apprenticeship programme which he said 'was very appropriate for a developing

country because you have people you train on the job’. Another view from an accounting lecturer (#NL09) was that industry-based learning ‘helps our society to be enlightened about what is happening within our industry...’, and helps ‘to educate our society or population on how businesses run’. Students were being educated and trained to be internationally relevant; to be suitable both in the Zimbabwean context as a developing country and anywhere else in the world:

We don’t concentrate on the local scenario but when we teach, we look beyond borders. What really is needed? What are the new developments? And by the time they [graduate], they can go and work in [the] States, they know what is to be done in the ... accounting field. They know the international accounting standards which are applicable for those countries, and they know how to report. So ... they are multi-purpose, sort of. They can fit anywhere (#NL09).

It is further acknowledged that industrial attachment allows students the opportunity to interact with Zimbabwe, their motherland, and produces graduates who have passed through Zimbabwe (#NL10).

- *Other universities*

One management officer in a state university believed that industry-based learning addresses the needs of the country because his university had embarked on production of equipment for the country’s needs especially in the agricultural sciences, saying, ‘I have seen them producing implements that are suited to the Zimbabwean environment’ (#OUMB02). The counterpart at another state university extended the concepts of producing a graduate for a global village:

... [O]ur institution is not premised on probably just being myopic to issues that we have locally and nationally. We want to be a global institution from a point of view that whatever we are giving as programmes, we want our graduates to be acceptable anywhere in the world. ... Anyone ... graduating from our programmes should be acceptable anywhere in the world. So we are not really looking at graduates who, you know, suit our local environment, but who can fit anywhere, and who are comparable to any graduate from any of world-class universities ... but we don’t forget the fact that we are entrusted by the nation to produce graduates anyway who can solve the challenges that we have in the country. So, embedded in our programmes obviously is that element of trying to ensure that we proffer solutions to some of the challenges that we have in industry and commerce (#OUMC03).

It is not clear whether more emphasis should be placed on world-class or on local relevance. The follow-up question on whether a university could be truly world-class if the community around it is poor was not satisfactorily answered by this or other respondents. This was linked to SMEs that are very close to the ground in Zimbabwe, and getting the views on whether universities wanted to help them or are helping them in

terms of bringing them up as vehicles to economic growth in a developing community or society. The respondent added:

But we are saying if we have to catapult this industry forward, because we are the custodians ..., we are supposed to do that with our institutions to ensure that our industry grows, because we are producing the manpower for that (#OUMC03).

The ability of students on industrial attachment to source or identify problems which are often latent in the organisations was raised by this minority languages lecturer respondent from a state university. She says that in those ‘un-researched’ or ‘not-so-researched’ languages:

... we notice ... we have the Statistics office ... in [named town]. ... They will have a lot of data relating to those [minority language] issues. But when our students go there they will say, ‘Ah no! But we were not aware this is the way we should handle this information. And we didn’t even know its relevance. We’ve just collected (data), and we’ve stored it here’. So they are saying, ‘Maybe we should do something, [the University] and the Statistics office. Let’s do something, so that we understand the work that we are doing out there’. So these are students now, who are reaching out, who are getting to these organisations and assisting. So I think, you know, [we too] ... get to understand what we really need so that we make a difference (#OULD05).

The likeability of students on industrial attachment impacts on their likeability when they have graduated and they have become employees or managers in business organisations. The private university lecturer in Agribusiness was encouraged by the response she got from industry partners in neighbouring countries hosting her department’s students:

I had a chance to go to assess a student ... who had been attached in South Africa, and the other one was attached in Zambia, the other one was attached in Swaziland ... To tell you the truth, they are saying, ‘I don’t know what Zimbabweans are like. We can’t do without your students’. They love the students from Solusi University especially the Agribusiness Department. They are saying they are hard-workers, they are dedicated to their work. ‘We don’t tell them what to do, but they will [arrive at work before] us the owners of the companies’ ... So I feel very much motivated because of that. I think they can [fit in] everywhere (#OULE06).

Her colleague in the finance department returned from visiting students on industrial attachment with a different perception about them - that in their workplaces they are innovative. They are hard-working and they prove to be very useful to their companies. They are very useful on practical aspects, indicating that they are ‘bound also to be very innovative, because university is a place that is supposed to bring out innovators’ (#OULE07).

#### 4.3.2.6 Format of IBL: the NUST brand and comparisons

The typical NUST brand of industry-based learning (discussed in more detail in Section 1.3) is one in which all normal undergraduate students go out during their whole penultimate academic year (two semesters) after successfully completing all their pre-industrial attachment courses. This format is not known to be popular in universities in other countries. However, after being pioneered by NUST in 1991, it has since been adopted by practically all universities in the country, including those universities that existed before that time. The effect of the full-year industrial attachment is that it extends the students' certification by one year. For engineering and technology degree programmes that normally take four years, the student awaits graduation after five years (See Table 4.2), and for science, commerce, communication and information science programmes, after four years instead of three.

**Table 4.2 Comparative formats of degree programmes (IA year shaded)**

<b>A. Faculty of Industrial Technology</b>					
Normal degree programme format	1 <sup>st</sup> year	2 <sup>nd</sup> year	3 <sup>rd</sup> year	4 <sup>th</sup> year	
Degree with industrial attachment	1 <sup>st</sup> year	2 <sup>nd</sup> year	3 <sup>rd</sup> year	4 <sup>th</sup> year	5 <sup>th</sup> year
<b>B. Other Faculties</b>					
Normal degree programme format	1 <sup>st</sup> year	2 <sup>nd</sup> year	3 <sup>rd</sup> year		
Degree with industrial attachment	1 <sup>st</sup> year	2 <sup>nd</sup> year	3 <sup>rd</sup> year	4 <sup>th</sup> year	

From the illustration in Table 4.2 it may not be clear that the majority of students have to go out at the same fixed time at the beginning of their industrial attachment year, which starts officially in July. The actual length of time that students are engaged in their companies of attachment apparently varies as some of the responses discussed below show.

- *NUST staff*

Universities are autonomous institutions that depend on alignment to peers for benchmarking on the one hand, and on innovativeness and competitiveness on the other. The knowledge of staff on practices that are occurring in similar and like-minded institutions helps to shape the processes that they are engaged in. I asked the more senior staff members in the university management how they thought the NUST brand featured and compared with similar arrangements elsewhere, and generally they did not know of a country that attached students for a whole year. Attachments for short periods, not in

any particular year, but from the second year upwards up to the end of degree programmes were known. The attachments could be of three months duration each year, adding up to much less than a year:

But the advantages of these other countries, of course, is that the type of installed equipment in their industries, in South Africa for instance, in a number of cases it's more modern than we've got. That is the advantage. But otherwise exposure to industry in a number of cases is similar, it's got a similar effect to the student ... (#NM02).

Regarding the question why a full-year is a suitable duration for the university, this respondent said it was suitable to give the students time to settle in before getting down to actual work and learning:

The first two weeks the student is ... familiarising [himself].... Eventually he gets his feet down on the ground. He gets to know people, and then for the next eight months or seven months, he is part and parcel of the team and they learn better that way. That's what companies tell us [that] 'If you are going to bring the student for a month here, you will be wasting our time and the student's time because they won't learn much'. So our approach with our one-year attachment, we think we stand a big advantage (#NM02).

The fixed timing (July to June) of the NUST industrial attachment programme has been questioned by one lecturer, who cited the competition from other universities, some of which send their students early, and 'they will have taken all the spaces that industries can allocate, because ... some of them allocate numbers and say we are going to take so many students this year...' (#NL04).

A colleague compared neighbouring countries to the effect that 'South African universities do industrial attachment for a few months only' (#NL08). She further explained that this made these South African companies to prefer Zimbabwean student attachees, ostensibly 'to train them better'. Another colleague added that the duration of one year attracted foreign companies that were interested or had been requested to attach students because they preferred longer attachment periods than their own universities offered, and 'after that period they normally request if they could extend the attachment. So in that [respect], really, our IA is quite good' (#NL09).

- *Industry*

I had one or two informal discussions with some industry supervisors who expressed their support for the one year duration of the IA. Most of their views on this aspect were captured through the questionnaire.

- *Other universities*

The issue with other universities was that if they adopted the concept of IA from NUST, was it mandatory for them to adopt even the format and duration? Asked how their institution arrived at the one-year duration, a state university management staff member said that it was through market research that they found out what industry wanted:

And industry, from our research, has been saying, by the time the student has just learnt how to do the job, they disappear. So they are not benefiting ... When we have trained them, they have gone. They are not using those skills here. So that's why each ... research has shown that it takes nine to twelve months for a student ... for a person to be productive in a company. That's why we came up with that (#OUMA01).

The duration and timing of the industrial attachment at another state university was the same as at NUST, a one year duration with the students spending between eight and twelve months (#OUMB02). Regarding how they arrived at the one-year, the respondent revealed a new concept of attachment, that of being attached to two companies in the one year, saying,

... [S]uppose he has learned ... the processes and procedures in a bank, he's supposed to move on to another institution. So twelve months, eight to twelve months, they feel is adequate for that kind of move, yes, acquiring those skills involved in those two companies' (#OUMB02).

From the third state university the response was:

... [O]ur regulations stipulate that we should have 30 weeks of internship or IA .... [Continuous weeks] ... We have then looked at particular programmes that we feel should have a full year of internship. These are programmes like computer science, financial engineering, and electronic commerce. These we have now started to have them doing one year. The rest of the programmes still have [the] 30 weeks, and our understanding is that 30 weeks, if you look at it in an academic calendar, it is almost a year (#OUMC03).

Generally the rest of the counterparts in different universities and in different programmes had the same format of a dedicated one full-year, in which students spend between 7 to 12 months in real terms on the ground. In one instance the lecturer respondent (#OULE10) indicated that their desire was 12 months for every student, but because of difficulties in finding attachment places in time, their department ended up accepting 10 to 12 months. The only exception was at one department in the private university:

Our students in Clothing and Family Studies go for six months of attachment, not one year. Most of the things that you can learn in this area can be done in six months .... Industry would prefer them to be there for one year, but from learning, the one year is just working, it's no longer learning. Some students like it because they would be paid by industry (#OULE08).

The important point to be noted here is that the degree programme referred to the above enrolls adult learners who have been working for at least three years.

#### 4.3.2.7 *Student supervision and assessment*

Respondents raised some pertinent issues related to supervision and assessment of the students' industry-based learning experiences, particularly as a quality assurance measure. Both the logistical (including procedural) and the professional aspects of supervision and assessment featured in the responses, with more of the former.

- *NUST staff*

The issue of the number of visits by the institution's supervisors or assessors (academic supervisors) was the most popular in the responses by both management and lecturing staff. The key concern was that the number of visits in recent years had been reduced from the recommended three per year to one (or none) due mainly to the country's economic quagmire. The timing of the one visit for each individual student and for comparison between students was also of concern. One management staff member (#NM02) added that the reduction of the number of visits was disadvantaging not only the students but the academic supervisors as well, who would normally 'use the first visit to better understand the company' and 'spend at least half a day in that factory'. The qualifications of the academic (and industrial supervisor) are discussed in Section 4.3.2.1, but another quality issue is that of the reduced number of supervisors, as pointed out by this respondent:

... you find that we now have an industrial supervisor who is only a single individual who is going to make judgements over so many students. Being a single individual, where this means that his result is not moderated by somebody else. So that has made our industrial attachment actually suffer (#NL04).

One suggestion coming from a lecturer (#NL09) to combat the lack of uniformity in assessing various students in different companies by different supervisors at different times was that students could be made to write an examination on their industrial attachment experiences. Asked to explain more about the written examination and whether it would cover uniform knowledge, she replied:

... it will be different ...[according to] their area of specialisation. It will be like common [for the] first part, but then it narrows to a specialised field to see if really you grasped what you were doing, theory to practice ... That one would help us to really know that if the student fails that exam, you know that this student didn't ... experience ... Even if the student experienced ... but there was a gap. The student didn't understand the basics

before they went to ... industrial attachment; or they were not properly supervised (#NL09).

Explaining the role of the written examination, and commenting on the quality and the criteria for awarding marks and grades to the diverse students in their diverse working and supervision contexts industrial supervisors suggested the following:

.... [W]e have that portion where industry is also going to assess the student. We have tried by all means [as a] department, each time we go to visit industry ... [to] explain to them what they should look for when they are awarding marks, because some can put 100. ... And you can't change [that]... [In] practical work you cannot [score] 100% even if you were a doctor. So there is that loophole. We have no control over the marks which the industrial supervisors can put. But when we introduce an exam, we have control over the exam. ... We don't want to disappoint our industrial partners. But it will neutralise their marks and we will get a good .... score which that student deserves (#NL09).

- *Industry*

Responding to the question whether the students they had on industrial attachment needed a lot of supervision or not, one respondent (#IND01) could only say, '... at most they have been able to work on their own'. And again asked to rate the students' overall performance, she replied, 'It's actually been excellent. The ones that we've had so far... have been excellent in their work'. Communication between academic and industry supervisors concerning the former's visits to assess students was brought up:

We just have problems with other universities, maybe due to challenges of transport, distances, finances and stuff like that, but with NUST, there hasn't been much of that problem actually' (#IND02).

- *Other universities*

One state university respondent explained extensively the procedures of assessment at their institution, the instruments used, documentation and compilation of marks, highlighting that 'the supervisor as well is very clear on what is required'. This respondent also mentioned the challenges experienced in the supervision of students attached in neighbouring countries such as Namibia, Botswana, South Africa, Mozambique, Malawi and Zambia, explaining how they have:

... come up with strategies where we make conditions, give conditions that before the student can go out, they need to get a letter from the company that what they are going to do out there is relevant. We want to get in touch with that company. ... They [students] must have ... a valid passport ... The parent must give permission ... Most of them [students] would have their parents out there. That's why they normally go there (#OUMA01).

A respondent from another state university reported on how their students on industrial attachment in a foreign country were assessed:

... [They] are assessed by academics in those countries. In Botswana we have quite a number of staff who were here who are at the University of Botswana. For example, a case in point [is] [name of academic] [who] assessed our students who were attached in Botswana. And then in South Africa the lecturers from here ... have travelled all the way to South Africa to assess about 2 students (#OUMB02).

Regarding the comprehensiveness of the student's assessment the management member for the third state university (#OUMC03) provided a picture comprising multi-pronged assessment by the company-based attachment supervisor, the visiting academic supervisor(s), the student's internship written report – all these constituting continuous assessment and finally the student's oral presentation. He concludes, 'So the oral presentation mark, the continuous assessment mark ... all these we add up. That's the mark for the student for internship'. A lecturer from another state university (#OULD05) expressed one problem that she had observed with student assessments 'at the stage of report writing'. She said although they had provided guidelines to students, some still went on and did not do it satisfactorily. Respondent #OULC04 expressed concern over disparities in student assessment and proposed coming up with a standardised supervision and assessment schedule for use by different supervisors in their different trades or disciplines. Responding to the question on the timing of visits by academic supervisors, one lecturer had this to say:

They [students] are not followed [up] in time to such an extent that they will end up misbehaving [in] one way or another. I have realised that some of the companies were even mentioning that we are no longer taking students from this college [university] ... because maybe it is on our part, the lecturers, who are failing to make a follow up in time (#OULE06).

One respondent touched on a crucial point about those students who go on industrial attachment in organisations convenient to them or in neighbouring countries:

[They look for] places that are nearer their homes where they can cut down on expenses, because practically some places are just impossible, especially if they are not paid because some organisations are actually voluntary organisations where the student is not paid. So they look for places that are nearer them. But what I see is sometimes they are just going where their parents are working, and you end up having the parent being the supervisor, or a relative being a supervisor. That is [a] problem (#OULE08).

Regarding the difficulty of sending out academic supervisors frequently, the above respondent noted that with limited members of staff in the department, it was problematic to free a lecturer to go out on visits, leaving classes unattended on campus. Suggesting that there could be truancy by some students in presenting themselves for

their industry-based learning, especially where they were not remunerated, one respondent noted that students needed somebody working behind them, or checking on them through phone calls for the advisors or human resource personnel, who would update them on how the student was faring, because ‘... if you don’t keep in touch they will not go for attachment. They will tell you stories. That is a big challenge’ (#OUL09).

#### *4.3.2.8 Shared conceptions of industry-based learning*

The main question here was whether the different players involved in the administration of industry-based learning shared a common conception or understanding of the idea, its philosophy and the programme. Such a shared understanding would ensure that each participant in the programme acted with common goals and expectations in mind and in concert with others even when alone, and this improves the quality of the whole programme. It is accepted that when the programme was first introduced as an innovation, early participants and stakeholders were thoroughly orientated regarding the rationale and the procedures through workshops, professional development and documented information. However, it is likely that as the years went by, and as new practitioners got roped in, the amount of professional development reduced, and as some of the pioneers of the innovation retired or left the institution, the original enthusiasm died down, and many participants started to take things for granted. In this light I sought to find out what background knowledge drove my interview respondents as they went about doing their industry-based learning tasks and how they shared this knowledge between themselves and other participants.

- *NUST staff*

The management staff member (#NM03) who brought this issue up had a warning to give to practitioners who engage in a crucial activity such as industry-based learning:

When you forget the philosophy or the motivation behind a certain activity, then you forget what you are expected to do, and then you have confusion and problems. I think the original concept of what industrial attachment was about is lost on the current generation of some lecturers here. They believe their job is simply to get into industry, and to make sure, you know, there’s a checklist, [asking students], ‘Are you getting your money, are you getting this, are you OK?’ (#NM03).

Probably deriving from these observations, the current staff members who are either new to the concept of industry-based learning or are simply ignoring the original stringent procedures are doing practices that do not show professionalism. His view is that the whole business of industrial attachment is a two-way affair, based on interaction

using strategies such as short one-day courses or seminars ‘on the essentials of industrial attachment, the philosophy behind it, the expectations behind it from the industry and for industry, from NUST and for NUST, and then if people were actually to use an old word, ‘conscientised’, then you would find that the people are better able to interact and be more productive’ (#NM03). Another view is how lecturers have perceived their industry counterparts’ understanding and subsequent interpretation of processes carried out:

... [W]hat happens is that when our students go to industry, and this has been a thorny issue because we have had sometimes to argue with industry whereby they think now they have got cheap labour. When our students go there, we expect them to go through all the operations of the industry during the attachment. But some industries you find when they get our students, then they will just stick them in one area where they can, the students will be solving their problems (#NL04).

The issue of companies taking students as cheap labour worries many other respondents, implying that it is a shared feeling among many university staff. It is questionable whether industry does this innocently or it does it because it is under no pressure to do the right thing. Some lecturers thought there was no problem in students being treated as ‘a workforce’ in industry as long as they were learning from doing ‘challenge solutions’ (#NL07). Regarding communication between the university and industry to build common understanding, some lecturers having students interacting with our stakeholders brought some of the stakeholders to come to know about the university, and ‘you find actually that there will be more communication between the university and some of these private sector[s] in certain areas of mutual interest’ (#NL05). The other lecturer extended the issue of communication between the university and industry:

... [T]here is a lot that is desired in our relationship with industry. We somehow live secret lives. Industry is doing [its] own thing. They don’t mind employing our students, but that’s about the end. ... [T]hose industrial [advisory] boards with departments must be re-established with the right people attending those meetings. They are usually over a day or two. Open days also need to carry on, and [we] invite and insist people from the industry to come. Lecturers must be given opportunities also to attend courses and some sort of training with the industry that are relevant to us that also will help, some work, some project ... We have to ... talk to them. We need to establish contacts ... in order to plan the avenues. The boring thing is that our students once graduated are not interested to come back to the department [as alumni, friends and employees] (#NL08).

A colleague (#NL09) believed that communication should start within the university, with meetings for finding ways ‘how we can improve and be ahead of others because everybody is copying what we have been doing’. She says since the industry is a third party, it ‘means we need to run workshops with the industry, like having breakfast

shows, where we address about industrial attachment, what we expect...’ I asked a question to some of the lecturers on whether they knew how other universities locally and internationally were handling the issue of stakeholder communication in industry-based learning. While some respondents had some faint knowledge, others admitted their ignorance, such as, ‘I must be frank, I’ve not had an opportunity to check what happens elsewhere’ (#NL10). This ignorance could easily impact on their sharing ideas with the broader teams of scholars and academics near and far.

- *Industry*

The industry respondents did not show any better understanding of the student needs and the lecturers’ expectations or of the ideal outcomes of the industrial attachment programme. One of the respondents was more general about the ultimate goals of the industry-based learning programme in producing a particular type of citizen:

So as they [students] go out in society, they become better, responsible citizens as compared to someone who hasn’t been thrown into a work environment before, and as they come on attachment, there at that point they are still willing to learn and we can still influence them to a certain degree in terms of responsibilities and accountability. But when someone goes out there without ... this experience, I think you are pushing them into the world and sometimes if they ... don’t have that from their own background, they are not really sure how to conduct themselves (#IND01).

Another respondent touched on her expectations regarding the content knowledge that students should bring to their industrial experience, implying there was no communication between university academics and industry on what pre-requisite knowledge students were expected to bring. She insisted on the students bringing all the necessary knowledge and skills from the university, even the very basics (#IND02). A concern was raised by this respondent about the motivation and keenness of the students going into IA, particularly in her field (Chemistry), who no longer showed ‘that self-motivation or zeal to learn more’ (#IND02).

- *Other universities*

One viewpoint shared with me was that the elaborate student preparation processes engaged in before students go out and during the first of three visits in industry were meant to make the lecturer or supervisor ‘very clear on what is required’ (#OUMA01). What was often required was encapsulated in the guiding philosophy of industry-based learning that many of my respondents regarded loosely as ‘to have students practise

what they would have learnt during their lessons’ and ‘to prepare for the world of work’ (#OUMB02).

Regarding institutional collaboration aimed at sharing goals and visions on ‘issues of best practices’ one respondent (#OUMC03) thought institutions ought to come together and craft some particular framework for doing things, particularly those engaged in the study areas of science, technology, engineering and engineering education. He added, ‘There is a need for all people to put their heads together and come up with something that will serve [their institutions] ...’ Another view is on the tensions that sometimes arise between permanent employees (often less educated but with extensive work experience) of a company and the students on attachment, an ‘attitude that we should try to work on so that the industry and the academic institutions understand each other so that we have a level ground for our learners’ (#OULD05). Referring to a common understanding about student supervision and assessment, a respondent had this to say:

I think the most striking thing which ... is missing is sitting together with industrialists, and coming up with a proper supervision schedule on the students on internship. You find the present assessment ... schedule ... differs from one industrialist to the other in that they have their ... different processing systems. So you ... I find it’s not as we would want it to be. We would have, of course, preferred an assessment which is almost uniform ... (#OULC04).

Replying to my question on the feedback obtained from industry on students’ progress and other needs, a respondent indicated that his department used a questionnaire on students’ behaviour and attitude, through which they got, among other things, ‘some input from industry on how they perceive our assessment programme’ (#OULE07). The student assessment visits also enabled lecturers to be ‘aware of what is practically going on out there’.

#### *4.3.2.9 The model for engagement*

Many of the respondents appeared not to be very familiar with the idea of a model for guiding an operation that is repetitive, recurring and central to an enterprise such as a university curriculum. A model is a theoretical representation attempting to group, connect and organise a collection of interrelated parts into a comprehensible whole. Respondents were happy to think in terms of principles, guidelines, regulations and procedures. In some of my interviews I then shelved the question on the model, but those I interrogated brought in issues that inadvertently answered my questions.

- *NUST staff*

One management staff member (#NM02) noted that some of the suggestions in the proposed model were not new and were happening anyway in some engineering departments, which I expected. He noted the following about students getting attached:

... we make friends with engineers out there. So when they have anything new as you walk around the factory, you may actually tell the engineer, 'Look I'm interested in this machine. I just want to know how it works', and things like that. And you can arrange a time to come in at any time. That's one big advantage that industrial attachment has created; that relationship between the university and industry. We become more or less like employees in companies, because you can come in, if you got a link inside, you can come in, you can spend the whole day there ... That can happen. That actually does happen (#NM02).

One aspect of the proposed model was the use of multi-disciplinary research and product development, it was suggested that there a concerted effort or a plan could be developed so that over two or three years there would be a big output. 'Each student does one, the next one builds on it, next one builds on it, so that effectively you got a big question answered or a product developed ... So that would be something to exploit, I think' (#NM03).

The importance of lecturing staff acquiring some prior industrial exposure is understood and is discussed earlier (Section 4.3.2.1). However, continuous direct and prolonged exposure to industry is uncommon once one has chosen to take the academic route for purposes of keeping in touch with the latest technology. One respondent (#NL05) was silent about direct visits but content with members of his department organising and attending joint seminars and workshops with industrialists, subscribing to professional organisations and publishing papers. His engineering lecturer colleague (#NL06) visualised a situation where, in trying to improve the lecturer profile, his department could send members of staff 'to be housed there [in industry] for perhaps two weeks, or a month ...' Estimating that the university and his department were presently operating at Level 2 of the proposed model, this respondent realised that a lot of work was needed to get to Level 3, citing the need for two-way and mutual efforts between the university and industry. Another lecturer (#NL12) was less optimistic:

I'd say we're still at level 1, even our department and I myself as the coordinator I'm very interested in this industrial attachment. I send almost all of them [students] to people that I personally know. They are either friends or colleagues. So I'm taking a very personal interest there. It's not a burden for me, you see. But I'd say that we are still at this Level 1 because we don't seem to have the time during the academic year to start getting more

things working with the companies. And certainly to come up to here (pointing to Level 3), research development areas negotiated between university and ... I'd love to be at that stage (#NL12).

- *Other universities*

Only one lecturer (#OULD05) from the other universities mentioned a point with some relevance to the model, stating that her department and university had memoranda of agreement with certain organisations 'where we see if there is a need [that] we go there, and do research and we can also benefit from the knowledge that [we get]'.

#### *4.3.2.10 Benefits of industry-based learning*

Some of the themes discussed above have actually been highlighting some of the benefits of the industry-based learning programme as espoused by the respondents quoted. The beneficiaries were students, lecturers, the university, industry, society and pedagogical phenomena such as the curriculum. In this section I summarise and pick out those that have not been specifically addressed in the foregoing discussions.

- *NUST staff*

It has been reported that one of the contributions of industry to student learning was the development of students' intellectual talents in the form of problem-solving, giving them the chance, as it were, for 'trailblazing the path of problem-solving' (#NM01). This was in addition to giving these students the competitive advantage in handling job interviews because the workplace becomes 'a familiar thing to them' (#NM02) even prior to employment, and in securing those jobs (#NL04). All these have mutual or shared implications between the parties involved, for instance a problem-solving student enjoys exposure to challenges, recognition and perhaps attendant rewards. The lecturer who develops a problem-solver and the university enjoy not only recognition and self-satisfaction but can use the student as an example to others as well as to extend their own knowledge base. The industry or workplace, for its part, might enjoy the services of such an able 'employee' at a cost less than that of a regular employee. Industry also benefits in the saving of recruitment costs, when 'most students [get] employed by the companies they were in on industrial attachment' (#NL08). Sharing of expertise between the university and industry has been expressed (#NL05) but the question of who benefits more than the other has not been clearly articulated. Benefits to the country and society entail employment of graduates within the country to maintain its economy even if only

for a short time while they garner experience in preparation for emigrating to ‘greener pastures’ (#NL05). Society benefits from the companies’ investment in the future through grooming a student who is honest, sober, hardworking and motivated (#NL12).

- *Industry*

In the eyes of industry supervisors one view is that students on attachment have an influence on the other permanent employees of the company and, through forums and meetings, ‘knowledge is passed around’ as the students are given challenges (#IND01) that make them showcase their knowledge, skills and creativity. Industry also benefits from the few occasions when university staff are able ‘to share some of the best practices’ with industry partners.

- *Other universities*

The aspects discussed above were reproduced by the members from other universities, highlighting the role of orientating students towards employment (#OUMA01) and assisting them to be prepared for work life through planned integration with other members of society (#OULC04), members who would matter most in their future career development.

#### *4.3.2.11 Challenges experienced*

The respondents spelt out the challenges they faced in their business of carrying out industry-based learning. Some of them are embedded in the discussions above, such as lack of clear shared conceptions of what processes students should go through. In this section I report on those that I think need further elaboration.

- *NUST staff*

One of the most cited challenges is the difficulty of placing students, or in students finding places on their own, a result of both the oft cited national economic mishaps and the adoption of the one model of IA by almost all universities in the country, a situation that ‘increased the number of students country-wide looking for attachment as the workplaces were diminishing or down-scaling in their productivity’ (#NM02). The stiff competition for attachment places therefore requires universities to plan carefully the release of their students to align with industry’s operational cycles rather than the university’s academic calendar:

... what I've noticed is that our students ... go on industrial attachment a little bit later in the year when other universities have already sent their students out. So as such you find that there's a tendency that we are now competing for limited places in industry for industrial attachment, and ... those who get there first ... [we find] they've already taken the place[s] (#NL04).

So acute has been this problem in recent years that the university has had to compromise on its earlier standards by using contingency measures such as providing attachment for some of their students within the university, and allowing some students desperate for being attached to settle for any placement even when it did not comply with the set standards, and tolerating very late attachment:

So we still have a number of students that have not been attached. We have had this problem for some years where we get students being attached late, but this year it looks like it's worse, maybe also worsened by the fact that industry is not increasing, production is not increasing (#NL10).

For industry, the challenge cited by university staff has been to maintain its unwritten agreement of paying allowances to the students, thus succumbing to the temptation of regarding students as 'cheap labour' (#NL04). The majority of challenges are already implied in the other sections above, with examples such as academic staff supervision, dealing with non-uniformity of experiences and exposures, standards of assessment and many more.

- *Industry*

The only notable challenge cited by this category of respondents is that of students' grasp of the latest in technology. In the area of information and technology (IT) skills, it would appear that universities have a problem:

... [P]robably the challenges that might be there [are] your IT challenges, basically. I think the more they are equipped also in terms of IT ... they'll adapt more as everything is moving so fast in that area ... because even with finance, basically everything is computerised and they move at high level (#IND01).

With regard to laboratory and other equipment, one respondent expressed industry's expectation that students arrive in industry with 'a hands-on feel with the latest or the most current ... piece of equipment that's already being used world-wide' (#IND02).

- *Other universities*

Regarding the consequences of a student failing to secure a place for attachment within a stipulated deadline, a university respondent explained the following:

... we require them [students] to be on industrial attachment for eight to twelve months ... Say if he [a student] goes for another four to five months without obtaining a place ... that student should defer studies. It means the student has lost a semester. So that is a challenge (#OUMB02).

The attachment of students in neighbouring countries has been brought up as posing the challenge of supervision by the university staff as discussed earlier. There are risks involved in following students up and the insurances that need to be covered. And in many cases they are not followed up and their assessment is then limited to their written reports on attachment (#OULE08). The respondent explained further that they had occasionally gone around that problem by asking the student to meet the expenses of the assessment visits.

#### *4.3.2.12 Transformation and transformative learning: orientation for life*

An elaborate programme such as industry-based learning should be expected to have some impact on those who participate in it. Among the various players the student is the one who is immersed in the programme and therefore most likely to be affected by it. Transformative learning is akin to a paradigm shift; it moves a person from one frame of mind to another.

- *NUST staff*

A point made earlier was re-emphasised by one respondent, namely that our industrial attachment sort of transforms the student from being a student to a professional. Such a transformation is important because it prepares the student for what to expect in the future, because ‘they will find challenges in managing manpower, equipment, and any other challenges actually associated with the construction industry’ (#NL05). The nature and importance of the transformation is explained in terms of, among others, moving from studenthood to adulthood:

I find them more mature. I find them [keener] to learn. They have better understanding of lots of concepts that they might have missed in their studies between Year 1 and Year 3. ... They are more organised, somehow they see the end, and [are] more disciplined. So I would say to some extent, yes, we can say that they are better learners (#NL08).

Students who go through the industrial attachment experience, in addition, appear to ‘have a different perspective about life and the work situation’ (#NL10) and some of the older students ‘come back from industrial attachment in a totally different groove than when they went there’ (#NL12):

If they were like one of these girls you saw in my office with their 4<sup>th</sup> year project. She was as shy as anything, until she went on attachment. They never come back shy anymore. They come back very fluent in English, thinking in English. They come back, ... they are much more global[ly] ... minded. They know where USA and Russia, China, Japan are, you see. And when they now are into their 4<sup>th</sup> year with all those courses that are of certain intensity, and they are doing their 4<sup>th</sup> year projects, I'd say it's very fair to say they are all [very] motivated as a result of that industrial attachment (#NL12).

It is quite interesting how students transform so much as to become better speakers and thinkers in a second language in one year, but there is also cultural transformation observed by this respondent:

... [I]t's given them an opportunity to ... come out of their culture, wrest[le] with their culture in an environment where it's expected but it's also crazed. If they come up with ideas, innovations, if they are running their lives properly, all that, and they just come up. It works out well (#NL12).

In this process of cultural and other transformation, the respondent assumed students are 'taking control of their lives in a way they never did before, and they come back here and they are very dignified ... they are nearly walking tall'. The students would be saying things like the following:

'Oh yes I was in Botswana, I worked with Birdlife Botswana. I did this, and I did that. I produced this newsletter. I did this website' or whatever. I'd say it transforms them in a way (#NL12).

- *Other universities*

Social and psychological transformation in the students as a result of pre-organised exposure to the workplaces is suggested by this respondent:

So at [this] level they are able to socialise with other colleagues and when they come back to class, I think what we have experienced is, they are a different student altogether. They can now interact with other learners more effectively than before because they understand the dynamics of relationships within a particular environment (#OUL05).

#### 4.3.2.13 *The student factor*

Issues pertaining to student preparation and orientation for industrial attachment, placement, welfare and well-being while on internship and other general concerns make up what I term the 'student factor' in industry-based learning. With regard to placement, it has been seen that some departments were able to secure places for their students while others were not. Some departments allowed some of their students' choice of places even when they could find placement for them. The scenarios around student

orientation and placement posed challenges to many students and the university, as did the other concerns described below.

- *NUST staff*

The level of satisfaction of university management and lecturers that students were well-prepared for heading out into the industry was not elicited directly and did not come out succinctly in the responses. However, there was the feeling that advance preparation of students and pre-departure briefing were important:

The important thing about IA, really, is how the department has prepared the student as he leaves university to get into attachment ... that's key (#NM02).

About the attitude of students towards manual labour and their general respect for physical engagement, one lecturer had advice for those students who wanted to succeed in life:

... most of the wealthy people started from the very bottom. So the sooner they establish some working ethics, I think, the better. This is how I did it myself in my education. We had a month or two after every academic year somewhere in the industry, and then in the agriculture of course ... (#NL08).

- *Industry*

The views of industry supervisors on how satisfied they were with the level of preparation shown by students when they arrived in the workplaces were positive.

I think basically they have been well-prepared. We find that they have adjusted well, within [a] reasonable time, actually, to the work environment. And we've been able to [actually] work with them, start them off, well I think ... within a reasonable time .... a month (#IND01).

Adequate prior preparation assisted the supervisors to go swiftly through induction and the necessary professional development before allowing students to begin standing on their own, a relief to the supervisors who had to do this every year. Industry supervisors tried to treat students as individuals, 'because each of them [is] bringing something different. So we look at them as individuals, and we ... try and channel them to their individual capacity' (#IND01).

- *Other universities*

The question of prior orientation and placement of students is explained in more detail by members of other universities. One management staff member from a state university provided a good summary of their orientation programme:

We give them orientation which focuses on a number of areas. The first area that we focus on [in] orientation is the process of getting a job, that to get a job you need to apply. And then we discuss with them the content of the application letter. We then go through a CV, that [this] is how a CV should be written (#OUMA01).

Further orientation details include briefings on university and industry requirements and expectations, diversity of companies and workplaces, reporting structures, potential problems and more. To conclude, another respondent said, 'Before students go ... we do have some workshops where we try to orient them on what they would meet ... when they go for their IA ... where we spell out the expectations of industry, the scenarios that they are likely to encounter' (#OUMC03). Among the scenarios or potential problems brought up in student orientation sessions are those of personal relations touching on gender:

... [S]ometimes students have problems of sexual harassment in a company. But those are becoming few because we ... do mention that to the [industrial] supervisor, that, 'Please can you also, as you introduce the student to the other members of the organisation, can you protect the student. Please can you discuss with other members that it is a university regulation', and I emphasise ... when we give [students] orientation, that falling in love with anybody at a workplace is not acceptable. 'If we get to know, you get dismissed, or suspended'. [This] the students know because it compromises relationship with other people ... (#OUMA01).

At the private university one respondent alluded to the occasional report of the involvement of female students, in particular, in male-female relationships:

I have not heard so much of that except once last year I had one student who complained about male workers ... wanting to abuse her. So she reported [it]. I had to call and we had her transferred to get to another place. Those are the few challenges that we have [had] (#OULE09).

#### 4.3.2.14 Innovation and creativity

The potential for creativity, innovation and the entrepreneurial mindset in students (and their lecturers) generates much discussion in university corridors and promotes strategies on how to handle emerging cases for the benefit of all concerned, including curriculum planning and implementation, intellectual property rights, ethics and product development.

- *NUST staff*

The system of nurturing and developing student creativity and innovativeness is often enhanced through teaching of courses on entrepreneurship (#NL10), using project- and the problem-based learning methods, and recognising rare intellectual talent through

close working relationships between students and their lecturers. The university also promotes staff collaborative work that brings solutions to industry and society problems.

Entrepreneurial ventures were exemplified by a former student of the university:

...who was originally [being] attached at [name of organisation] who has since opened up a children's wildlife and forestry centre and she is working on making sure that there is awareness in terms of conservation of natural resources broadly but bringing in the children from the primary schools, secondary schools where ... to a place which is not very far away such as those places like national parks which could be quite a distance. And operating that, [she brings] large exposure in terms of awareness of our children, primary school children. I think that actually is a very good testimony of going out there and being entrepreneur[ial] (#NL11).

- *Industry*

Asked if their company expected attached students to contribute unique solutions to company problems, this respondent agreed, saying that her organisation had a forum for everyone from any level to be able to participate in improving their own work, improving something that perhaps they have seen in other departments:

We've got a forum where they can bring their suggestions, and those suggestions are taken right to the top. Some are implemented if they're feasible. If not they are put on sort of like a parking bay, until we can actually implement them (#IND01).

The other respondent reiterated that students were given all the time and every resource that they would need to bring up novel ideas:

And what we have here is, every Friday, each and every department has what we call 'green circles'. They operate just like the quality circles in the Japanese ... So in those circles then, that's where we discuss issues and matters pertaining to our work. So if they have anything, this is the area where they air their views, and if you feel there's need to, for them to really move on with the view or the initiative or what, we give them that support and that time to do those things (#IND02).

- *Other universities*

The basic idea of running a taught course on entrepreneurship for all students enrolled for a degree with a potential for creative output seems to apply to all the universities.

This response typifies the scenario in other universities:

We also have a practical project course that we have that they get in Part III which they take to IA. We call it HIT300. It's called Design and Innovation. Each student is mandated to undertake a project of design and innovation. But that project will solely not be theoretical. It has to be practical (#OUMC03).

#### 4.4 Findings from Questionnaire Data

This section presents the data obtained through questionnaires. The data consists of both quantitative and qualitative aspects as described earlier. Quantitative data is obtained from closed-ended questions while qualitative data is obtained from open-ended substantiations of selected responses. Quantitative data were analysed statistically using the BDMP4M and SAS computer software programs. Some open-ended responses, specifically item 37, have been subjected to statistical analysis as well. The data is presented concurrently in the true fashion of a concurrent embedded mixed methods design (Creswell, 2002).

##### 4.4.1 Participation and response to data

The response rate to the questionnaires was not very encouraging. Among the students the response rate was about 51.86%; among the lecturers it was 23.53% and the least was with the industry supervisors where 11.33% of the expected completed questionnaires were received (see Table 4.3).

**Table 4.3 Questionnaire Response Rate**

Location	Category of Participants	Estimated Population	Proposed Sample	Actual Responses	Response Rate (%)
NUST	Students	700	700	363	51.86
	Lecturers	170	170	40	23.53
Industry	Industry Supervisors	300	300	34	11.33

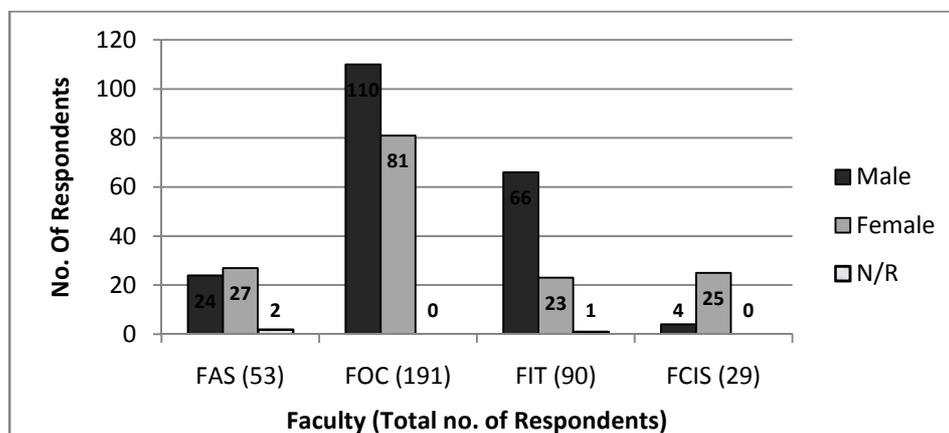
##### 4.4.2 Analysis of background information

The information required in Section A of the questionnaire is presented below, mainly relating to selected characteristics of the respondents, providing some variables for analysis of the information in Section B. Data summaries comprising absolute and percentage frequencies for different variables are presented in Appendix XVI.

- *Students*

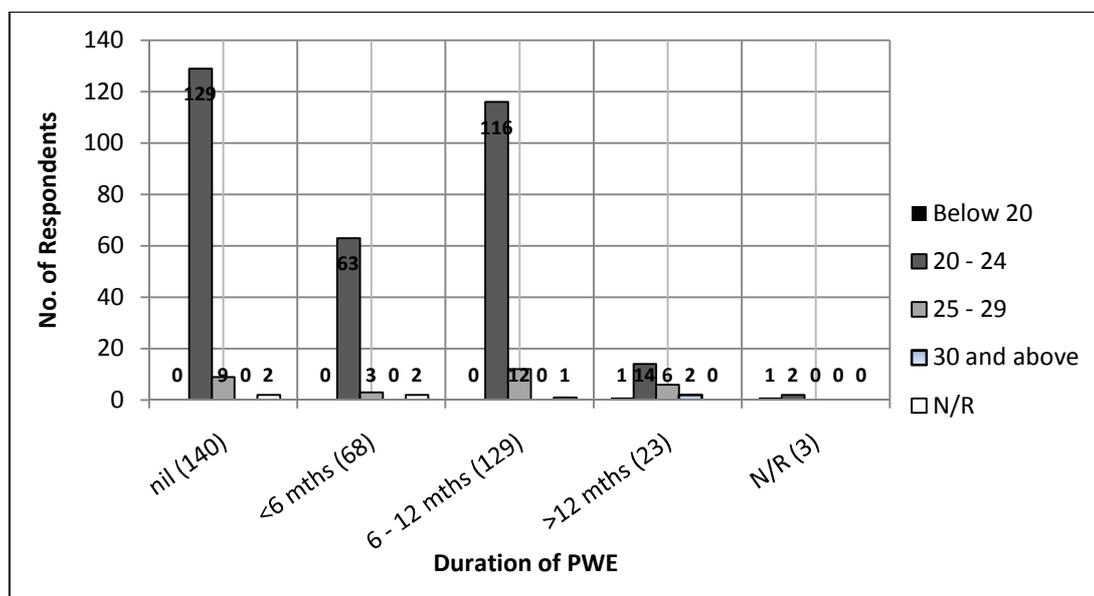
The student respondents came from the four faculties of the university, namely Applied Sciences (FAS), Commerce (FOC), Industrial Technology (FIT) and Communication and Information Sciences (FCIS). Of the 363 student respondents, 204 (or 56.19%) were males and 156 (or 42.99%) were females, while 3 (or 0.83%) did not indicate their

gender. The Faculty of Commerce contributed the highest number of respondents with 191 or 52.62%, with males and females constituting 57.59% and 42.41% respectively. The Faculty of Communication and Information Sciences provided the lowest number of responses of 7.99%, of which 86.21% were females (See the bar chart in Figure 4.1 and the table in Appendix XVI(A)).



**Fig. 4.1 Student Respondents according to faculty and gender (n=363)**

The majority of the student respondents were undergraduates (89.26%) in the age range of between 20 and 24. This is the appropriate age group for the majority of students who enrolled at the university soon after completing high school.

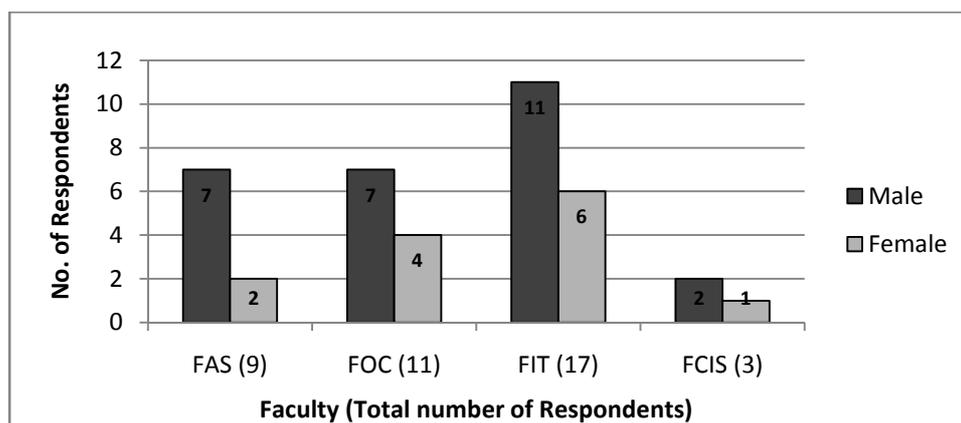


**Fig. 4.2 Student respondents according to age and duration of previous work experience (n=363)**

The number of those that had some previous working experience (PWE) prior to enrolling for their current studies was 220 (or 60.6%) compared to 140 (38.57%) who had no PWE, and 3 (0.83%) who did not respond to this question. Of the 220 with some PWE, 68 (18.73%) had experience of less than six months, 129 (35.54%) had between six and twelve months working experience, while 23 (6.34%) had over 12 months of previous working experience (See Figure 4.2).

- *Lecturers*

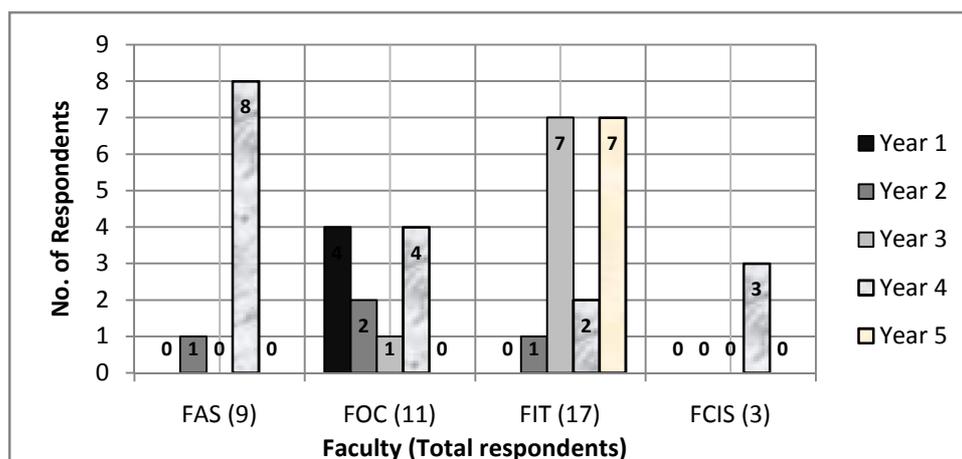
Among the 40 lecturers who responded to the questionnaire were 27 (67.5%) males and 13 (32.5%) females from the same four faculties as the students above. The faculty with the highest number of respondents was Industrial Technology with 17 (42.5%) while the lowest number came from the Faculty of Communication and Information Sciences. The low response rate from the other two faculties was below expectation as the number of lecturers in them was relatively high (See Figure 4.3 for a graphical representation).



**Fig. 4.3 Lecturer respondents according to faculty and gender (n=40)**

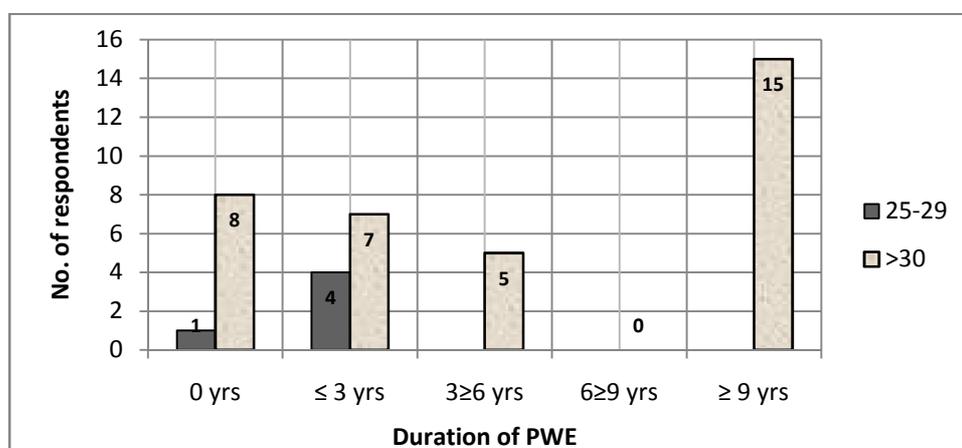
Another characteristic of the lecturers measured was the highest year level of students that they taught. In the Faculty of Industrial Technology with five-year degree programmes 7 respondents (or 41.18% in the faculty) taught final year students, while another 7 (or 41.18%) taught third year students and below. In the other faculties with four-year degree programmes, high relative frequencies of lecturers taking final year students were recorded, 88.89% in Applied Sciences, 36.36% in Commerce and 100% in Communication and Information Sciences. Figure 4.4 shows the graphical picture. The importance of lecturers teaching final year students is that they engage with post-industry-based learning students; most teach pre-industry-based learning students as well, which means that the lecturer has a broad overview of the whole degree programme.

It is important how familiar lecturers were with workplaces other than their current teaching positions. The question (item 6) asked for the duration of the lecturers' previous non-educational work experience in a workplace other a school, college or university. In total 9 (or 22.5%) had no such experience, one was below 30 years old and the rest were 30 and above. In other words they went straight into teaching once they had attained their degree qualifications. It was not asked but it is possible that some of them began their teaching career at lower levels such as the secondary school prior to coming to the university.



**Fig. 4.4 Lecturer respondents according to faculty and highest year level taught (n=40)**

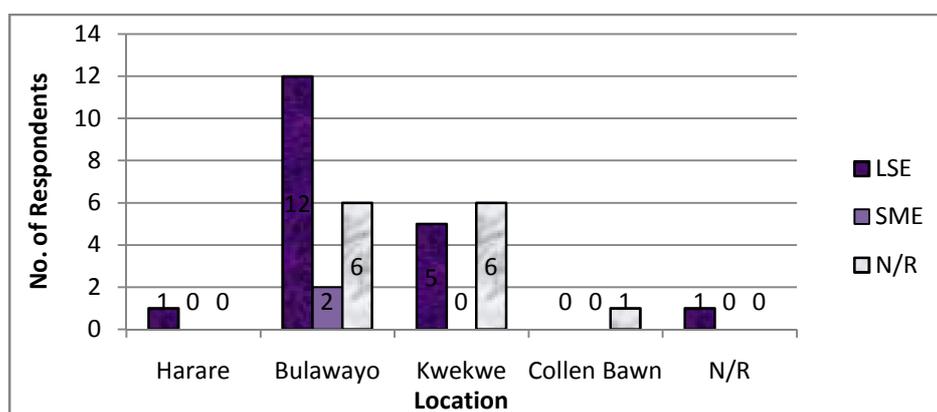
As many as 11 (27.5%) had previous non-educational working experience of under three years, four were aged below 30 while seven were 30 years old and above. In total 5 (12.5%) respondents, all above 30 years old had between 3 and 6 years of previous work experience, none had between 6 and 9 years, while 15 (37.5%) had more than 9 years experience (Fig 4.5).



**Fig. 4.5 Lecturer respondents according to age and duration of PWE (n=40)**

- *Industry*

The greatest number of industry respondents, 20 (58.82%) came from the city of Bulawayo, followed by 11 (32.35%) from Kwekwe. While the majority 19 (55.88%) of these indicated that they worked in large-scale enterprises, and 2 (5.88%) in small and medium-scale companies, 13 (38.24%) did not indicate the size of their companies. See Figure 4.6 for the graphical presentation.



**Fig. 4.6 Industry respondents according to location and company size (n=34)**

Industry supervisors also responded to the question regarding the preferred duration for students to be on industrial attachment. Only 3 (or 11.76%) preferred a period between six and twelve months, while the majority, 31 (or 88.24%), preferred exactly one year.

#### **4.4.3 Factor analysis**

Going into the research I had anticipated seven factors that would be represented by the questionnaire items and the variables (Questionnaire items 7 to 25). Assuming the data was drawn from a normal distribution, parametric procedures were applied first. Thus a factor analysis was performed on student respondents to the 19 Likert scale variables using the BMDP4M computer software program. This analysis produced three factors with significant eigenvalues of 5.12, 1.05 and 0.86 (See Appendix XVII for determination of factors and a Scree plot). The Cronbach standardised alpha for all 19 variables was 0.87. Descriptions of the 4-point Likert scale numerical values were:

**1 - Not at all                      2 - Slightly                      3 - Moderately                      4 - Greatly**

Factor analysis was not done for the lecturer and the industry supervisor versions of the questionnaire because of the low number of respondents. However, I compare below the means of scores from each group of respondents on the three factors produced from the students' questionnaire responses.

- *Factor 1: Curriculum Coherence (or integration)*

Four questionnaire items (7 to 10) in the box below were confirmed statistically as one factor that I termed *curriculum coherence*.

7. My earlier university courses and other learning experiences prepared me for IA.
8. My IA experience consolidated the courses I had studied earlier.
9. The IA experience has improved my study skills.
10. The IA experience has improved my deeper understanding of subject content knowledge.

With an eigenvalue of 0.86 (slightly less than 1.00), this was the weakest grouping, one with the lowest internal correlations. In my prior anticipation item 10 had not been included in this factor. The mean of the students' responses on the 1 to 4 Likert scale was 3.27, signifying approximately 27 percentage points above the *moderately* response, compared to the lecturers' mean of 3.44, and industry respondents' 3.31. All three groups ranked this factor second. The explained variance on rotated factor loadings in this factor is 1.395.

- *Factor 2: Learning*

The 12 questionnaire items (11 to 22) in the box below were statistically confirmed as a second factor that I called *learning*. In my questionnaire preparation, however, I had anticipated that these twelve items (plus item 10) would bring out five different factors, namely *active learning (AL)*, *self-directed learning (SDL)*, *cooperative learning (CL)*, *learning styles (LS)* and *learning processes (LP)*. In my data analysis, these five have become sub-factors under the *learning* factor.

11. The IA experience has improved my practical skills and workmanship.	AL
12. The IA experience has helped me to be more creative and innovative in problem-solving.	AL
13. The IA experience has empowered me to develop control of my own learning.	SDL
14. The IA experience has improved my capability to work in a team.	CL
15. The IA experience has improved my sensitivity and responsiveness to problems in my environment.	LS
16. My IA has improved my organisational and administrative skills.	LS
17. My IA has improved my social, emotional and people skills.	LS
18. My IA has improved my imaginative, conceptual and strategic thinking skills.	LS
19. My IA experience has prepared me for the realities of the world of work.	AL
20. My IA experience has taught me to respect and uphold the dignity of practical, work whether skilled, semi-skilled or unskilled.	AL
21. My IA experience has improved my ability to work closely with different kinds of people.	CL
22. My IA has improved my time management and systematic planning of my studies.	SDL

With an eigenvalue of 5.12 this was the strongest grouping, showing the highest internal correlations. The variance explained on rotated factor loadings in this factor was a reasonably high value of 3.86. The mean of the students' responses on the 1 to 4 Likert

scale was 3.51, approximately 51 percentage points above the *moderately* response, compared to the lecturers' mean of 3.45, and the industry respondents' 3.50, giving this factor a top ranking. This was the highest scored factor among the three, and it includes the highest scored among the 19 items in the questionnaire section (item 21) with a score of 3.72. This means that students perceived highly that the industrial attachment improved their ability to work closely with different kinds of people, an indication of cooperative learning. Industry respondents' mean score (3.91) agree with students on this rating, where it is tied with item 11, indicating that industrialists also highly believe that industrial attachment improves the students' practical skills and professionalism. On their part lecturers rated highest (3.83) item 19 stating that IA prepared students for the realities of the real world of work.

- *Factor 3: Assessment processes*

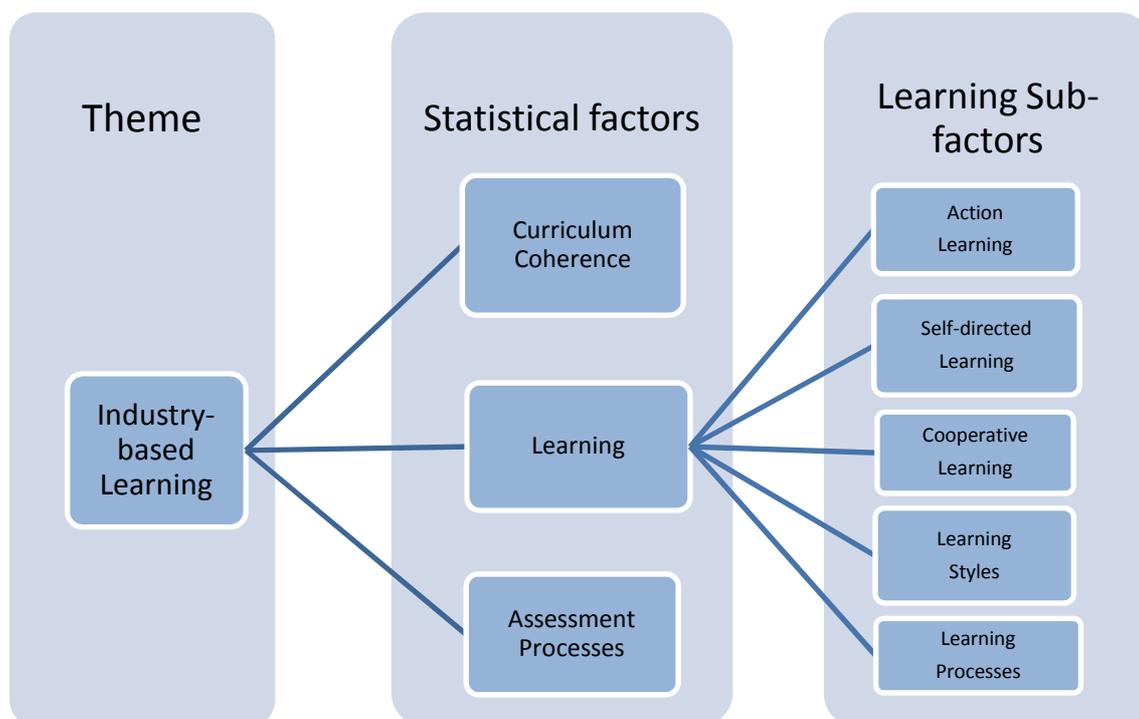
The three questionnaire items numbered 23 to 25 were both anticipated and confirmed statistically as a standalone factor, termed *assessment processes*. The box below shows the items.

23. I was satisfied with the supervision and assessment by the industry-based supervisor. 24. I was satisfied with the supervision and assessment by the university-based supervisor. 25. The overall process of assessment of my IA experience was adequate and appropriate for me.
--

This factor had an eigenvalue of 1.05, and the explained variance of 1.68 on rotated factor loadings in this factor is not particularly high. The mean of the students' responses on the 1 to 4 Likert scale was 3.07, signifying approximately 7 percentage points above the *moderately* response, and compared to 3.06 and 3.30 by lecturers and industrialists respectively. This was the lowest rated grouping of variables by all groups and it included the lowest rated item (item 25) with a mean score of 2.97 by students. Industry supervisors scored item 7 lowest that stated that university courses and other learning experiences prepare students for industrial attachment. The students thus rated lowest the adequacy and appropriateness of the overall processes of assessment of their industrial attachment. On their part the lecturers rated lowest item 23, registering their satisfaction with the supervision and assessment by the industry-based supervisor.

#### 4.4.3.4 Summary data on the factors

The ultimate relationship between the anticipated and the statistically confirmed factors in the students' questionnaire is illustrated in Figure 4.7 below and in Appendix XVIII.



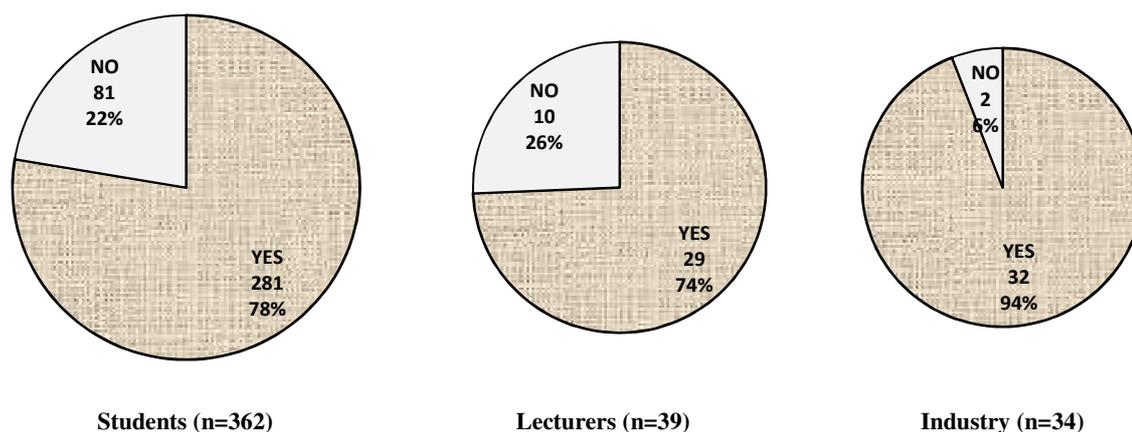
**Figure 4.7 Relationship between the research theme, statistical factors and sub-factors**

In general all three respondent groups produced mean scores above 3 (*moderately*), and all three were unanimous in scoring factor 2 (*learning*) the highest, factor 1 (*curriculum coherence*) and factor 3 (*assessment processes*) as the second and third respectively. (See Appendix XVIII). In essence they perceived the experiences gained from the industry-based learning as contributing to quality and effectiveness in their degree programmes, in the areas of learning, curriculum coherence and assessment processes, in that order, albeit with some variations. The above was further confirmed in all the sub-groupings of the student respondents according to faculty, gender, age (in the 20 to 29 year old age group only) and according to previous work experience. Lecturer and industry supervisor sub-groupings had rather too small samples and thus produced subtle variations.

A further non-parametric test, the Kruskal Wallis Analysis of Variance (ANOVA), was done on the factors to confirm if the observed differences between the groups were significant or not. The result confirmed that the between-group differences were not significant, giving  $p = 0.1081$  for factor 1,  $p = 0.5374$  for factor 2, and  $p=0.2275$  for factor 3. In other words, although the students, lecturers and industry supervisors appeared to differ (or vary) in their scores in each factor, the difference is not significant, meaning they were not necessarily disagreeing with each other.

#### 4.4.4 Categorical questionnaire items

Questionnaire items that required a YES/NO response, some with accompanying open-ended questions, were analysed using the chi-square ( $\chi^2$ ) statistic. Pie charts are used for visual illustration of the proportions of YES/NO responses in only three selected cases. The open-ended portions are thematically analysed concurrently.



**Figure 4.8 Comparative opinions on contribution to student learning and self-development**  
(Inter-Group variations not statistically significant:  $\chi^2=5.493$ ; probability =0.642)

##### 4.4.4.1 Contribution of industrial attachment to learning and innovativeness

In item 26 (which reads: Most IA organisations provide opportunities for students' continuous learning and self-development.), 77.62% of the students answered in the affirmative, compared to 74.36% of the lecturers and 94.12% of the industry supervisors (Figure 4.8). The computed  $\chi^2$ -value of 5.493 shows that the difference among the three groups was not significant at the 5% level, implying that students, lecturers and industrialists agreed that the workplace provides, or is assumed to provide, students with opportunities for continuous learning and self-development.

Item 27 sought to find out the involvement of students in identifying and contributing new ideas to their organisation of attachment. In total 83.98% of the students replied in the affirmative, compared to 84.62% of the lecturers and 91.18% of the industry supervisors; the  $\chi^2$ -value of 1.24 indicates no significant difference between the three groups at the 5% level. In item 28, 70.28% of the students considered their IA experience to be one of the best, while 87.18% of the lecturers thought that most organisations provided desirable student experiences, and 88.24% of industry supervisors thought that they provided excellent IA experiences to students compared to other organisations. The  $\chi^2$ -value of 9.37 is significant at the 5% and 1% levels, implying that the students' lower rating indicates that they did not consider themselves to have had a pleasant experience in industry. Item 29 enquired about the lecturers' encouragement of the integration of IA information and experiences in post-IA classes. The YES was given by 87.02% of the students, 92.11% of the lecturers and 91.18% of industry respondents. The  $\chi^2$ -test shows no significant differences in the three respondent groups. Item 30 asked if the industrial attachment experience contributed to progress on the students' final year project, and 76.52% of the students answered in the affirmative, supported by all (100%) lecturers and 91.18% of the industry supervisors. The  $\chi^2$ -value showed a significant difference among the different groups' views at both 5% and 1% levels, observed particularly between the students and lecturers' responses. While lecturers thought almost unmistakably that IA contributed to the students' progress in the final year project, the students thought less about this. On whether the IA was a vital component of degree studies, 96.69% of the students responded YES, as well as all (100%) lecturers, and 94.12% of the industry supervisors. There was no significant difference on the  $\chi^2$ -test between these responses.

#### *4.4.4.2 Industrial attachment and small and medium-scale enterprises (SMEs)*

The remainder of the categorical variables discussed below were accompanied by open-ended statements to substantiate or qualify the YES or NO response. Item 34 inquired if small- and medium-scale enterprises (SMEs) required more assistance from the university than LSEs, and the affirmative came from 86.57% of the students, 89.74% of the lecturers and 81.82% of the industry supervisors. This was not a significant difference on the  $\chi^2$ -statistic. To substantiate their YES, students, lecturers and industrial

supervisors gave an array of reasons mostly in agreement with one another. Typical responses from students included the need for SMEs to grow, gain publicity and up-to-date intellectual and technological support, and contribute to national skills development. It was widely reported that students could help with their innovative ideas in the form of projects to help the SMEs to grow into bigger and more efficient enterprises, one Commerce student saying, ‘I was attached in an SME development funding institution and I realised that the university should contribute to some problems faced by SMEs’ (Student #0117). There was a mixed perception on the balance of benefits between the SMEs and the students, with some respondents saying that SMEs would benefit more from IA than students, while others saw a mutual benefit. An example was, ‘There are some SMEs that go unnoticed because they are not known, while on the other hand they can give a good service for academic development’ (Student #0281).

One student reported that her attachment had been at an organisation ‘headed by three people who could really use the help of the [university] department in skills involving report-writing and other(s)’ (Student #0247). In support was the following suggestion:

There is need to support them (SMEs) with intellectuals from NUST who will further improve their performance and product quality (Student #314).

The lecturers, among other responses, corroborated most of the students’ views, recommending the inclusion of SMEs in an industrial attachment programme that would be sensitive to the needs and requirements of all stakeholders – local, national and global. Concerns about global relevance of SMEs featured in responses such as:

On [the] aggregate SMEs make significant contribution to GDP hence [they] require the support (Lecturer #1010 and Students #0138 and #0188).

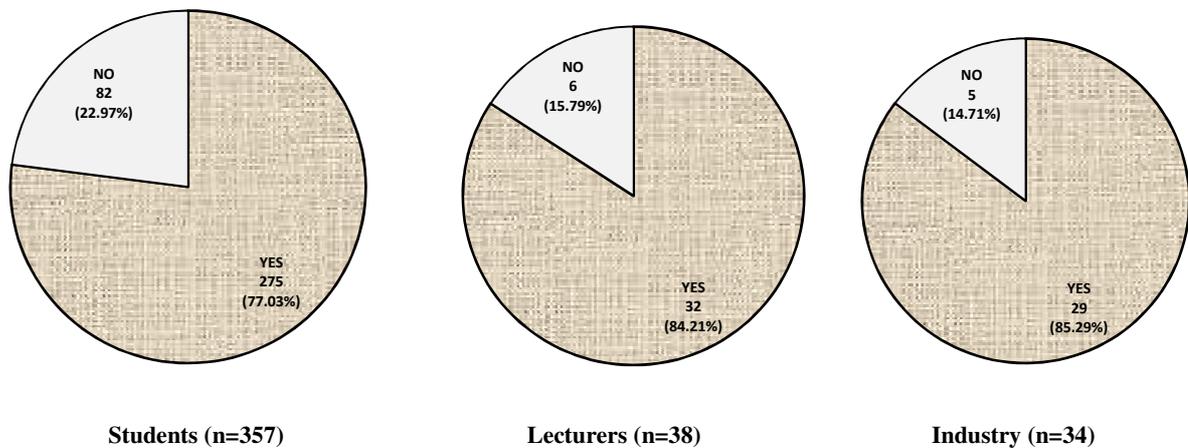
This is supported by Vollgraaff (2011) who reports that, according to estimates, ‘businesses employing fewer than 50 people contribute around 50% to South Africa’s GDP and around 70% to total employment’. In general SMEs were viewed as having greater room for improvement and expansion, hence students will gain more experience than they would do in LSEs. One industry supervisor thought there was a need for innovative ideas that could lead to the growth of such industries, adding that, ‘These ideas and knowledge can be tapped off (from) IA students (Industry Supervisor #2002). Another said, ‘Universities are normally the hub(s) of research and development. Thus

the wealth of knowledge in universities can help both SMEs and Large organisations to grow’ (Industry Supervisor #2026).

The few respondents that selected a NO felt that both SMEs and LSEs required the same nature and amount of support, with a common view among students that while SMEs might need assistance in attaining better process routes, LSEs might require optimisation on their current routes. It was thought that SMEs did not require special attention:

They do not need to be supported in terms of human resources (i.e. attachment students). However, they can be assisted through occasional projects carried out by groups of students (Student #0242).

The lecturers’ view was characterised by the feeling that SME operations were at a much lower scale than their LSE counterparts and therefore they could not accommodate many students and extensive learning processes, and thus desired student experiences. The view of a LSE industry supervisor against IA in SMEs was that ‘The size of the SMEs is a limiting factor in terms of learning. [There is] not much to learn from compared to LSE (Industry supervisor #2016).



**Fig. 4.9 Comparative opinions on engagement with SMEs (Item 35)**  
(Inter-Group variations not significant:  $\chi^2=2.1$ ; probability =0.3499)

Question 35 enquired whether the university should include SMEs in their industrial attachment programme. All three respondent groups were significantly in agreement with one another ( $\chi^2 = 2.1$ ) on the YES response (compare relative YES/NO proportions in pie charts in Figure 4.9). Of the 357 responding students, 77.03% said YES, backed by 84.21% of lecturers and 85.29% industry supervisors. To substantiate their stance, the students believed in sustained, broader and continuous engagement with the SMEs, systematic placements, proper management practices shared and design application,

among many. Some saw SMEs as comparatively offering better experiences than LSEs, especially in terms of information, skills and knowledge flow, perhaps because of the low level or scarcity of organisational information. The following recommendation was put forward:

[SMEs] should [try] to expose the students to various hardships that the SME would be facing so that they are aware of the causes of these hardships in their future endeavours (Student #0363).

Lecturers affirmed their support of engagement with SMEs by stating that SMEs could inspire students into considering starting their own enterprises later in their working life, promoting professional and skilled leadership, and self-motivation and innovativeness:

SMEs offer (1) early responsibility, more control over career development (2) opportunities which may not be available in larger organisations, (3) varied work & flexibility – students need to be able to adapt quickly & be competent in several roles, (4) however, less formal training might disadvantage student (Lecturer #1011).

Industry supervisors added the dimension that SMEs were ‘part of the reality’ in the business environment, thus providing some necessary skills and knowledge, although some were family-owned and tightly managed with no option of contribution by outsiders. Other views targeted the productivity side of enterprises as a stimulant to students opening up to their potential:

With SMEs there is room to explore new product lines and services and also the opportunity for the NUST students to express themselves (Industry Supervisor #2026).

The few who responded with a NO based their views on the quality of student experiences arguing that, for instance, most SMEs are not quite professional in their operations and dealings, they lack reputable mentoring skills and are irrelevant to most of the university study programmes. A sample response is the following:

There is very little to learn especially for chemical engineers who study heavy duty equipment at [university] and would want exposure to that in industry (Student #0274).

The lecturers who responded with a NO, too, thought SMEs had no relevance to universities, perhaps ascribing to the common notion that SMEs and semi-skilled jobs are the burden of non-degree vocational and technical institutions in terms of education and practical competence development. Several suggestions were proposed of short student visits to SMEs as part of their community service, as well as running short professional development programmes at designated times rather than waiting for

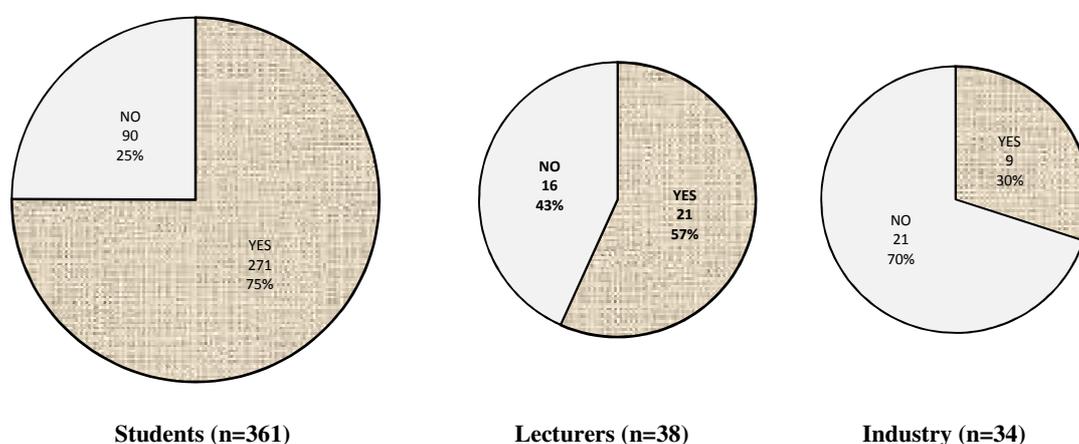
industrial attachment periods. One respondent reiterated the issue of student supervision and quality of professional development:

There might be lack of effective and professional industry-based supervisors which could affect the overall performance of students on IA. Students will be prone to abuse by doing any other duties not related to their areas of study (Lecturer #1025).

Industry supervisors had strong views on management and learning scope for students, arguing that twelve months was too long a time for a student to spend in an impoverished learning environment such as an SME, adding that most SMEs were not established and were run by bogus individuals and ‘the experience does not provide a full picture of a working environment’ (Industry supervisor #2023).

#### 4.4.4.3 Developing the industrial attachment programme

Item 36 asked if changes or improvements were needed to the current IA programme. AYES came from 75.07% of the students, 56.76% of the lecturers, and 30% of the industry supervisors (Figure 4.11). This produced a highly significant difference on the  $\chi^2$ -statistic at both the 5% and 1% levels (compare the YES/NO proportions in the pie charts in Figure 4.10). Clearly the students seemed to prefer changes, lecturers were reluctant and industry supervisors appeared content with the prevailing state of affairs.



**Fig. 4.10 Comparative opinions on whether the current IA programme needs change**  
(Inter-group variations statistically significant):  $\chi^2=30.5347$ ; probability  $\leq 0.0001$ )

Selected suggestions of what changes were desired by students included curriculum matters, IA preparation, processes and assessment, and communication issues. Among the curriculum suggestions was that some courses selected in the final year should be completed before IA. Also lecturers were expected to refer to the practical situation

while teaching and curriculum should be dynamic to suit current technology and industrial needs.

There were suggestions for adequate preparation before going out to industrial attachment, including assistance with placement. Some students asked for more communication between the university and industry before and during the attachment period, including spelling out clearly ‘the objectives of the IA to the personnel responsible for the student at the organisation’. Further suggestions were the following:

There should be a specification, or at least [a] guidance posted or communicated to the companies that take students for IA concerning the expected duties of the student so as to allow students equal opportunities ... There needs to be continued interaction between academic supervisors and students; forums for students to go on attachment should be held for them to learn from those that have been on attachment before (Student #0314).

Quite a number of suggestions were raised concerning student supervision and assessment, in which students were calling for more and longer visits by the university staff.

Lecturers suggested changes pertaining to their own involvement in industrial attachment activities ‘in order to improve the [university] connections with industry’. A suggestion of prime importance was that lecturers must also be attached to keep track of developments in industry. Still, lecturers wanted the university to get more involved so that students were not used as cheap labour or made to do tasks that would not be relevant to their degree studies. Similarly, student supervision and assessment were given much space in the lecturers’ responses, with suggestions for: (1) clarity on what is to be covered or what the student should learn during attachment, and (2) professional development of industrial supervisors on objective assessment (Lecturer #1040). One seemingly very concerned lecturer respondent (Lecturer #1022) listed 6 specific items of change that he desired to be implemented:

- More time to do the visits and providing available transport
- Some secretarial assistance for the [industrial] coordinator
- Ability to respond to extra demands by the SMEs, especially for research attention
- Students are always looking for some financial support
- Company supervisors need some lessons on how to assess the student
- IA should contribute >20% to the final mark of the degree

Another respondent retorted, ‘Change? No! Improvement? Yes! More involvement from lecturer[s] is needed in order to improve the NUST connections with industry’ (Lecturer #1002).

Industry supervisors proposed changes in improving student supervision, in university-industry communication or dialogue, and in preparation for entry into industry, adding that ‘Students should be attached to SMEs as a learning process for SMEs, students and NUST itself’ (Industry Supervisor #2018).

One student respondent who said NO to changes in the current IA programme explained that, ‘IA must be phased out because we still have to undergo the graduate trainee programme wherein we will be exposed to industry’ (Student #0275).

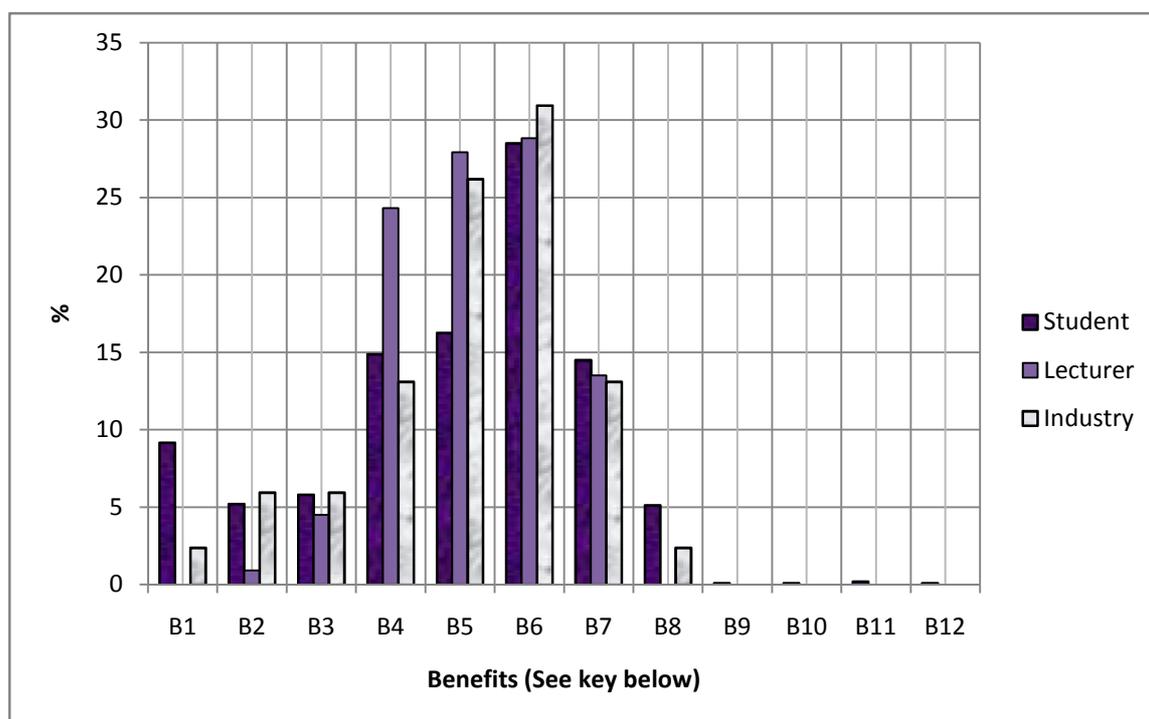
#### *4.4.4.4 Benefits to students*

Question 32 sought to find from students what they benefited most from their organisations of attachment, from lecturers what they desired their students to benefit, and from industry supervisors what they desired to offer students on attachment in their organisations. Respondents in all cases were provided with a list of eight suggested benefits to choose from, with the option to add other benefits that they felt were not covered in the list provided. The respondents were asked to rank the top three benefits they considered the most important to students. A few respondents had difficulty following this instruction and their responses were not considered in the analysis.

Of the 338 student respondents who performed the correct rankings in this item, about half (49.41%) ranked learning new knowledge and skills as the top benefit to students, followed by application of prior knowledge (11.83%), intellectual challenges (10.65%), prospects for employment (10.65%), remuneration (5.92%), the organisation’s reputation (5.03%), offering a service (3.85%), material benefits and working conditions (2.37%). One respondent added that they benefited from the organisation’s offer to assist her (financially) to complete her studies. The graph below summarises respondents’ rankings of the benefits of industrial attachment.

The 37 lecturers who responded with expected rankings considered application of prior knowledge (45.95%), learning new knowledge and skills (37.84%) and intellectual challenges (16.22%) as the top benefits, while industry put learning new knowledge and skills (53.57%), application of prior knowledge (28.57%), and material benefits and working conditions (7.14%), intellectual challenges (3.57%), prospects for future

employment (3.57%) and offering a service (3.57%). However in considering the combined first, second and third rankings, all three respondent groups were unanimous that the top benefit was learning new knowledge and skills (students 28.5%, lecturers 28.83% and industry 30.95%), application of prior knowledge the second (students 16.27%, lecturers 27.93%, and industry 26.19%), and intellectual challenges the third (students 14.89%, lecturers 24.32%, and industry 13.10%). Ranked very low by students and not at all by other respondent groups were that the students were offered assistance to complete their studies, gained work experience and exposure, built a personal character and managing difficult situations (See Fig. 4.11 and tables in Appendix XIX).



**Key to benefits of IA:**

- |   |   |
|---|---|
| B1 Remuneration                                   | B7 Prospects for future employment        |
| B2 Material benefits and other working conditions | B8 Offering a service                     |
| B3 The organisation's reputation                  | B9 Offered assistance to complete studies |
| B4 Intellectual challenges                        | B10 Gaining work experience and exposure  |
| B5 Application of prior knowledge                 | B11 Building a personal character         |
| B6 Learning new knowledge and skills              | B12 Managing difficult situations         |

**Fig 4.11 Combined rankings of IA benefits according to students, lecturers and industry**

In summary, students valued their learning of new knowledge and skills, the opportunity to apply their prior knowledge, and the intellectual challenges provided by the industrial experience above the other listed benefits of their industrial attachment, reinforcing the learning focus of industry-based learning. These are the same benefits that their lecturers

desired them to attain, and they are the same benefits that the industry supervisors desire to offer students, above all others.

#### 4.4.4.5 *Industrial attachment contexts and workplaces*

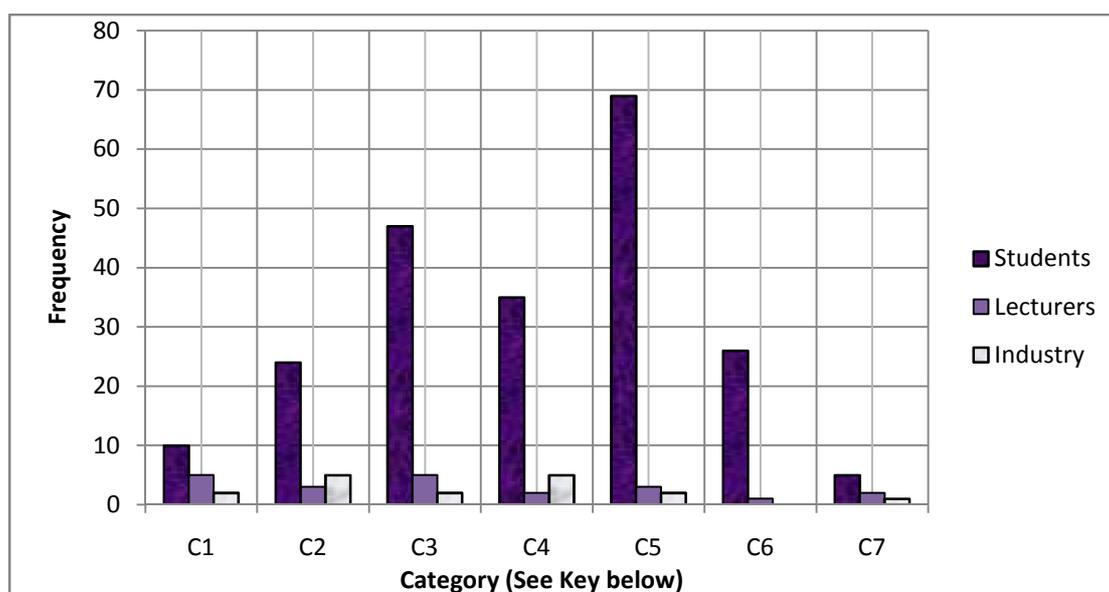
Item 33 in the students' questionnaire asked the students the category and location of the organisation they had been attached to. The majority (70.14%) had been attached in large-scale urban companies, followed by 17.97% in urban small and medium-scale organisations. Other categories of student attachment places were large-scale rural (3.19%), SME peri-urban (3.19%), SME rural (1.45%), and an assortment of others (4.06%) not easily classified, such as district government stations, non-governmental organisations (NGOs), wildlife posts, and nature reserves. The corresponding question to the lecturers sought to find out the percentages of students attached in different categories of industries by location. Of the 34 respondents, 32.35% said all (100%) of their students were attached to large-scale urban companies, 35.29% said between 80 and 99% of their students were attached to the same, 11.76% said they had between 50 and 79% attached, while 20.59% said they had between 0 and 49% going to the large-scale urban organisations. Lecturers said that those students who did not go to large-scale urban companies were spread in SME urban (42.75%), large-scale rural (20.83%), SME peri-urban (18.75%), SME rural (6.25%), and in other areas (10.42%). Industry supervisors were asked to indicate the category and location of organisations they did most business with. Of the 34 respondents, 25 large scale companies (73.53%) indicated they did business with other large-scale companies, 4 large-scale companies (11.76%) with both SMEs and LSEs, 2 SMEs (5.88%) with urban SMEs, and the rest (all LSEs) were distributed equally between other remaining categories. The essence of involving SMEs in the analysis is to show the importance attached by the university to engaging with them in a comparative manner to LSEs; Ramaphosa (2011) offers this explanation:

It is a widely accepted phenomenon that SMMEs (small, medium and micro enterprises) provide the majority of new jobs worldwide and are vital to the continuing growth and success of any economy ... In South Africa, SMME development is of critical importance as it helps to create jobs. Despite this, research shows that South Africa has a low level of entrepreneurial activity compared to other developing countries. This begs the question of what it is that is standing in the way of South Africa increasing its entrepreneurial activity (Ramaphosa, 2011).

As with Zimbabwe, one possible answer to the question could be that not much systematic attention is being given to the SMEs compared to their LSE counterparts by influential players such as the government, enabling institutions, and universities.

#### 4.4.4.6 Additions, concerns and explanations

Item 37 provided all respondents the opportunity to volunteer any additions, concerns or explanations to some of their answers in the previous questions. In the students' questionnaire, 156 (43.00%) of the total 363 respondents volunteered at least one additional item, with 105 (67.31%) of them volunteering exactly one addition, 43 (27.56%) exactly two additions, 7 (4.49%) exactly three additions and one (0.64%) respondent contributing four additional ideas, bringing the total additions to 216. A thematic content analysis of these 216 additional points produced seven categories. It is possible that with further and finer scrutiny of the respondents' answers, some overlaps could be found to exist between certain categories, such as sentiments expressed under preparation and placement could also fit under student welfare. Figure 4.12 And Appendix XX show the graphical representation of the above information.



#### Key to thematic categories:

- |   |                                      |
|---|--------------------------------------|
| C1 SMEs                                   | C2 Supervision and assessment        |
| C3 Learning, involvement and IA relevance | C4 Preparation and placement         |
| C5 Student welfare                        | C6 University-industry communication |
| C7 Conditions                             |                                      |

**Fig. 4.12 Consolidated student, lecturer and industry additions according to category**

Topping the list of students' additions with almost a third (31.94%) of all the additions is the category of student welfare. Other additions included the issues of learning, involvement and relevance of IA (21.76%), preparation and placement (16.20%) university-industry communication (12.04%), student supervision and assessment (11.11%), SMEs (4.63%) and conditions and the timing of industrial attachment

(2.31%). Analysis of lecturers' additions similar to the above shows that top on the list of additions are the two issues of SMEs (23.81%) and learning, involvement and relevance of IA (also 23.81%). The other concerns are the order of supervision and assessment (14.29%), student welfare (14.29%), preparation and assessment (9.52%), conditions of IA (9.52%) and university-industry communication (4.76%). The industry supervisors' list of additional comments is headed jointly by student assessment (29.41%) and preparation and placement (29.41%). Following these are the issues on SMEs (11.76%), supervision and assessment (11.76%), student welfare (11.76%) and conditions of IA (5.88%) (See Figure 4.12 for the graph).

When the additions by students, lecturers and industry are combined and analysed together, the order almost matches the students' figures with student welfare (29.13%) topping the list, followed by learning, involvement and relevance of IA (21.26%), preparation and placement (16.54%), supervision and assessment (12.60%), university-industry communication (10.63%), SMEs (6.69%), and conditions of IA (3.15%). Below is an elaboration of these themes.

#### *4.4.4.6.1 Student welfare*

It is befitting that students have raised the highest number of comments and additions on the subject of their own welfare during industrial attachment, a sign either of their expectations not being met or an indicator that this is the area given less attention by their lecturers and industrial supervisors, jointly or individually. Their major concerns range from suggestions for increased student support to complaints about the university's and the industry's treatment of students during their attachment. Complaints about students being used as cheap labour were prominently raised once again, as well as social aspects and personal relations including gender-related relations and sexual harassment. The university, industry, government and other relevant institutions are urged to provide more financial support to students on attachment:

Money is a problem for most students on IA. It is not an issue of gaining knowledge only, the student does not have to feel the effects of lack of money because the company also benefits from the services provided by the student (Student #0048).

One sample comment was:

Some students were treated unfairly by their respective organisations in different respects. These include: (1) not being involved in decision work, hence just doing the technicians work i.e. producing drawings, (2) too little money (allowances) were given to students for

their sustenance. Some were given transport money only which does not compare with the work they were made to do. Students have been taken as cheap labour. With respect to this I think students should be given the opportunity to air their views and supervisors should take time to look at the issues (Student #0302).

Lecturers' lacklustre prioritisation of the students' welfare issues was confined to the shortages of resources for quality student competency development and treatment of students. One respondent in the Commerce Faculty thought that 'FIT [the Faculty of Industrial Technology] is more serious about student exposure to attachment than Commerce. Commerce students are often dumped and become a cheap source of labour to industry, yet they are taught little' (Lecturer #1035). King (1986:128) notes that there often exists a large 'grey' economy thriving in part on the ill-requited labour of youngsters, even in developed countries, which has adverse effects such as drop-outs or extended durations of undergraduate studies, but also had 'an educative dimension' in orienting students for their future.

One of the two industry supervisors to address the student welfare issue urged the university to provide the students with log books instead of having them improvise 'as they currently are doing' (Industry #2018). The other comment concerned the inability of the industry organisation to provide decent allowances to students owing to 'difficulties getting ZIMDEF [Zimbabwe Manpower Development Fund] to pay for supervisory services in terms of ZIMDEF's own rules' (Industry Supervisor #2033). There seems to be a lot more that could be researched from the students' own viewpoint on the subject of their welfare, which does not lie within the scope of this study.

#### *4.4.4.6.2 Learning, involvement and the relevance of industrial attachment (IA)*

Issues raised by students touched on the link between pre-IA and post-IA learning in the years prior to going out on IA to experiences during and immediately after IA, as well as the nature of involvement in the industrial environment:

IA is very important and specialisation should be seriously considered because Computer Science is broad. Learning experience during Part I and Part II should be coupled with practical industrial visits and seminars so that students may be able to define their interests (strengths) for the [continuation] of their career (Student # 0016).

One respondent complained that 'companies do not respect the fact that the student has academic requirements to fulfil' (Student # 0022), while another applauded the fact that IA helped her 'to develop skills of being able to adjust to a new environment, understand

human behaviour and skills for undertaking an accountancy job’ (Student # 0058). One complained about the industry’s rigidity in that the company ‘will have an engineering attacheé work in the plant throughout and not [give them] managerial skills’ (Student #0278). One respondent recommended that industry supervisors be better informed and well versed ‘with the requirements of specific fields of [student] training’ and the ‘depth of the training’, adding that his attachment experience ‘had no depth in the software applications and integrated circuits applications’ and suggesting that perhaps the industry personnel ‘feared to disclose much of the software-based information for reasons of security’ (Student #0321). On the relevance of the learning content, one student said:

The current curriculum is outdated and does not match the current events in industry, like in electronics we should study in depth optical fibre communication as a stand-alone course (Student #0314).

A summary evaluation of the whole IA experience in regard to learning and relevance to future employability and entrepreneurship is the simple view of this respondent who said the following:

I learnt new skills and had the chance to use the knowledge that I had acquired in my previous academic years before IA. As a result IA equips students by transforming them from being students into professionals (Student #0133).

Lecturers reiterated the usefulness of IA in complementing classroom learning by providing the practical component that could not be achieved without appropriate workshops, studios and laboratories, one respondent adding that ‘IA should continue for as long as the technological gap between industry and [the university] exists’ (Lecturer #1010). Another said that, ‘Students need to be [explained to] that industrial attachment is not for earning money but to apply theory and mix it with the practical experience to get a better understanding’ (Lecturer #1026).

Only one industry respondent volunteered a comment regarding student learning, involvement and relevance of the industrial experience. This respondent confirmed a statement attributed to one student above that, ‘Some areas of work are not exposed to students due to their sensitivity’, adding, ‘If you realise that a student is lazy and not self-motivated you avoid giving [him or her] work and in the process [his or her] work experience is limited’ (Industry Supervisor #2019).

#### 4.4.4.6.3 Preparation and placement of students

The third most popular theme volunteered by respondents as an additional point was the preparation of students before going out to industry as well as issues surrounding student placement in the companies. The variety of comments, concerns and explanations raised by students cover the courses that are meant to prepare students for IA, the logistics of transferring students from a class environment to a working environment, the responsibility of finding attachment places for students, and the effects of placement on assessment and grades. Observations such as the following were made: ‘Some of the things we learn prior to going for IA [are] not relevant; before students go for IA they must be taught some of the hands-on essentials’ (Student #0014). This sounds like a simplistic comment which would require further explanation since, in my view, basically not all that students learn is meant to be applied later by one particular learner. Indeed, learning is often an experience in itself and most things learnt are forgotten and not used in the later life of the individual learner, although they may be used by other students who went through the same programme. Regarding logistical preparation, the comments were of this nature:

The students who go on IA should be taught or have a seminar with those already on attachment giving them ideas of what will be expected in the organisation[s] because some students go to IA with wrong ideas and motives. IA is a learning stage, not a period of thinking about money-making. Learning should be given priority (Student #0160).

This is surprising because some lecturers indicated in the interviews that pre-departure seminars and elaborate and prescribed preparation procedures were followed to assist the students as they left for the often lonesome one year sojourn in systematically selected workplaces. The sentiments of this student seem to suggest that many lecturers as individuals or departments or faculties, have over time relaxed these requirements, releasing students into the workplace jungle virtually unprepared or just partially prepared. This has a heavy impact on the quality of students’ overall and desired learning, causing them to strive to learn everything on the spot.

One student respondent brought up the point of unfairness that results from being placed in differentially endowed companies. The disproportionate cash allowances that these companies pay out to industrial attaches cause attitude problems, such as that ‘if some students get paid a lot more money than the others, they tend to think that they are better than others after attachment, but the truth [is that it] will be a matter of luck of finding

attachment at a highly paying company. They should respect others' (Student #0230).

On the vicissitudes of getting placed in industry, this student complained:

As an electronics student on IA, I faced great challenges in getting IA due to the fact that the university is not liaising with industry well. We had to go [from] door looking for work (Student #0314).

The lecturers' views touched on the inadequacy of communication between relevant parties, causing some companies not to be 'sure as to what and how they must treat the attached students'. Moreover, 'There is a need for a coordinated approach by both parties so as to make the exercise effective' (Lecturer #1018). It was further observed that, 'Due to Zimbabwe's economic problems and resultant industrial closures, IA is almost losing meaning as students are attached in organisations unrelated to their degree programmes' (Lecturer #1033). This lecturer goes on to point out that a 'serious marketing effort is required in order to get IA places outside the country'. However, it must be assumed that in a stable economic environment, placements outside the country will be unnecessary.

Industry supervisors reiterated the call for thorough and systematic pre-IA departure preparation incorporating sharing of information by post-IA students with their outward bound counterparts. As if to suggest that universities knew less about it, this supervisor drives the all-too-familiar crucial point home:

IA students should be adequately prepared for attachment. A course or programme should be put in place to tune the students into the right mindsets and preparedness to face and have an impact in industry in terms of contribution of innovative, fresh and learned ideas. .... Post-attachment programmes should also be put in place for students to share the gained knowledge from different industries as this will better equip the students for industry after completion of their respective programmes. A more practical approach in the final years is needed so as to churn out more effective and results-orientated graduates from the universities (Industry # 2002).

There are some who would soften and say, 'I think NUST is a good institution. It however needs to spread and have its students to be placed on industrial attachment in big organisations' (Industry supervisor #2008). All in all, it would be expedient 'to provide clear performance measures for attachment to ensure optimum benefit' (Industry supervisor #2013), 'students should be willing to do any tasks given (industry supervisor #2024) and students should be taught the 'dress code' (Industry supervisor #2025).

#### 4.4.4.6.4 Supervision and Assessment

Principles, processes, and outcomes of student supervision and assessment during the industrial attachment period came under further scrutiny in the added items of the questionnaires, as had been the case in the factor analysis section. Issues were raised on expectations by company supervisors overshadowing objective assessment, regularity and adequacy of lecturer visits and the effectiveness of such visits, reliability of assessment grades by both university and industry-based supervisors, qualifications of industrial supervisors, what aspects to be assessed, student cheating and plagiarism, and more. One student blatantly complained, ‘Some of us did not get assessed yet we paid fees. So there is no need to pay fees at all’ (Student #0047). Another blamed lecturers for not turning up for assessments, adding that if ever they did, ‘... they will be in a hurry, they hardly do anything’ (Student #0284). Another concurred, saying, ‘... they did not visit me where I was and [I] do not know how they got my supervisor’s mark’ (Student #0323). One female Commerce student provided a comprehensive narrative:

I was satisfied of course by the supervision I got from my industry-based supervisor, but the overall mark that he gave me in the end was quite demotivating. If only I had [had] more time in the organisation, I do not think I was going to perform in the same way as I had done earlier. I implemented several changes in the organisation and implemented some new policies and at some instances formulated them. Some of my colleagues who absolutely did nothing during the attachment period earned marks higher than those I got. I think the supervisors from the college [university] need to analyse closely the reports which we submit in the end. ... Ladies at times are penalised for issues [beyond] their reach, like sexual favours in return for marks and this is a great disadvantage (Student #0132).

Cases of students capitalising on the loopholes of the assessment procedures and the company setup were hinted at, with warnings that much plagiarism did go undetected when students reported to different supervisors. ‘NUST also need to take the issue of plagiarism more seriously because it affects us when we are making project write-ups on attachment’ (Student #0045).

Lecturers encouraged more visits to assess students (Lecturer #1008), encouraged professionalism in the award of marks and updating of assessment procedures and instruments (Lecturer #1028). One observation was that, ‘The marks students earn from IA hardly reflect their performance but how friendly they were to their supervisors. The reports submitted by students are marked with little seriousness if any’ (Lecturer #1035). Supervision and assessment are some of the top issues of concern to industry

supervisors, prompting calls for more frequent lecturer visits and follow-ups as ‘a control measure to ensure that the student focuses on value-adding activities during IA’ (Industry supervisor #2012).

#### *4.4.4.6.5 University-industry communication*

Closely linked to preparation of students for IA is the nature and level of communication between the university and the companies in which students are attached. Apparently some respondents were not happy with the quality of the university-industry collaboration with regard to the smooth administration of the industry-based learning activities that were imperative for both organisations year in year out, beginning from the preparation of students through the attachment and extending to the post-IA final year. Students, for instance felt that it was the responsibility of the university to create and maintain ‘a continuous relationship with people in industry [so] that when students go for IA it’s not difficult’ (Student #0085), to ‘liaise with the responsible sectors of the industry to make sure that their students are learning the right and relevant things’ (Student #0098) and also so that ‘the university will closely understand the needs of the industry’ (Student #0236). The following captures this point further:

There is a constant need for the university to get in touch with the various industrial supervisors to at least explain to them and give them prior knowledge of what IA should encompass and make an effort to ensure that the students are given the requisite knowledge and authority during the attachment (Student #0144).

Communication between the students and the university was also cited as an area requiring improvement (Student #0259) which consolidates that the university needs to maintain its eyes on industry and the students out there. Advocating a broader form of university-industry collaboration, one student (#0280) calls for the establishment of a team from the university to ‘study the various industries and then work together with [their] personnel to draft new programmes’. One engineering student’s complaint about her company’s failure to provide her with requisite experience could be ascribed to the lack of communication between the student and her industrial supervisor, the student and her university supervisor, and between the university and the company. She said:

... I did not get a chance to undertake or to under-shadow management. This, I feel, deprived me of a chance to explore the management qualities in industry even for a month. Thus if proper duties are stated, one may get a chance to learn all the faces of work as an engineer (Student #0290).

A proposal was made for a stronger bond to be ‘created between the department and the companies we are familiar with, on what the students have learned and what the company has to focus on after receiving the attachee’ (Student #0324).

The only view related to university-industry communication by a lecturer was that currently there was not enough time to interact with the IA supervisor. Such interaction would be necessary to help companies be ‘sure as to what and how they must treat the attached students’ (Lecturer #1018). There was no volunteered comment from the industrial supervisors on this issue. One complaining Commerce student (#0126) summarised four points on issues discussed in sections above:

- NUST does not help us look for attachments
- Supervision is poor
- They do not update us on any developments on campus
- They have no relations with companies

In a Swedish study on the interaction between academic and industrial supervisors in graduate education, Salminen-Karlsson and Wallgren (2008) found that ‘industrial graduate students often require joint engagement in a way that differs from other forms of knowledge transfer between the academy and industry’. They noted that the two supervisors had to find a common denominator in order to make the student’s learning and the cooperation rewarding. This is the expectation in our practices, too.

The emerging concerns above have provided analysis insights into student welfare and learning of the students, lecturers and industry supervisors, both desired and actually experienced on the ground.

#### *4.4.4.6.6 Small- and Medium-scale Enterprises (SMEs)*

All three groups of respondents had something to add in the questionnaire about SMEs and their involvement in the industrial attachment programme. Most of the students were just repeating what was asked in questions 34 and 35, embroidering on the inadequacy or otherwise of SMEs to provide the requisite industrial experience to students, shortage of equipment, their relevance and contribution to the country’s economy and the justification or otherwise for their inclusion in the university’s programmes. One response was the following:

The current economic situation has realised more growth of SMEs and thus has led or increased the need to support these SMEs of which not only financial support from its ministry but also from universities and colleges with the proper human resources with good entrepreneurial skills and also colleges developing more curricular courses to aid these SMEs (Student #0130).

On realising the diversity of the SMEs and their contributions to student learning, one student suggested a kind of selection process to ‘choose the ones best suited to develop the student’ (Student #0316). Such a move will be flying in the face of a university trying to make an impact and contribute to the holistic development of its community. In practice, help is often given to the weak ones in society.

Lecturer (#1003) notes that ‘there are many small and medium scale enterprises that are not really familiar with the academic knowledge’, implying that it might be problematic for a university and its staff to do business with them in the way it is happening with large companies. It is my contention that this familiarity must begin somewhere, and the university is in a good position to cultivate it broadly. Lecturer #1027 observes that:

The small enterprises are becoming the drivers of the economy the world over. Governments need to give facilitating factors especially easy loans to [institutions] or graduates to start-up their projects.

The suggestion of one industry supervisor was that, ‘SMEs need to be driven and directed by universities and/or colleges so that due professionalism is practised instead of the culture of doing things the ‘backyard’ way’ (#2020). Recommending mentorship of SMEs and noting that small businesses are the biggest employers in South Africa, Vollgraaf (2011) says, ‘For the average small businessman, the biggest problem is the lack of someone to take him by the hand and help him develop.’ He adds aptly that this task should be done by ‘an independent institution which advises and mentors entrepreneurs about business, not an institution linked to government’.

#### *4.4.4.6.7 Industrial attachment conditions*

Some respondents added comments addressing the current conditions and procedures followed in the conduct of the industrial attachment. These included the timing of the exercise within the whole degree programme, the duration of the attachment and the subtle regulations such as registration details and payment of university fees. A strong proponent for shifting the industrial attachment year to the end of the degree programme wants a situation where students move into employment immediately after IA and going back to university for the final year:

... has the problem of having students going for IA without the full knowledge of the things they are learning and because of this they are not able to obtain the maximum benefit of IA because of some knowledge they would be lacking which they then do in [the] final year and this limit[s] the students' ability to demonstrate their full potential in the industry. Therefore I strongly suggest that attachment should be moved to the final year for Commerce students (Student #0088).

A Faculty of Communication and Information Sciences student concurs with the above, saying, 'IA should be done after 3 years continuous study because breaking in between disturbs students' concentration' (Student #0246). Regarding the duration of the industrial attachment, a suggestion of shortening the period in response to the prevailing economic ills is made:

... I think it is of concern that the period be reduced from [minimum] 8 months to 6 months [because] most students are failing to get attached. This would give room for others to leave space for those that wouldn't have found attachment ... (Student #0122).

The duration is considered from the position of benefit by a lecturer who suggested that 'a year is too long; students benefit in the first few months. After that it just becomes routine and does not add value to students' (Lecturer #1038).

Concerning the fate of students who fail to get satisfactory placement in the year they are due, one lecturer proposed that 'for students who fail to get IA [placement] in their penultimate year of studies, provision should be made to proceed to the final year; then [they can] go back for IA later' (Lecturer #1033). The only respondent from among the industry supervisors reiterated the proposal for the reduction of the period to 6 months 'to cater for more students' coming from different universities (Industry supervisor #2026).

Universities in other countries recognise that the workplace can play an important role in supporting student learning experience. However, it has been suggested that not all placements, short or long duration, live up to their expectations. Bowden and Marton (1998) suggest that there is a need for learning to be taking place during the time the student is in the workplace and that, like any other learning, should not be left to chance. They suggest that project work, small-scale research and development tasks for real clients, course advisory groups comprising professionals from relevant workplace areas, and the involvement of similar external professionals in the learning programme and in assessment of student work 'are examples of ways the workplace and campus learning have been linked'.

#### **4.5 Emerging perspectives of quality through service learning**

What follows is a summary and synthesis of the knowledge obtained from the data presented above by categorising that knowledge according to three broad locations of the respondents, namely the university (NUST) that is the subject of the case study, the industry partners with which the university collaborates, and the other universities who are interested parties and keen participants in the practice of industry-based learning. All the participating groups of respondents were interrogated during data collection on how they perceived the quality aspect in the learning of the students at NUST, and they appear to provide some overlapping responses. However, since they had different inclinations and interests towards the subject of discussion and the research process, they were bound to offer some differing opinions in one or two aspects of quality practice as experienced at NUST at the particular time of the study.

##### ***4.5.1 A NUST perspective of quality academic practice***

The three categories of respondents comprising management staff, lecturers and teaching assistants (practitioners) and students all share the position of being within the institution that carries the operational load and responsibility for rolling out the practice of industry-based learning as part of its mandate enshrined in its mission statements. As such there is bound to be a concentration of information and activity that touches all participants and affords them a chance to build expectations and form opinions. Such information would also produce biases and prejudices in the interpretation of issues as experiences from the field are shared each year by those students who return to campus with stories of their experiences.

The management staff at NUST appear to be concerned with issues of impact in the world of industry and the reputation of the institution counts high on the priorities. This may be linked to the fact that two of the guidelines for students as they participate in industrial attachment are “to keep good relations with all the staff of the company” and “to promote the good name of NUST”. In this study, management staff emphasised the qualifications of the industry-based supervisors as a key factor in achieving quality supervision and mentorship of the students. They mentioned the benefits of university

academic staff being at least partly exposed to problems happening in industry for them to initiate research and development projects with industry partners and with students. One respondent gave the NUST graduates a big chance that they were able to find their feet anywhere in the world and perform well from the quality teaching and learning experienced which included industrial attachment.

The practitioners at NUST were less keen on research and reputation, but touched on basic issues such as provision of appropriate equipment and materials for on-campus practical lessons so as to adequately prepare for and link with students' participation during industrial attachment. The practitioners, among other things, envied the resources enjoyed by students in universities in industrialised countries. The uncertainties, stagnation and the decline in the country's economy made it difficult for sustained knowledge building and sharing between academics and industry partners, making it necessary at times to seek more innovative company ventures in neighbouring countries with relatively stable economies. Although the qualifications of industry supervisors was also raised by this group, the mechanism of supervision was more important to them, that is, the instrument of assessment and the frequency of assessments. The aspect of innovative outputs (such as starting up a company) was brought up as an indication of quality learning by lecturers who credited some of their former graduates for setting good examples in society.

The student body at NUST was typical of its nature and its greatest concern was not more with national impact or institutional reputation and competitiveness, but with their own welfare and urgent concern of the moment. Students concerned themselves with their assessment standards, since their immediate objective was to obtain a qualification. Their judgement of quality was biased towards those factors that contributed to their success in obtaining grades that enabled them to graduate successfully. On the quality of learning, that is the processes, resources and the environment, the students aligned this with their general welfare, including the overall treatment by both academic and industry staff. As a consequence, students had more suggestions for changes to be made to the current programme of industrial than other groups of respondents. This could imply that they perceived it to be lacking in quality. The changes suggested included the types and size of companies they were attached to, the immediate short-term and long-term benefits of engagement with companies, and the intellectual challenges expected

and experienced while on attachment. There were strong sentiments about the linkage between the experiences in industry with those on campus, emphasising curriculum coherence and integration.

Generally, all the NUST respondents did not dismiss the industry-based learning pedagogy altogether as one that had to be discontinued and abandoned. This is in-keeping with the accessed literature discussed in chapter 2 of this study. All respondent suggestions pointed to a plausible undertaking that needed to be modified and adapted to deliver the best results in the eyes of the various stakeholders.

#### ***4.5.2 An industry perspective of quality academic practice***

Interestingly industry respondents were apparently not in touch with learning and teaching processes at university. It brings the question whether they lumped students as part of the workforce with no special needs. Such a position would affect their supervision successes since student orientations differ from those of permanent, temporary or part-time employees. Industry and business organisations are known, among other things, to be keen on safeguarding their interests and keeping competitors guessing about their strategies. In this light, it was easy to note that representatives of large-scale companies considered extending the industry-based learning practice to small and medium scale enterprises not a pressing issue. They again were not looking at the issue holistically, from the perspective of the partner university which was more concerned with knowledge and building communities than focusing on markets, profits and costs of operations. That it was a quality exercise for the university to contribute to the growth and survival of all sizes, types and orientations of companies was seen to be of little significance.

One aspect that industry seemed to appreciate in students attached to them was self-regulated learning and self-direction. The industry supervisors mentioned preference to students who did not require much supervision, who were ‘able to work on their own’. This implies the preference for training more than education. Trained employees are assessed on their adherence to expected procedures with little room for making mistakes. However, for quality output, training is best integrated with innovativeness so as to allow for improvement in company routines and procedures, a duty that should be expected of graduate employees.

On the question of sharing meanings and understandings about the importance of industry-based learning, industry respondents observed that students with industrial attachment experience had an edge over counterparts without, but there remained a great need for academics and industrialists to interact about the best ways to groom the students for the good of society.

#### ***4.5.3 A perspective of other universities***

Other universities practising the use of industry-based learning in whatever format can be classified as imitators, collaborators or competitors. Since in general universities belong together as producers of human resources in a country, they share comparable conceptions of quality and allied practices. In the Zimbabwe context, this is most likely because the mushrooming of universities in a space of ten years from one to over a dozen was believed to have been enhanced by some new universities duplicating regulations and programmes of existing ones and only putting minor modifications.

Universities are popularised by their programmes on paper as well as through the graduates they produce. The curriculum is therefore one of the frontline considerations as to the quality of a university's offerings. But yes, indeed, also the tangible resources and facilities of an institution contribute to its fame. Quality control mechanisms for self-regulation and benchmarking were cited in this study as indicators of quality assurance, as were efforts and real engagements in applied and community-based research. But in the prevailing Zimbabwe situation at the time of the study, research and outreach were curtailed in sister universities as at NUST.

There was a perceived high incidence of value-addition to the learning and teaching practices brought by industry-based learning in other universities in Zimbabwe, as well as an appreciation for holistic engagement with all sectors of the industrial and business communities. The experiences gained from such engagements improved the shared knowledge between partners who would then help the students to grasp both the learning content and the work ethic to the advantage of their future careers and society. Concern over the limited platforms for sharing goals and visions on best practices towards quality assurance hinged around the preoccupation of young universities with consolidating their positions in the face of stiff competition, as well as the shortage of stable, senior

and experienced staff to function in key decision-making and strategic positions that influence practice and curriculum issues. In this regard, all universities in the study shared the concern that the current climate in the country was not conducive to the rapid stabilisation efforts needed by young universities to capitalise on the quest for higher education sweeping the country in this period in the history of the country.

#### **4.6 Conclusion**

The system of presentation of findings adopted in this chapter largely followed on the categories of predetermined and emergent themes broken down into categories of respondents, and it separated the data obtained through the two main instruments, the questionnaire and the interview. This approach, though open to criticism, is only one way of accomplishing the task of picking up as many of the varied responses as possible in a simplified manner. However, in the analysis and discussion of these findings in the next chapter, a unification of themes from across the data collection methods and respondent groups is appropriately done.

The respondents in the interviews raised important points both as anticipated through directly answering questions, and through offering extraneous views in open-ended questions and discussions. The various categories obtained included issues directly addressing the concept of quality, as well as learning, research, academic improvement, engagement, relevance, supervision and assessment of students, benefits, among others. The inter-relatedness of most of the obtained views suggests the richness of the topic of discussion, and was a pointer to possible future research in one of the methodologies of qualitative, quantitative or the mixed methods. The various respondent groups in the interview processes, that is, NUST management staff, NUST lecturers, industry supervisors, management and lecturers of other universities provided convergent and divergent information, allowing for cross-comparisons between views of respondents. NUST management and lecturing staff were in the forefront of quality academic issues including research, curriculum integration, holistic engagement, relevance and transformative learning.

The questionnaire data was equally comprehensive. The factor analysis used in the closed-ended section of the questionnaire became a useful tool for capturing the hidden associations of mini-themes and ideas, grouping them into broader relational ideas for

systematic analysis. The categorical questionnaire items produced data that consolidated the factor analysis with common themes including the following: contributions of industrial attachment to learning and innovativeness, benefits of industrial attachment, contexts and workplaces, relevance, student supervision and assessment, among others. The data from open-ended items substantiated the categorical data in the majority of items, and the above exhaustive analysis of all issues raised is an attempt to answer the research questions and sub-questions. Combined with the data from interviews, this analysis points to both anticipated issues and others emerging and requiring further probing and research.

The summary of the identified emerging themes (section 4.5) provides another angle of analysis of the data in the study by taking the perspectives of key respondents by site or location. The NUST perspective synthesises the insider views from the institution under study, the industry perspective gives the strategic partner view, and the other universities perspective gives the collaborator and competitor view. This style of analysis provides a multi-pronged approach to data interpretation which makes use of insider, peripheral (inside-outsider) and outsider inputs. For an adaptable and situational concept such as quality, these multiple perspectives enhance reliability of findings and subsequent interpretations.

The findings presented in this chapter signify an attempt not only to reinforce ideas picked from the literature but to extend those ideas and bridge gaps in knowledge that would assist university policy makers and practitioners in engaging in an innovative pedagogy such as industry-based learning. The findings are further interpreted, deliberated upon and theoretically contextualised in the next chapter.