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ENHANCING QUALITY ACADEMIC PRACTICE THROUGH INTEGRATED INDUSTRY-BASED LEARNING

by

NDUDUZO PHUTHI

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This is to certify that the thesis titled **ENHANCING QUALITY ACADEMIC PRACTICE THROUGH INTEGRATED INDUSTRY-BASED LEARNING** by **NDUDUZO PHUTHI**
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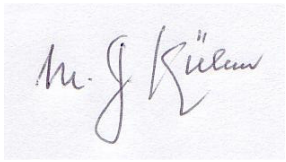

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DEDICATION

To three most enduring and unwavering ladies in my eventful life:
My dear wife Kesi, lively, resolute, courageous and inspiring life partner;
My blossoming daughter Noku, my emotional stabiliser;
My prayerful mother Olive, who showed me into this world.
Also to an exemplary gentleman, Isaiah, my late father,
And to two promising lads, sons Thabi and Mgcini.

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All said, I wish to venerate my family for their patience when I took away time and other resources that would have made a difference to their welfare. It is just not enough to say that my wife and children endured stress during my long periods of absence, and had to put up with my many excuses to sneak away or to be left alone to concentrate on my work. In particular, my sons, Thabisani and Mgcini, were somehow deprived of my role-modelling presence when it mattered most in their unfolding lives. I will forever cherish this tolerance and work to extend the spirit to benefit others who will need the same support. And, above all, I give honour and gratitude to the Almighty and my Creator who, in his abundant wisdom and benevolence, has deemed it befitting to endow such a prized gift at this juncture of my life.

ABSTRACT

Universities in Zimbabwe have universally adopted a full-year integrated undergraduate student workplace-based learning pedagogy following the precedent set in 1991 by one pioneering university, the National University of Science and Technology. In this explorative study I analyse participants' views, reflections and understanding of how the full-year model of workplace-based learning enhances quality academic practices and impacts on short, medium and long-term visions and opportunities for students and other stakeholders. I employed the embedded concurrent mixed methods research design (Creswell & Clark, 2007) using interviews with lecturers, university administrators and industry supervisors, as well as open-ended questions in three matched versions of a questionnaire to students, lecturers and industry supervisors respectively. The same questionnaire provided quantitative data that was statistically analysed.

Interviews were conducted with 24 participants from the university under study, industry and other universities, while 363 university students, 40 NUST lecturers and 34 industry supervisors responded to the respective questionnaires. Students, lecturers and industry supervisors concurred on the coherence between industry experiences and university learning, the beneficial experiences at the workplace, and the relevance of those experiences to society, confirming the expressed view that industry-based learning promoted quality learning and teaching, and enabled students to become work-ready. However there were perceptions of inadequate student supervision and assessment, unsatisfactory student welfare safeguards, inadequate research enthusiasm among lecturers, and the lack of involvement of the whole spectrum of industry categories. There was an underlying regard for lifelong learning enabling societal transformation into the increasingly dominant industrialised culture. Lecturers indicated an appreciation for a holistic orientation to teaching and learning (Taylor, 2009), and were inclined towards adopting the hermeneutic approach to education (Danner, 2002). It is recommended, among other things, to revitalise effective practices through staff development efforts, increasing student knowledge and empowerment, and strengthening collaborative platforms between the university and its industry partners. Chief among the suggestions for future research is the understanding and promotion of student welfare during their placement in the workplaces.

Key Words: workplace-based learning, industry-based learning, quality, engagement, student supervision, assessment, industrial attachment, curriculum coherence, student placement, research-enhanced learning.

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LIST OF ACRONYMS

AL	Action learning
ASL	Academic service learning
CBET	Competence-based education and training
CC	Curriculum coherence
CL	Cooperative learning
CCFO	Critical cross-field outcome
CZI	Confederation of Zimbabwe Industries
DOE	Department of Education
EWP	Education with production
FAS	Faculty of Applied Science
FCIS	Faculty of Communication and Information Science
FIT	Faculty of Industrial Technology
FOC	Faculty of Commerce
HEI	Higher education institution
HEQC	Higher education quality committee
IA	Industrial attachment
IBL	Industry-based learning
LP	Learning processes
LSE	Large scale enterprise
NAMACO	National manpower advisory council
NUST	National University of Science and Technology
OBE	Outcomes-based education
OECD	Organisation for Economic Co-operation and Development
PGDHE	Postgraduate Diploma in Higher Education
PWE	Previous work experience
QL/QUAL)	Qualitative
QN/QUAN)	Quantitative
R&D	Research and Development
SARUA	Southern African Regional Universities Association
SDL	Self-directed Learning
SME	Small and medium scale enterprise
SRL	Self-regulated learning
SAS	Statistical analysis software
TQM	Total quality management
TVET	Technical and vocational education and training
VTE	Vocational and technical education
WBL	Workplace-based learning
WRL	Work-related learning
ZIMCHE	Zimbabwe Council of Higher Education
ZIMDEF	Zimbabwe manpower development fund
ZINTEC	Zimbabwe integrated teacher education course
ZNCC	Zimbabwe National Chamber of Commerce

CHAPTER 1: THE FOUNDATIONS OF THE STUDY

1.1 Introduction

As an educational practitioner, it is desirable to reflect on one's own and colleagues' professional practices, and to interrogate the importance of one's day-to-day interactions with various individuals and groups of people. In so doing, one is likely to identify the human quest for the improvement of the quality of the life among members organised around various institutions of any dynamic culture. Quality of life is a perceived state of being, interpreted and achieved through learning and cumulative social interaction among people.

This study places significant importance on learning through action and reflection in practice as a stimulant for personal and organisational growth and human development in general, and for the sustained impact and relevance of higher education practice in particular. The study focuses on the educational practice of experiential learning of a particular category known as industry-based learning, a practice that typifies the growing concept of university-community partnership and collaboration in a developing country in the current globalisation drive. My role as the conceiver, researcher and author impels me firstly to explain my motivation and drive for carrying out the study. This is followed by the characterisation and exposition of the key theoretical and practical foundations on which the study was conceived, implemented and evaluated.

1.2 The Motivation for and Purpose of the Study

I have been motivated to carry out this applied research activity partly spurred by a continuing interest in lifelong learning for myself, colleagues, students and interested others, to become 'students for life' for whom, according to Ramaley (2005), lifelong learning is an essential condition for sustaining a democratic way of life as well as for solving practical problems while contributing to our fund for knowledge and theory at the same time. I realise at this stage of my life that challenges and problems are inevitable and are to be regarded as our friends (Fullan, 1993). In the past few years of my career in teaching and learning in higher education, I have come to be part of a young and forward-looking university in a developing country experiencing a socio-political and economic transformation. The university is seeking growth in the face of numerous adversities which came unforeseen as it struggles to find and consolidate itself in its early years of

existence. Such adversities have come by way of socio-economic instability manifesting in student and staff dissatisfaction and unrest, macro- and micro-economic pressures, strained local communities, and a bewildered foreign community.

I am not alone in my quest for lifelong learning. Many of my colleagues are eager to learn rather than to succumb or quit in the current adverse conditions. The whole university itself is indeed a learning organisation or an 'organisation (or institution) that learns' (Dicks, 1993; Peddler, Burgoyne, & Boydell, 1997; Ramaley, 2005; among others). The learning university's challenges seem to force all those connected with it to adopt and employ innovative tactics for sustainability, and, in my view, the university's leadership and followership are keen (perhaps compelled) to live up to the task. For my part, I feel the university and its experiences are transforming me in a gradual but significant way, and I owe the institution some payback in any acceptable way, in recognition of what I have gained and continue to gain from it.

During my learning journey I have realised the importance of 'learning the right lessons' (Fullan, 1993). This necessitates engaging in one or more of the following: self-learning, self-understanding, and self-organisation, which in turn lead to critical self-reflection and self-renewal. In self-learning, I engage to explore myself: my strengths and weaknesses, my mistakes and triumphs, my successes and failures. The fruit of self-learning is self-understanding, which 'comes from engaging with others who are different' to me (Wang, 2009) and ties in with Howard Gardner's idea of interpersonal intelligence. Self-understanding refers to the awareness one has of one's self at a certain moment in time, and the on-going process of making sense of one's experiences and their impact on the self (Kelchtermans, 2007). As a mature adult learner, I realise and understand it when my learning capacity is not the same as it used to be during my more youthful years gone by. I now require more time to learn new technical information and skills, and often I have more reduced confidence than before in learning new complex information and skills. But I wish not to experience that decrease in *memory self-efficacy* that tends to stop many adults from pursuing further education (Dunlosky & Hertzog, 1998). On the positive side, I have gained some invaluable skills and attitudes, such as a sustained interest and self-determination, patience and endurance, which are necessary for goal achievement.

What do we reflect on? Reflection follows an action, and is primarily prompted by conditions common in the workplace such as a complex situation involving problems, ambiguity and uncertainty, and reflection enables us to correct distortions in our beliefs and errors in problem-solving (Hoyrup & Elkjaer, 2006). The basic is self-reflection which is an isolating act of solely personal benefit (Boud, Cressey & Docherty 2006). For the good of the workplace, reflection must go beyond the self and the individual perspective, to the group and organisational perspective. Say Hoyrup and Elkjaer (2006), we should develop a concept of reflection that can encompass both the individual and the social processes that are important for learning at the workplace. Self-renewal often follows a phase of challenge and depleted performance. Forward-looking organisations do not wait for challenges to be able to renew themselves. Re-branding is a continuous and integral process through which these organisations maintain their position in the highly competitive environments of today.

There is a strong link between action learning and critical reflection. Although action learning takes many forms, many (authors) agree about the criticality of alternating cycles of action and reflection, driven by questions, to generate strategic insight (Marsick & Maltbia, 2009). Critical reflection refers to questioning the integrity of deeply held assumptions and beliefs based on prior experience, prompted in response to an awareness of conflicting thoughts, feelings, and actions. At times critical reflection can lead to a perspective transformation (Taylor, 2009). Learning to be critically creative is seen by some to rest on “mature cognitive development”. However, cognition alone would not reflect holistic development and aspects such as emotional intelligence (among other intelligences), skills or practical competences, attitudes, values and virtues should be included

My university’s senior management has demonstrated its leadership ideals of continuous improvement and self-renewal through taking action meant to yield identified results. They have systematically and periodically engaged in some or all of the following processes and activities that enhance professional learning:

- Strategic planning
- Learning in action (deliberate or unaware)

- Sustained use of participatory decision-making, through the management committee and consensus system, seeking participatory democracy for transparency
- Emphasis on core leadership development and support despite brain drain and depleted professorial support
- Periodic professional development of university administrators
- Using university-community partnerships, outreach and engagement – cultivating entrepreneurial academic mindsets
- Promoting research, innovation and knowledge management

Undoubtedly, while registering gains on the above, the university has met with some challenges in its quest to live up to its developmental ideals, among them the following:

- Consolidating the processes and practices of learning and teaching to approach world-class standards
- Enhancing the unique selling advantage – such as the industrial attachment programme
- Investing in building a sustainable culture of quality and academic excellence in teaching, research and extension
- Attracting and retaining key staff at academic and management levels

As I participate in voicing the assurances and concerns of my university community, I am not sure if I am not one of those action researchers of whom McNiff and Whitehead (2006:46-47) say, "begin their enquiries on the grounds that they want to improve certain aspects of their work or work situation, in order to live more fully in the direction of their social and educational values, … they experience themselves as 'living contradictions' when their values are denied in their practice".

The action, or the target for the institution, is prospective quality assurance and quality enhancement in processes and products that characterise a university's mission in the prevailing scenario. The two processes of action learning and action research take the researcher and research participants towards addressing the action. Action learning is built around a significant problem, project, challenge, issue or task, the resolution of which is important to an individual, team or organisation (Marquardt, 2002). Action research entails

involvement by the researcher and partners in an unfolding situation which needs intervention, interpretation and reflection. More is said about action learning and action research later in this study report (Section 3.3.1). Suffice to add that through self-renewal, research contributes to organisations that learn, promoting the learning of all their members and consciously transforming themselves and their contexts (Peddler et al., 1997).

Another motivating factor for this study has had to do with *identity discovery* on my part. Over the years of my practice in facilitating learning for my adolescent and adult learners, I have held tentative and unproven views about quality practices and what drives university student learning. At times I have tried and implemented measures to address my desires for quality practice. At other times I have resorted to the usual ordinary practices that I knew were mediocre. In the middle of my reflection on my actions, I have often wondered what I stood for, and what my professional identity was. I have observed that there were at the very least quite a few of my colleagues in the same boat with me. And when I recognised that my personal uncertainties were shared with those of the other colleagues of mine, and that they were products of broad-ranging situations defining my work environments, my views have changed. I no longer have had to blame my own personal inconsistencies, and, in the words of Butin (2005), I could see possibilities in joining with others to take action, while also seeing possibilities for developing stable habits and personalised styles as an individual. To substantiate my on-going learnings and understandings of quality and effective practice in context, I describe the background features of the university in general, and the programme that is central to this study in the next section.

1.3 Background to the study

In the current drive for globalisation, enterprising institutions and organisations strive for effectiveness, relevance, continuity and survival by engaging the concept of quality. In all phases of any undertaking in today's world, be it planning, processes, systems or products, quality is an indispensable component and a guide to competitiveness and goal achievement. Regrettably, although quality is widely desired and much sought after by many organisations and institutions, it is neither easy to achieve nor to sustain.

Universities in developing countries exist and function in the midst of a diversity of communities and in socio-economic contexts often characterised by problems. Ngara (1995) notes that the African continent experiences unique economic, social, cultural and political challenges, many of them a direct result of European imperialism, economic mismanagement by African leaders and a shortage of the requisite human resources. Ngara's (1995) view suggests there is a combination of factors that work against Africa's development, bordering around practices and world views held by those wielding the power to transform the continent from within. It calls to question whether the university, as one of the most stable and resilient national institutions, is well placed to influence development agendas in Africa's struggling nations.

1.3.1 The Ideal University

Many of today's leading African universities were inaugurated during the era of colonisation by foreign powers. They were thus positioned to serve colonialist interests benefiting privileged minorities, notably the business and industrial sectors, state and local government authorities, sectoral civic and civil society, and other non-inclusive institutions. In the post-colonial era, however, these prestigious institutions of higher learning have had to shift policy and allegiance gradually, being required to increase interaction with indigenous and local communities around them, and operating under the vigil of majority-ruled governments. The communities in question, however, have also slowly warmed up to the western culture in which the university was founded. The transition is not smooth and easygoing. Efforts at mutual understanding and searching for meaning have been initiated, necessitating the growth of engagements bringing the two cultures together.

By reason of its mission and positioning, the modern university in a developing country has maintained a number of partnerships and collaborations with sections of its communities. However, little is known about the nature and forms of these partnerships (Kruss, 2005) and the level of reciprocity within them (Feldman, Moss, Chin, Marie, Rai & Graham, 2006). Much less is known about the congruence between the internal university culture and that of the community surrounding it in a developing country context to enable the articulation of collaborative engagements that maximise shared benefits.

Several decades after national sovereignty, universities in developing countries still largely remain shadows of institutions in industrialised countries. The historical tradition of universities being western has little if anything to do with the intellectual or educational traditions of the Third World (Altbach, 1998). Further, the university concept is not part of the culture in developing countries, and to date no Third World nation, regardless of political ideology or orientation, has altered, in a basic way, the western university model. Third World universities are mainly urban institutions commonly separated physically, culturally and intellectually from their immediate neighbourhoods, largely the rural majority populations, and European languages continue to occupy a key place in higher education. Consequently, because of the entrenched historical, knowledge and cultural incongruence, Third World universities have tended, on one hand, to associate more with the knowledge-rich, large-scale, formal and well-established local organisations for beneficial and reciprocal interaction, and on the other, to disadvantaged and marginalised sections of the community for charitable and philanthropic engagements. In the process, many of the more proximal, middle-of-the road and knowledge-starved sections of society, among them the small and medium-scale enterprise (SME) sector, have been left out of active and sustained partnerships with these institutions of higher learning and knowledge generation. Broadening the scope of collaboration to include this and other sectors impacts on the quality and depth of community engagement. And since quality and standards are pertinent issues in university business, the consideration of quality assurance and quality enhancement initiatives in the development of the broad quality agenda aids our understanding of the process of institutional change (Filippakou & Tapper, 2008). There is a need for academic-community interventions which inevitably interrupt routine processes so as to produce some sort of change for social betterment, change whose quality, quantity and purpose remains a central focus of scholarship (Cooks & Scharrer, 2006:44). Carriere (2006:14) advocates for ‘radical institutional change’ and the recruitment and support of ‘new champions’ in higher education to carry such change forward. This is an issue touching on university leadership, administrative functions and overall staff professional development.

Leadership revival, renewal and development, in my view, become the guiding principles of a university seeking world-class recognition. They are aimed at developing a new breed of institutional leaders capable of adapting to the fast-changing scenarios

manifesting in the need for engaging with the community in, and driving their institutions through hitherto uncharted waters in the quest for recognition among progressive peers. Staff development, for its part, identifies knowledge and skills necessary to move the university forward, and imparts these to willing and dedicated staff who link with the leadership in achieving agreed goals.

Active community engagement cannot succeed without institutionalisation (Shrader, Saunders & Marullo, 2008), and institutional change promotes integration of community engagement into the mission of the institution and into the teaching and learning processes (Carriere, 2006). Visible signs of community engagement include the creation of 'living-learning communities', the production of 'service-focussed undergraduates' and the development of 'off-site institutions'. According to Wood (2007), the ultimate goal of community engagement is to produce graduates with critical and practical competences (as well as positive attitudes, values and virtues) who would be socially relevant throughout their lives in a rapidly changing world. However, much more can be achieved. Learners' intellectual and other competences can be developed through other enabling means of learning such as metacognitive and holistic learning approaches (Du Toit, 2008).

There are challenges to successful community engagement. The traditional university faces practical and conceptual hurdles as engagement activities appear in competition with traditionally acknowledged roles of teaching, research and community service (Bloomgarden & O'Meara, 2007). The nature of engagement is also often contested as university-community partnerships look quite different and often bring out diverse and sometimes negative outcomes (Kecskes, 2006). If, for instance, students spend a considerable amount of time at the workplace, some people may question the difference of university education to apprenticeship and hands-on learning often thought suitable for learning of manual competences and experiential tasks. I consider this argument valid on the face of traditional conceptions of university education, where the student is expected to assimilate a large repertoire of knowledge, practical competences, attitudes, values and virtues from senior, knowledgeable and experienced mentors quickly, before going out to apply these resourcefully and innovatively in the community.

This study is situated in the context of learning practitioners in a higher education institution. It has utilised mixed methods enquiry to analyse an aspect of learning embedded in existing university-industry partnerships, the aspect of industry-based learning. The study also seeks to characterise and/or synthesise a model of sustainable and mutually beneficial engagement between a university in a contemporary developing country and 'needy' sections of its industry community, namely the large-scale and the small and medium-scale enterprises sector. The 'responsive' university and its academic posturing is questioned if it cannot transcend to meet the aspirations of an equally 'needy' community around it, which is searching for solutions to its own survival. To put in clearer perspective the subject of inquiry in this study, a closer description of the involved institution and its mission is necessary, together with the national milieus that created and nurtured the university under study.

1.3.2 Historical Background

Zimbabwe's accelerated drive for advancement in general education started at the attainment of independence in 1980, following close after just under a decade of a protracted war of liberation and about two decades of political contestation between nationalists and the successive colonising British settler regimes. The early years of independence saw phenomenal increases in the provision of primary and secondary education in terms of increasing the number of schools and enrolments in existing ones. Although the quality of the education was initially negatively affected by the shortage of qualified teachers, learning materials, adequate and appropriate facilities, the outcome was a manifold increase in the number of literate and relatively knowledgeable young people within the first ten years of national independence. Driving this was a bold political stance and a buoyant agriculture and mineral-based economy responding to the overwhelming support of the free world towards a newly emancipated member. In a short time, Zimbabwe's literacy rate was counted among the top five in Africa, and within the country, education was taken very seriously by individuals, families and organisations, all taking the cue from the government which featured the education budget persistently as the highest in its fiscal expenditure for successive years.

The inevitable outcome of the above was that the increasing number of secondary school graduates became suddenly unemployed, even when they had good passes. These then opted to apply to the then only university in the country, the University of Zimbabwe.

This university had by 1982 already started feeling the pressure of increased numbers of applicants, and in that year mooted the idea of a second university or campus (National University of Science and Technology, 2003). It was not until 1987 that serious moves were taken and by 1991, after submissions to government, a commission, a Foundation committee, the draft University Bill and the subsequent Act of parliament were in place. The National University of Science and Technology (NUST) was thus born in the second largest city of Zimbabwe, about four hundred and forty kilometres away from the University of Zimbabwe in Harare. One of its purposes was 'the advancement of knowledge with a special bias towards the diffusion and extension of Science and Technology through teaching, pure research, applied research and the fostering of close ties with commerce and industry'. Furthermore the focus of the university academic pursuits was to combine sound theoretical training with a strong applied orientation (Williams, 1989).

One of the methods adopted to foster close ties with industry and commerce by NUST became the introduction of a unique model of industry-based learning. The regulations governing the industry-based learning used by the university are summarised in the yearbook (National University of Science and Technology, 2003). The university calls the programme 'industrial attachment' (IA). All students undertake a full year of work-related learning during their penultimate year of study in an organisation approved by their respective departments or faculties that evaluate the suitability of the organisation's functions to the requirements of the curriculum. The regulations stipulate that, during the attachment period, students receive an allowance, insurance and medical aid from the university. The allowance is provided by a government-linked institution, the Zimbabwe Manpower Development Fund (ZIMDEF). However, the above-quoted regulations further state that, 'If the company wishes to pay the student an extra allowance, the arrangement is only between the two parties, the student and the company involved.' The result of this has been that these additional allowances have differed substantially from company to company. Over the years of the economic crisis, the ZIMDEF allowance gradually fell off or became erratic, so that students depend on the company allowance or have their parents or guardians meet their living expenses for the attachment year.

While the industry-based learning strategy originated at one university, the National University of Science and Technology (NUST), as a unique and innovative approach to

university education, over time and on realising the importance of the strategy, other like-minded universities coming on the scene were quick to adopt the same in the spirit of sharing good practice. Generally, the use of real workplaces for teaching, learning and professional grooming of university students is a feature of medical schools the world over, many of which have university teaching hospitals attached to them. At the college level polytechnics, technical and teachers' colleges have employed workplace-based 'practice' of varying formats and durations.

Of particular interest in Zimbabwe's educational history is a unique teacher education programme for primary school teachers that operated between the early '80s and mid-90s called the Zimbabwe Integrated Teacher Education Course (ZINTEC). This programme used the system of a sandwiched whole-year deployment of student teachers in schools where they filled in vacant teaching posts. The programme meant that students studied an array of pedagogical subjects through distance education, reinforcing this through vacation courses and weekend seminars, and practising teaching on a full-time basis with the same responsibilities as qualified teachers (Bassoppo-Moyo:undated). While on this deployment, the student teachers were under the close professional supervision and guidance of the head, deputy head or other experienced senior teachers in the school. College lecturers paid periodical supervision and assessment visits to the students in post, and they were given staggered practice-related written assessments throughout their year of 'teaching practice'. It is evident that the NUST industrial attachment model has borrowed from the ZINTEC approach the broad concept of on-the-job professional development and workplace learning. Whereas the typical ZINTEC student teacher spent more of his/her four-year teacher education programme in the workplace, that is, the school, the NUST student spends more time on campus, for good reason.

The period beginning in 2000 has seen the gradual (sometimes very rapid) and harsh economic decline in Zimbabwe, reaching the peak around 2008. This has affected the factories, shops, and organisations - the sites of workplace-based learning for the university. This study was conceived in 2008 and the fieldwork was carried out between 2010 and 2011. The effects of the reported economic upheavals on this study are quite significant, and they have been discussed in later sections where they apply. To cap it all, the brief snapshots above on how NUST runs its model of industry-based learning

describe the background that forms the basis of all the discussions in this study. Further descriptions are provided where applicable in the report.

1.4 Research Scope and Focus

To situate this study within the broad conceptual themes it is important to discuss the issues that inform the study and thereby provide a guide to its scope and conceptual boundaries. Also, relating to the mission and the goals of the university discussed above, this section links the nature of industry-based learning practised at the university to what is happening elsewhere in the world.

1.4.1 Styles of university-community partnerships

Having investigated the nature of university-community engagement in American universities, Kecskes (2006:6) provides a model (Figure 1.1) depicting four styles of university-community partnerships. The four styles, *individualistic, egalitarian, fatalistic* and *hierarchist* are presented in a four-quadrant format. The first, the *individualistic* style, depicts a situation in which one or both partners seek to gain competitive advantage through the engagement. The partner embarks on creative visioning, and orientates itself towards growth in its market. This style is weak on group or collective will, as well as low on conformity to rules and social tendencies.

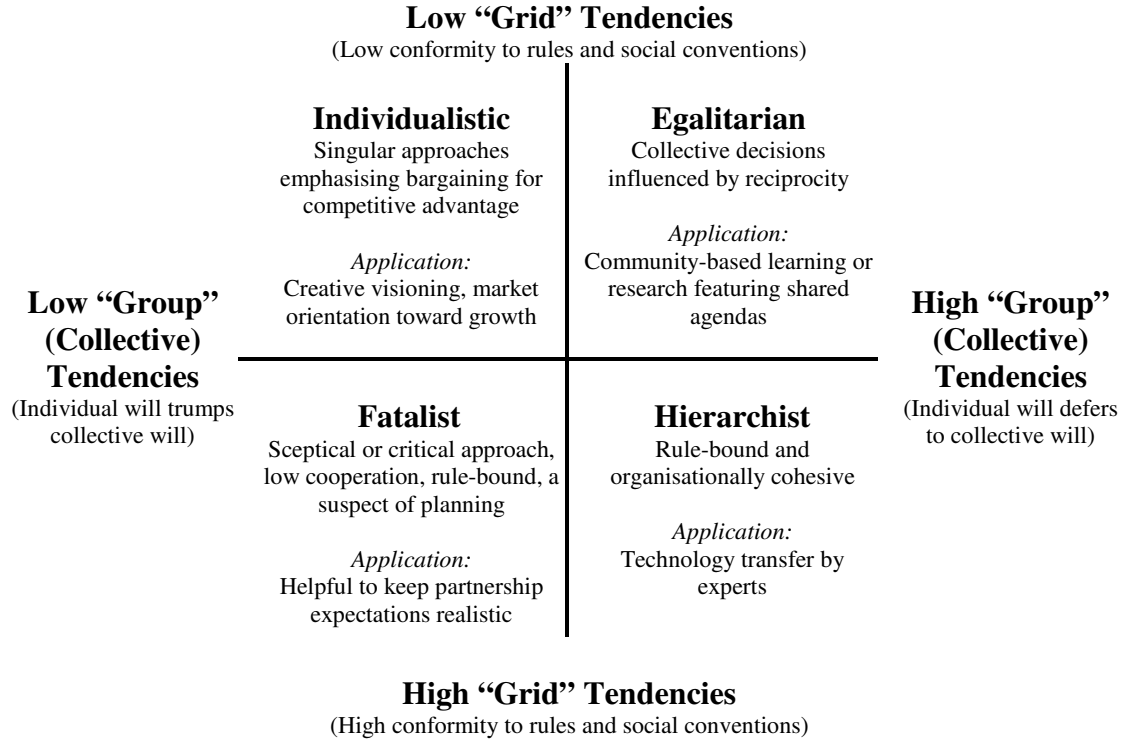


Figure 1.1: Four styles of university-community partnerships: An application of cultural theory (Source: Kecskes, 2006:6)

In the *egalitarian* style collective decisions are highly influenced by reciprocity, still low on conformity to rules and social conventions, but there is a substantial incidence of shared agendas. The *hierarchist* style depicts high conformity to rules and conventions, is formal and rule-bound, as well as having high group tendencies. The fourth style, the *fatalist*, is an individualistic and critical approach, with emphasis on rules and conventions, keeping partnership expectations realistic.

The model of the four styles of university-community partnerships by Kecskes (2006) gives a lens with which to view existing and envisaged university-industry partnerships. I view my university and others around currently featuring more on the individualistic and fatalistic quadrants, needing to increase emphasis on the group and collective strategies of engagement with surrounding communities.

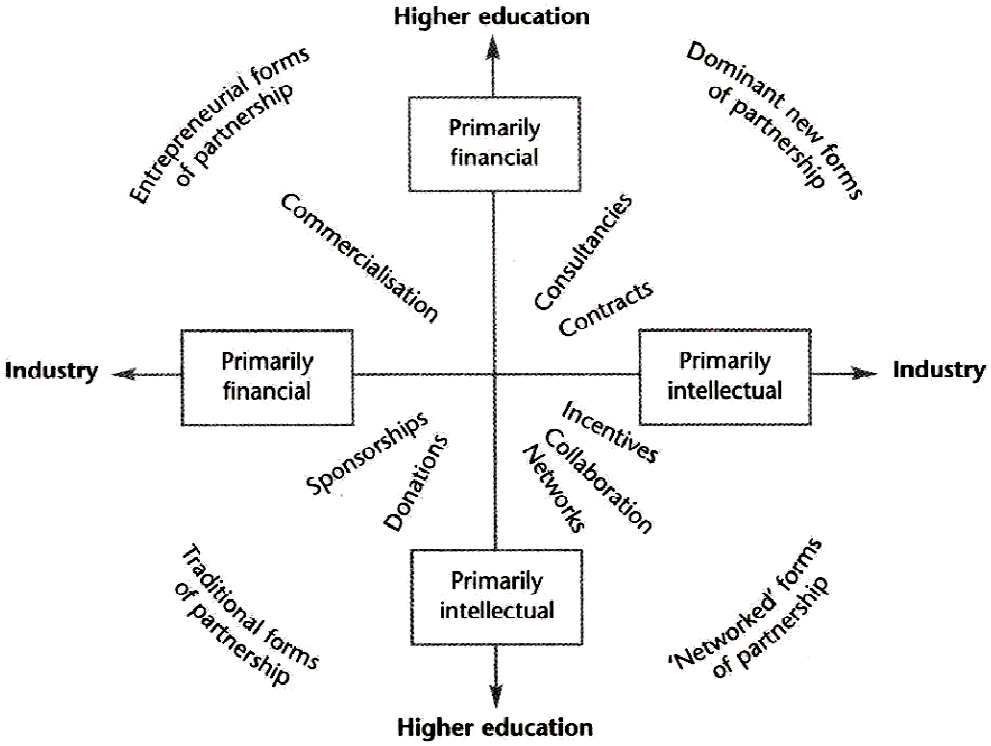


Figure 1.2 Forms of higher education industry partnerships in South Africa (Source: Kruss, 2005:75)

In another four-quadrant matrix representation, Kruss (2005:75) has analysed the forms of higher education-industry partnerships found in South Africa (Figure 1.2). The nature of partnerships, according to Kruss (2005:75), is 'defined by either a primarily financial or a primarily intellectual imperative.' In the whole analysis, the four forms of partnerships that emerge are *traditional, entrepreneurial, dominant new, and networked*. Each of these forms has a characteristic set of activities that identify closely with it. For example, the traditional form of partnership is primarily an intellectual exercise for the university and primarily financial for industry, and is characterised by industry sponsorships and donations to the university.

Universities that exist now but are looking into the future will go beyond the traditional form of partnership. They will seek not just the intellectual benefits of their actions, since these mean that they are perpetual beggars and eager recipients of fiscal handouts, donor aid and corporate benevolence. Outward-looking universities will want to forge a respectable self-made identity and semi-independence based on their own creativeness. Thus they will include newer financially-driven forms of partnerships that engage entrepreneurship and networking. Workplace organisations for their part will find that they cannot naturally continue on a pure financial path if they are to maintain competitive advantage. Knowledge and its use are burgeoning, practices are changing, and people are becoming more pliable and liberal. Organisations that do not enter the learning culture, be they industry or institutions, to become 'learning organisations', face the possibility of fast extinction. Both university and industry seem geared to pursue both intellectual and financial goals at the same time in appropriate proportions.

1.4.2 Focus of the Study

The above two and other models in the literature have provided the conceptual basis for this study, which addresses community engagement between the National University of Science and Technology (NUST) and it partners in industry. Since its origin in 1991, the university has pursued a number of community outreach and engagement programmes and the industrial attachment programme for undergraduate students is the prime one. While the focus is on the programme at NUST, a comparison of similar activities in other universities in Zimbabwe is made.

This research draws from my interest in the broad area of partnerships and engagements between higher education institutions and their various communities. In 2006 I carried out a small fact-finding study on university-community collaborations and their contribution to enhancing quality to move our university towards world-class status. I presented the results and analysis of that study at an in-house seminar for senior administrators at NUST in early 2007. From the encouraging response I got from the seminar I decided on an extended and formal research study, culminating in this effort. This study, therefore, which seeks to characterise and analyse the benefits of industry-based learning in an existing partnership programme, also proposes to develop a model of university-industry collaboration that would be considered by universities that seek to use industry-based learning or its other versions, as well as for an industry that seeks to grow together with its local citizens. The proposed model (Appendix XII) comprises three levels, Level 1 being the most basic, and level 3 the most comprehensive. In the next section the objectives of the study, the research question and sub-questions are presented formally, and after that, the conceptual framework underpinning the study is unveiled.

1.5 Objectives of the Study

This study aims to achieve the following:

- To obtain and consolidate views of participating students, university and industry staff on the nature and quality of academic practices (processes, outcomes and outputs) achieved through the NUST industry-based learning programme.
- To analyse critically the respondents' views and interpretations on the need for country-relevant and responsive university education as a driver for sustainable human development in a developing Zimbabwe.
- To develop a model indicating levels of engagement between universities and industry in a variety of mutually-beneficial activities.
- To highlight and interpret views from the respondents and from the literature on possible ways of strengthening the current industry-based learning format to be aligned with the changing vision, conditions and needs of a modern university.

1.6 Research Questions

Key question:

How does integrated industry-based learning enhance quality academic practices and relevance to national needs of Zimbabwe?

The key question is broken down into three main questions below, each of which is broken further into sub-questions under them:

a) ***What understanding do participating students, lecturers and industry supervisors wield on the nature and quality of academic practices realised through industry-based learning at NUST?***
   i. *To what extent has the NUST brand of industry-based learning been jointly perceived as significant in enhancing quality academic practices in university teaching and learning by participating students, lecturers and industry supervisors?*
   ii. *How do the participants' views on the potential for, and the achievement of research-driven learning and learning-focussed research and development (R&D) in the current industry-based learning format indicate concern for an effective university service?*
   iii. *How is the proposed and developed model for university-industry engagement conceived by lectures as a contributor to sustainable transformative learning and mutual benefit to both partners?*

b) ***How do the views of participants inform analysis of the local relevance and impact of value-added university education on national socio-economic development?***
   i. *How does the perceived value added by industry-based learning indicate an improvement on the traditional and prevailing modes of university teaching and learning that affect graduate performance in the workplace and beyond?*
   ii. *What contributions are perceived to be attributable to industry-based learning in knowledge growth and holistic economic development of the country?*

c) ***How do sentiments shared between NUST and other Zimbabwean universities engaged in industry-based learning indicate their awareness of quality practices and the importance of needs-based and responsive higher education?***
   i. *What motivations have popularised the NUST brand of industry-based learning among sister universities and why?*
   ii. *What quality academic practices are expressed by participating universities and how do they signify goal-directed and needs-based university education?*

iii. How is integrated industry-based learning perceived to respond to local needs of Zimbabwean society?

1.7 Conceptual Framework

The culture of openness and endurance, the perceived neutral and apolitical orientation of the university in a changing society, and the drive for creativity, promote free knowledge generation, development, advocacy and change, for society's and the university's own survival. Describing them as the 'conscience of society', Jarvis (2001) states that universities cannot afford to remain ivory towers alien to their immediate neighbourhoods and ignore meaningful engagement with a variety of communities, big, small, rich or poor, to become 'sites of the production of multiple and contending perspectives'. Waghid (2002:19) avers that university research has to be relevant and socially accountable, primarily by supporting the economy of a country and promoting the quality of life of its typical citizens. It will not be enough to nurture researchers and educators who have had little capacity to work in their local communities but who could move to any industrialised country, and serve any privileged community around the globe with comparative ease (Crossman, 2004).

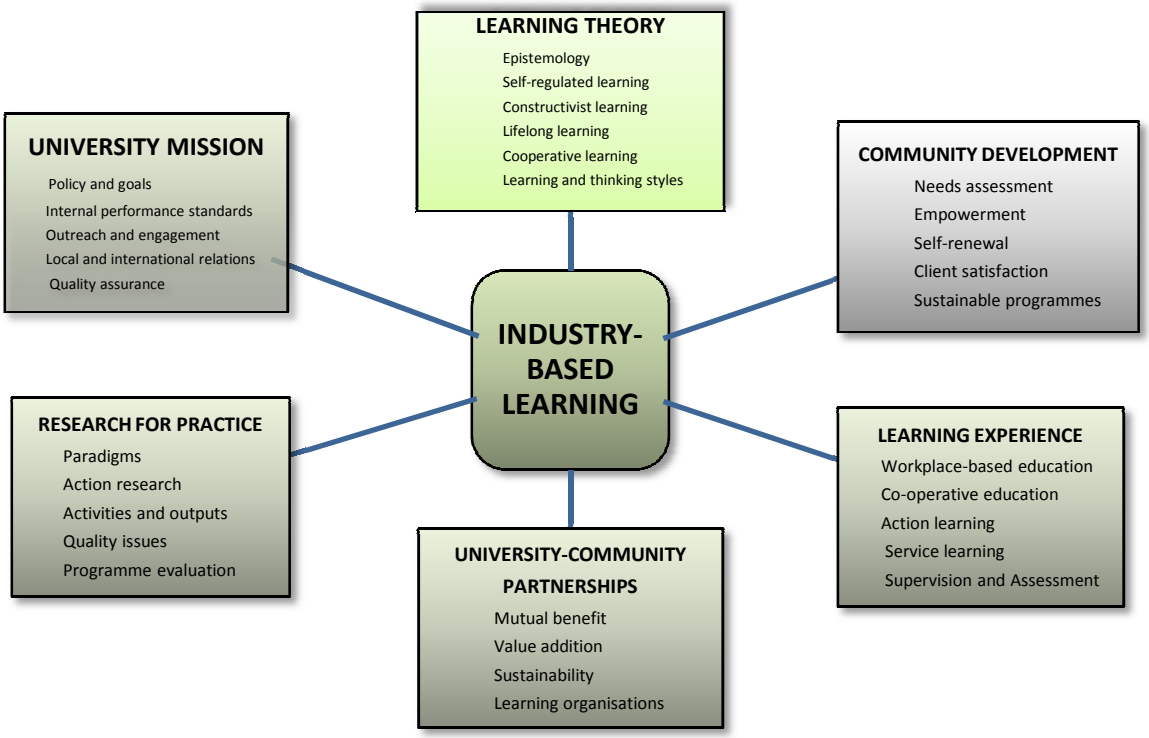


Figure 1.3 Conceptualising university-community partnerships

A conceptual framework for approaching the proposed research study on university-community partnerships is presented diagrammatically in Figure 1.3. The framework is built on the image of what Daniels and Adonis in the Higher Education Quality Committee (2006:142) call 'an infused approach to institutionalisation of service learning based on the higher education institution policies'. The university has its mission and goals, expectations and mandates, which will impact heavily on what sort of engagements it can enter into with the communities around it. The nature of partnership activities, according to Martin (2000:4), includes student placement schemes, staff exchanges, consultancy services, continuing professional development, joint research and development (R&D), small enterprises development and creation of spin-off enterprises for the joint commercialisation of R&D products.

Common reasons for universities to seek community collaboration are to carry out routine administrative business, to solicit support for academic programmes and processes, to maintain curriculum relevance, and to contribute to various areas of national economic activity. The communities themselves are motivated by the pursuit of development efforts, and they look to themselves and acceptable capable others for ideas on development. A key element in this intricate setup is 'learning', not just for university students, but for all involved in the collaborations. This makes lifelong learning a key strategy in the human development matrix, particularly the development of careers in an advancing technological world. Theory helps practitioners to locate their activities and outputs within an existing thesis of conceptualised ideas arrived at by others over a long period of time. This affects the research processes and the programme evaluation methods and purposes. Learning theory is particularly useful to bring together world-views and strategies that maximise the effort of passing on constructed meaning and tradition to younger generations.

The theoretical or conceptual framework (Figure 1.3) presented above is a mere guide to the understanding of identified dimensions of industry-based learning that are visited in this study. In typical constructivist style, the motivation of an inquiry or investigation such as this is the construction of new theory based on experience and existing knowledge rather than the articulation of previously established and documented theory in the literature. Thus my experiences and the experiences of colleague lecturers and

supervisors serve in this study to point to the construction of new meaning, and subsequently to the development of new theory.

1.8 Limitations and Constraints

This research is a case study in which one university is the principal source of information. However, some limited data was obtained from other universities within the country that have adopted the same pedagogical approach. Universities are unique and autonomous, and there is no one model of university. Although this research negotiates its arguments from the platform of a developing country university, it does not claim to be representative of all the universities found in the group of developing countries. The research took place at a definitive moment in Zimbabwe's history, the height of unprecedented socio-economic turbulence, and it is possible that the outcomes of the study would have been different if not for the current situation. The notable constraints were that the moods and preoccupations of participants were not the usual, and the experiences around the living and working spaces of the respondents were far from being normal. In this light, too, caution is exercised as the implications of the research are discussed, since no attempt is made to quantify the effects of the aforementioned economic unrest.

1.9 Organisation of the Study

This thesis is divided into six chapters. So far in this first chapter I have laid the foundations for the study by first outlining the motivation for and the background behind my choice of the study theme, and then providing the scope, purposes and the conceptual grounding for the study. In the next chapter I explore the key themes in the research literature that inform and shape my conceptual ideas, methods, analysis of results and conclusions reached in the study. In Chapter 3 I report on the choice and utilisation of methods and techniques to gather and analyse all original data required to answer the questions and sub-questions of the research. Chapter 4 presents the results and findings, while Chapter 5 provides the discussion and interpretation of the results in view of the questions and in light of the literature. In the final chapter I present my conclusions and recommendations.

In the early stage of the research project, I developed a working time schedule or activity plan meant to guide me as I went about carrying out the different requisite activities that would eventually see me reach my goal. The simplified Gantt chart in Appendix I shows

both planned and actual activities. The purpose of the chart, first developed by Henry Lawrence Gantt in 1925, is to be "an insightful graphic presentation of the activities that have to be carried out in a plan" (Mulders, 2010:159).

1.10 Conclusion

I have engaged in self-reflection and personal professional challenges so far encountered in my career as educator in a university environment to conceive this study that centres on workplace-based learning. The desire to see improvement in my own and my colleagues' academic practices in addressing students' learning is the impetus for this study. As the concept of quality drives all competitive and progress-seeking organisations and institutions, my study takes a deliberate slant towards issues that define and portray quality assurance and quality enhancement as ultimate goals for academic practice.

A key underlying assumption of this study is that a university operates within a defined community or group of communities to which it is answerable for the bulk of its activities and influences. It is thus expedient that the university engages in a manner to add appropriate value to all the communities it is connected and committed to, be they proximate or remote. The key focus of this study addresses the mutuality of benefits in a partnership such as that between a university and its industry partners. In adopting a mixed methods approach of inquiry, I am attempting to reach out to multiple sources of information and to stimulate alternative dimensions of these sources. In other words, the use of a variety of methods is expected to bring out more perspectives from the same respondents as well as capturing views from more respondents.

With the main goal of advancement of human well-being in mind, this study partially seeks to promote wider involvement and continuity of the processes of enquiry, practice and reflection on a shared activity in a developing university that is in the process of building a culture and seeking a niche in the well-subscribed space of competitive institutions. The university under study has to be accountable to the adjacent communities from which it derives many of its resources.

In exploring multiple dimensions of the research topic through the key research question: *How does integrated industry-based learning enhance quality academic practices and relevance to national needs of Zimbabwe?,* I attempted to involve a selection of

participants in the industry-based learning activity to provide views of their experience so as to build a case around this activity of interest. The research sub-questions also provided a basis for further analysis and breakdown of information to bring out a unified argument that adds to existing knowledge.

Theoretical underpinnings of this study rest on the institution's mission and goals, influenced by learning theory affecting young adults, concern for communities served and the nature of relations, actual learning experiences, and the role of research and practice, all ensconced in the realm of quality assurance and quality enhancement. Like any other undertaking that seeks to lay claim to new or re-constituted knowledge, this research study has its own inherent limitations and constraints that invariably undermine the production of an infallible scientific effort. In the next chapter, I explore some of the concepts and ideas encountered so far in greater depth with reference to the accessed existing literature. Other related and pertinent concepts are also brought into focus in as far as they shed further light to the study. The literature helps to position the study in relation to similar studies and to existing knowledge shared and published on the concepts around the study topic.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

There is a growing interest in university-community co-operation in general, as evidenced in the increasing prominence of university-industry partnerships on the agenda of higher education policy-making at both the national and institutional levels (Martin, 2000) and workplace-based learning by university students in particular. Coupled with the very commonly espoused goal of quality assurance in higher education in developing countries, workplace-based learning promises to enlighten academy on the efficacy of existing theory and practice of university learning and teaching.

This chapter provides a survey and a critical analysis of the accessed literature on general and specific issues around the topic and theme of this study, with a view to organising the study and situating it in acknowledged spheres of academic discourse. Such issues have been hinted at in the conceptual framework of this study in the previous chapter, and include university roles, quality in higher education institutions, academic practice and learning processes, community engagement and organisational concerns and learning theory and environments, among many others.

Literature reviews have certain characteristics and intentions and some of these have been highlighted by scholars. For instance, Cooper (2010) developed and documented a taxonomy of literature reviews in the field of research synthesis and meta-analysis that I have considered useful in this and other types of research. Literature reviews, according to Cooper (2010), have the following features: focus, goal, perspective, coverage, organisation and audience. Based on these categorisations, although my literature review in this chapter focuses mainly on practices and applications of industry-based learning, it also addresses methods and findings of similar research elsewhere, and on theory and theories related to the research topic. The goal is mainly the identification of central issues and to integrate what others have done and said, and to rationally critique and evaluate some of the views encountered in my literature search that may not be compatible with certain arguments and lines of thought that I present. The perspective of my literature review is neutral representation of other scholars' viewpoints, while the coverage is basically central and pivotal, in Cooper's (2010) terminology. The organisation is

conceptual, bringing together relevant themes and concepts, and the target audience are the practitioners, policymakers and general scholars.

The literature review that follows below is organised into concepts around industry-based learning as highlighted in the theoretical framework in Chapter 1. It starts by discussing issues related to the university as an organisation before picking on a variety of themes that lay the necessary foundation of knowledge for the study.

2.2 University community engagement functions

Among the university's key functions is outreach and engagement with external organisations and significant others for purposes ranging from public relations to concrete bilateral cooperation and business dealings. The majority of engagements may largely be at the formal level, although others may be informal, such as engagements with residents and the business community in the neighbourhood of the university campus (Zlotkowski, 2005). It is the more formal relationships that this study and this section are concerned about. In the sections that follow below, a discussion of aspects of the university that link to formal engagement with communities is given.

2.2.1 Universities and their Mission

The traditional key functions of a university remain to be those of teaching and learning, research and service. Ngara (1995:31) adds a fourth function that consolidates service, namely that of 'fostering moral values and raising social consciousness'. This function calls on universities to engage in activities that have a bearing on the specific historical and social conditions under which they operate. Kaye (1994:5) notes that universities pursue the goal of inquisitiveness and understanding, and the benefit that the university gives to society and learns from society is not just the external products in the form of graduates, research results and other service to society, but also in the 'maintenance and promotion of a life of individual and social enquiry within the university itself'. The university is therefore a learning community, engaged in organisational learning. In this sense the university is not merely a transformative or transforming institution. It is a driver of human survival and adaptation to an increasingly hostile environment. In support of the views of Ngara (1995) and Kaye (1994) above, I note that where the university is not freely integrated in and accessible to communities around it, as in most developing

countries, traditional ways of life weigh heavily on the lives of people, and the stalling of socio-economic development becomes evident.

As public organisations, universities are not exempt from the temptation to pursue purely self-serving goals such as profit, image and posture building at the expense of public accountability. Fryer (2007) describes the case of the University of British Columbia's move 'from the ivory tower to the community' in which the neighbouring Vancouver's Downtown Eastside community came to benefit through the establishment of a Learning Exchange initiative. Fryer (2007) observes the following:

> While the university can be seen as being at the top of the social ladder and the Downtown Eastside community at the bottom, in fact both are dependent on the state for their survival and are therefore, vulnerable. … Where universities and communities co-create environments where people can engage in acts of caring and thoughtful citizenship ..., the move from the ivory tower to the heart of community has been achieved.

It is worth noting that the social gap between the university and its typical neighbourhood in a contemporary developing country is far greater than that in developed and industrialised countries. Fryer's (2007) example portrays a scenario culminating from many years of social experience and a solution to a long perceived bone of contention, namely the viewing of the university as an ivory tower.

A major focus of the university's mission is the quality and quantity of its graduate output. Universities, perhaps inadvertently, aim to develop learners suitable and adaptable for the rapidly changing world, learners who have the ability to comprehend and generate socially useful knowledge and skills to carry them through the rest of their lives (Wood, 2007). Not only that. University graduates are expected to be versatile and flexible in their approaches to life and work so that they remain on top of any situation that is prone to arise be it through economic or social mishaps. Wood (2007) notes that lifelong learners have the ability to, among other virtues, identify and solve problems, make decisions using critical and creative thinking, work effectively with others as members of teams, groups, organisations and communities, and demonstrate an understanding of the world as a set of related systems by recognising that problem-solving contexts do not exist in isolation, as it is listed in the South African list of critical cross-field outcomes (CCFO) which Smith refers to in her work. According to Smith (2006), CCFOs are crucial for the transfer of

competencies from classroom learning environments into the real complex world of work and life in general.

The research culture and output of any university is an important determinant of its potency and visibility, its status, and in recent times, its international ranking. Community service is one other determinant although it is often the least recognised among the three key recognised functions. Increased and sustained collaboration between universities and their communities and reciprocal learning could change the academic process and profile of faculty. Martin (2000) cites the existence of outward-looking academic staff, with experience in both industry and academia, as a factor that could facilitate (or hinder) the development of joint activities. University-industry linkages have a great potential to improve the practice of relevant teaching and research in universities, and in addition, may provoke a number of other unintended effects. Frazer (1994) contends that quality in higher education is achieved when universities are accountable to society, employers, to students and to each other, and the accountability is not merely financial.

In the industrialised world, universities developed out of a need and were a result of social development in their communities. Thus they have always existed to serve the societies in which they are located (Kaye, 1994:10), and they promote a broad, plural, inter-active, dynamic, and fundamentally humane vocation. However, it has been observed elsewhere, that universities in less industrialised countries, being a borrowed concept, tend to be rigid, hierarchic, traditional, and lacking autonomy with respect to their ministries of education, and university research groups tend to be so small as scarcely to be viable (Organisation for Economic Co-operation and Development [OECD], 1984). Further, it is observed that in these circumstances, there is little or no external demand for academic research, since firms make little use of R&D and lack the capacity to absorb its results. Firms which are involved in mass production under licence tend to turn to their foreign licensors for help with any problems which emerge in the production process. Industry is not capable of adequately defining its problems in ways meaningful to scientists and may not even have problems amenable to scientific research. Industry concern is essentially with survival and short-term profit with little willingness to invest in R&D aimed at product improvement when the internal market can be retained without taking such risks. Surprisingly academics are reported not to have sought industrial contacts, preferring only to try to build up

scientific reputations through publication in the international scientific literature (OECD, 1984:24 – 25).

The stark reality of the sentiments raised above manifests in the under-utilisation of the university by industry in less industrialised countries is heightened by the existence of more advanced institutions elsewhere that have the capacity to solve not only their own problems but those of others in developing countries that may not be able to do it for themselves.

2.2.2 University-community Collaboration

Community engagement for academic intentions by any higher education institution, that includes service learning (including reciprocal learning) and collaborative research, has been defined as those initiatives and processes through which the expertise of the higher education institution in areas of teaching and research are applied to address issues relevant to its community" (*University World News*, 2008). This definition is silent about the expertise available in the community, and how 'indigenous' knowledge often serves as the ideal starting point for mutual engagement. In the available literature, academic interactions between universities and communities have been given different labels, some of which are: higher education-community collaboration, university-industry interaction, collaboration, partnerships or engagement. In this study the terms *university-community engagement* or *collaboration* or *partnerships* are used liberally and interchangeably.

A variety of formalised avenues of university-community interaction exist worldwide. Ebong (2004) has identified two levels of relationship between universities and industry experienced in Nigeria, namely the informal (through alumni, faculty consultancies, company scholarships, et cetera), and the formal (through student work experience schemes and staff sabbatical leave schemes). In Ramaley's (2005) 'engaged university', engagement is distinguished from outreach in the following way:

> Institutions that take on the mantle of engagement are committed to direct interaction with external constituencies and communities through mutually beneficial exchange, exploration, and application of knowledge, expertise, resources, and information. These interactions enrich and expand the learning and discovery functions of the academic institutions while also enhancing community capacity.

The work of the engaged institution is responsive to, and respectful of the community with which it engages. A model of engagement (Figure. 2.1) has been developed by the South

African Higher Education Quality Council (HEQC) in which various combinations of activities of the university through teaching, research and service produce five key types of engagement, namely distance education, service learning, professional community service, participatory action research and community-based research. This model is pertinent in the function of providing learning for the community, as well as the learning of the students and the university as a whole from the engagement. My curiosity is aroused regarding activities and outcomes of service learning in its many forms, wondering if the model could not be modified so that the fields of service learning and research overlap to mould a new type of engagement called research-enhanced service learning.

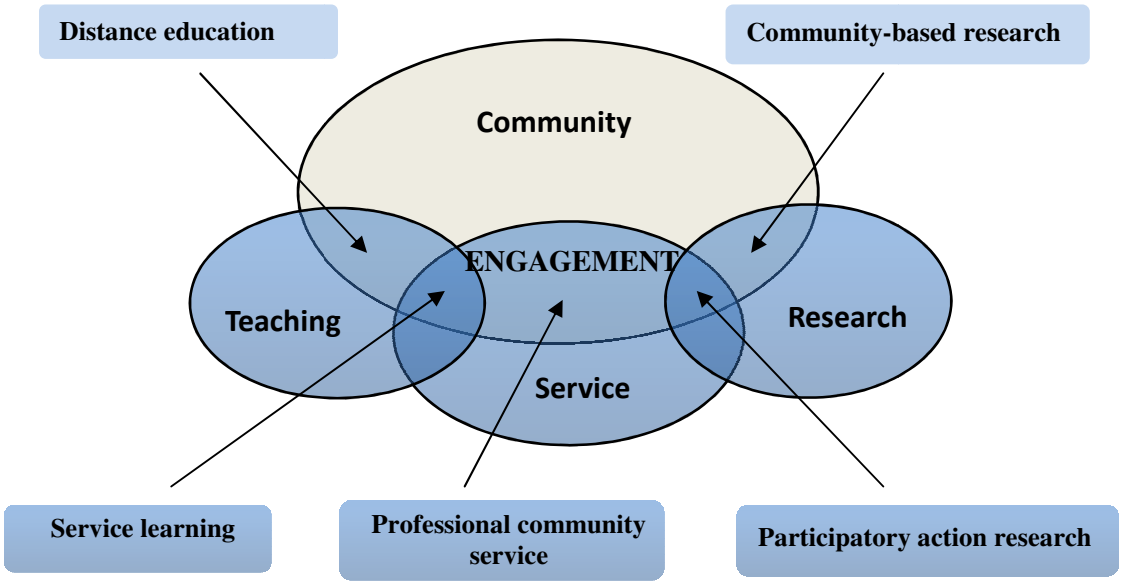


Figure 2.1 Types of community engagement (Source: HEQC, 2006: 13)

In the collaboration between the university and the community other players come in, and one such crucial player is the government. National needs, incorporating the agenda for national development and civilisation, are nowadays defined by the government of the day (Kaye, 1994:5). It is important, therefore, that government creates conditions for the promotion of industrial and economic progress. The university, industry and the government (the triple-helix model) must be prepared to accept new responsibilities that require a sympathetic dialogue within the universities, as much as among university, industry and government (Parra-Sandoval et al., 2010). Ryan (2006) contends that government policy should aim to make universities 'business friendly', and to make small and medium-scale enterprises (SMEs) university-aware; that is, to ensure that SMEs take advantage of whatever scientific work their local universities are doing, and that

universities are active in seeking out SMEs with whom they could do some good in a reciprocal way. This is one of the crucial contentions in the developing countries, where the capacity of government and its institutions is limited and such challenges are left to universities themselves and, in some instances, non-governmental organisations.

Ayiku (1991) cites the example of product development that starts from the generation of an idea followed by the determination of the technical feasibility and the commitment of resources to the development of the product. He rightly points out that since SMEs in Africa are unwilling and unable to commit funds for elaborate product development, university/research institutions must undertake this function in the national interest, adding ideas such as:

> In view of the low educational background of many African entrepreneurs in the SMI sector, these entrepreneurs can neither assess their own needs nor accurately define their problems. They are even unaware of the business opportunities in the SMI sector. The available economic opportunities must therefore be researched and the results made available to them from time to time.

A model of partnership thus appears lacking between universities and SMEs, one that incorporates self-regulated learning or action learning among the participants and partners. Teare and Prestoungrange (2004:52) write about the Revans University of action learning and attempt to answer the question 'Can work and learning really co-exist?' They point out that, 'people generally engage (and learn) more readily with their peers and from the issues that they confront each day at work'. In essence a deliberate programme of empowerment of SMEs may become part of the mission of a university that prides itself on community engagement of relevance with peers, clients and needy neighbours.

It would appear that the balance of functions of a university academic has an effect on their productivity. A university academic is only partly a researcher, while a full-time consultant may be involved in more research activities, and an industrial researcher will be either fully involved in research or partly so (e.g. in the case of action research within a context of being both researcher and practitioner). Manjarrés-Henríquez, Gutiérrez-Gracia, Carrión-García & Vega-Jurado (2009) have established that university lecturers' scientific productivity was highest only when they had a low engagement in research and development (R&D) contracts with industry, prompting the indication that the positive effect of university-industry relationships (UIR) on a lecturer's scientific production comes fundamentally from the capacity to provide complementary resources (cognitive,

affective, practical competence, values and virtues, technical, and/or financial) for research activities, rather than being fully submerged in the activities of the industry. In contrast, a Bolivian study by Vega-Jurado et al. (2009) on university knowledge production and its transfer to industry has found that there are several barriers to university-industry relationships including institutional support, the generally unfavourable atmosphere in universities and an unsupportive industrial structure. The arguments above, taken together, give the impression that the desirable environment for fruitful research for the benefit of industrial production is an elusive one, and most likely a dynamic one too.

2.2.3 The University as a Learning Organisation

A progressive organisation values the knowledge of individuals as well as that shared between them. The organisation as a perpetual entity staffed by individuals who come and go is constantly undergoing inevitable change. Such change offers opportunities for learning, and consequently an accumulation of wisdom that builds a heritage for generations ahead. A learning organisation promotes and engages in progressive change-sensitive processes such as systematic problem-solving, experimentation with new approaches, learning from the past, learning from the best practices of others, and transferring knowledge (Kermally, 1997).

Defining a learning company as 'an organisation that facilitates the learning of all its members and consciously transforms itself and its context', Peddler et al. (1997) envisage a dream of creating organisations that are capable of changing, developing and transforming themselves in response to the needs and aspirations of people inside and outside them and that enrich and sustain the wider world of which they are part. In the end 'the people in such a company can, through their work, make contributions not just to their organisations but through them to the wider society. In return they receive 'an enhanced sense of personal contribution and meaning' (Peddler et al., 1997:4). One of the defining characteristics of a learning company is 'inter-company learning', one of whose determinants is that 'people from the company go on attachments to our business partners, including suppliers, customers and competitors' (Peddler et al., 1997:31). To Ramaley (2005:178), quoting David Garvin, a learning organisation is one 'skilled at creating , acquiring, interpreting, retaining and transferring knowledge; and at purposefully modifying its behaviour based on new knowledge and insights'.

Briggs (2002:173) writes about the learning-centred institution in which learning is not confined to the student alone, but also to staff who learn about their subject, their support or management function, about student learning, about leadership and strategic direction, and in a symbiotic and organised fashion, the whole organisation collectively and continuously learns how to become more effective as an institution. An organisation such as a university is invariably in a state of change (preferably change for the better). This is an inescapable transformation which McNiff (2000:43) calls the 'ontology of becoming', when she explains:

> Whatever is, is constantly transforming into newer versions of itself. Each new transformation is an entirely new creation which has evolved out of its own history. There are no final outcomes, for any experience in any moment is already in a process of change; any answer is already transforming into new questions.

The implications of outward-looking faculty (Martin, 2000) are reinforced by Henderson et al. (2008) who recommend faculty development and pedagogical improvement achieved through service learning, student research, involving improvement of approaches to facilitating learning, increased collaboration with community partners, recruitment of more service learning faculty, and support for the institutionalisation of service learning.

A learning university is an image or inspiration for a learning society, composed of lifelong learners. Lifelong learning is viewed as holistic and comprehensive. It has to do with the overall development of individuals throughout their life span and in all life's domains, aiming at enhancing the quality of their lives and that of their collectives, and is, therefore, related to the twin educational aims of modernity – individual growth (or learning to be) and collective enlightenment. It is based on a comprehensive and unifying idea of education, which includes learning of all kinds – formal, non-formal and informal – and is, therefore, tied to the idea of a 'learning' or 'educative' society (Wain, 2004:9-10). The above sentiments all provide moments of reflection from the practitioners in our university on whether it is a learning university in the same sense expressed above.

2.2.4 Company and university roles in facilitating business innovation

This section provides a deeper understanding of workplaces and industry so as to better conceptualise industry-based learning. It is also an insight into the sort of benefits that industry can obtain from an engagement with a university. The organisation for Economic Co-operation and Development (OECD) has suggested four ways in which universities

can participate in business and industrial development by infusing researched knowledge and innovation into productive outcomes. These are depicted in Table 2.1 and discussed below.

Table 2.1 University Participation in company development

Form of participation	Major collaboration requirements
Starting new companies	*Research, marketing and management*
Assistance to small, growing companies	*Expertise, technology, marketing, and management of specialisation*
Collaboration with large science-based firms	*International networks, advanced research, reputable universities, equal partnerships*
Assistance to mature industries	*Fight stagnation or decline, active R & D, innovative graduates*

The OECD (1984:60) refers to the following in terms of starting new companies which it regards as the life blood of any industrial system:

> Through them new ideas are brought nearer to the point where their ultimate commercial success can be gauged. … some universities have set up organisations to help both academics and non-academics carry research results much closer to the market place. In this respect, universities act as "incubators" of innovation by assisting innovators to acquire the requisite management and financial skills.

Engagement with small but growing companies is summarised as follows:

> Here, companies are generally in need of a wide range of expertise from technological advice through to marketing knowhow. The problem for firms in this phase of the innovation cycle is that their needs are so specific that it is not always possible for universities to organise their activities to deal effectively with them' (OECD, 1984:61).

In collaboration with large science-based firms, both universities and industry are usually operating at the forefront of research and play a part in an international network of activity. Relations between these types of firms and universities, then, must depend on the excellence of the latter and developing an ethos of 'equal partners' in research (OECD, 1984:62).

Mature industries, large or small, are likely to be the most difficult stage of the industry life cycle within which to foster university-industry relations. Frequently, unable to interest government or to attract high quality graduates, these firms seem to be set on a

path of inevitable decline. Such firms may need more, not less, investment in R&D and require more, not fewer, highly qualified graduates in their workforce (OECD, 1984:62).

Companies, for their part, are encouraged to endeavour to remain effective and competitive to survive in the entrepreneurship jungle. One of the key strategies for this lies in the manner in which the organisations deal with knowledge. Kodama (2007) notes that to establish and maintain competitive advantage, companies need to have a quality assurance process of accessing, sharing, and integrating knowledge in diverse areas such as technology, business processes, and others spread out within and outside the company.

> In an environment of turbulent change and uncertainty, a dynamic strategy-making process in which the corporation goes beyond its own core capability and always deliberately forms new market positions (new products, services, and business models, et cetera.) is an issue of daily importance for managers and practitioners (Kodama, 2007:5).

Further, emphasising the crucial role of knowledge, Kodama (2007:38) calls it the only significant management resource in society, created by strategic communities, and

> "the many types of knowledge and core competencies inside and outside the company, including customers and strategic partners, are then merged and integrated to produce the integrative competencies that become new sources of competitive advantage."

In general, companies achieve spectacular high-performance promise, of growth, gain and sustain value-creating growth through a growth system consisting of three elements: commitment (the will to grow), strategy (managing and executing growth) and capability (building growth-supporting foundations) (Doorley & Donovan, 1999:24). Kodama's (2007) inference on knowledge as a management resource links with Doorley and Donovan's (1999) management of growth in an organisation. Such a link points to the role of staff in both the university and industry as being active partners in the execution of collaborative efforts such as industry-based learning.

2.2.5 University Effectiveness and Relevance in Society

The concern about the local relevance and visibility of Third World universities can be addressed by government through sustained consultancy and systematic progressive delegation of intellectual responsibilities aimed at local development. Such an approach builds mutual trust and subsequent competence on the part of the university to be a trusted partner in conceptualising and addressing national development goals and other emerging challenges. Universities must also be encouraged to develop partnerships with local technology businesses to create meaningful experiences for students and develop a pool of

potential mentors, and to deepen the fundamental role that education has in fostering technopreneurs (Urban & Barreira, 2007:571).

Efforts at promoting university-community collaboration exist at international and regional level. In the 2007/8 period, the Southern African Regional Universities Association (SARUA) reportedly commissioned four research projects, among them a study on University-Industry Interaction and National Systems of Innovation. This study looks at how universities as knowledge generators make their resources available for innovation in firms and industrial sectors to create a critical difference to knowledge intensification and competitiveness in developing countries, providing an understanding of universities' role in facilitating technological upgrading (and technological innovation) in those countries (SARUA, 2008). The opportunity therefore exists for universities to participate and make a difference, in the process underwriting their relevance to society at large.

Intra-country initiatives on promoting community engagement vary. South Africa has moved many steps ahead of other Southern African countries in institutionalising community engagement in its higher education quality assurance system, says MacGregor (2008), who further notes that the imperative for increased community engagement is driven not only by the demands for accountability and the moral obligations that flow from a public role. South African universities are, according to MacGregor (2008):

> under continual pressure to tackle the huge socio-economic challenges of the developing world, as institutions that receive a large share of scarce public resources and whose students increasingly come from communities that are in dire need of support.

One benefit resulting from sustained university-community partnerships is that academic staff members (and students) fulfil theirs and the university's role of community engagement by doing intellectual business with and for the community in a reciprocal way – emphasising the importance of learning with and from the community. While most professional development initiatives strive to combine theory with practice, the introduction of service learning as part of the higher education curriculum provides students and faculty with experiential learning of a different kind – allowing for a learner-centred approach and promoting constructivist learning. One instance of constructivist learning makes reference to Vygotsky's zone of proximal development (ZPD), where something one can do 'today' with the help of someone else (often someone more

experienced), is something one can do on one's own 'tomorrow' (Cowan, 1998:54). This suggests that universities attempt to develop a socially responsive orientation to their learning programmes in different fields of specialisation and across disciplines, and that they are seeking to meet the challenges that derive from the application of knowledge and skills in poor communities (Perold, 1998). In their study Feldman et al. (2006) found that students' community-based learning experiences had an impact on the quality of their end-of-semester research papers, recommending that research on the impact of community-based learning should take into account the contemporary university's emerging paradigm of engaged learning and research, which calls for a redefinition of the nature of partnerships and the reciprocity benefited between partners.

Concerned about the challenges militating against successful community engagement by faculty, Bloomgarden and O'Meara (2007) investigated the extent of integration of community service into the mainstream roles of university academics, that is, teaching, research and community engagement that should promote scholarship of teaching, research scholarship, and scholarship of engagement. They identified three levels of integration, namely integrated, if only, and non-integrated. Some participants in the study reported that community engagement served their growth as scholars simply by exposing them to underrepresented communities, thus enhancing cross-cultural understanding as a result. This would appear to be a very simplistic outcome. Faculty who integrated community service in their practice ought to have entrenched it into the curricular activities and processes that would make a sigificant impact on the quality of their graduates.

Another major challenge to university-community collaboration emanates from the fact that universities are largely autonomous and rely on the expertise and innovativeness of their staff for maintaining a competitive edge over their kith and kin. Comparability and bench-marking are achieved by staff mobility between institutions. Kecskes (2006:6) argues that existing partnerships in American universities tended to be of a contested nature regarding what purpose they attained, and what quality they achieved. They also looked differently, that is, universities not only carried out different engagements but perceived their engagements differently. The engagements sometimes had negative outcomes, e.g. an institution proceeding to carry out a certain capital project within the community without informing the local residents about its (well-meant) intentions on the

project, and then receiving protracted resistance leading to the subsequent abandonment of the project. Kecskes (2006) here overlooks the trailblazing concept in which new, and often unpopular, ideas are forced down on reluctant participants for the sole purpose of bringing awareness and gaining entry.

Requirements for the success of university-community partnerships include, among others, an informed leadership, a shared vision among partners, an entrepreneurial approach (which includes innovation), mutual benefit (reciprocity), and availability and accessibility of parties to one another (Carriere, 2006:4). Apart from the types of partnership described in this study, universities in developing countries are urged to develop customised partnerships with one another. Such inter-university partnerships are hailed by Abramson, Bird and Stennett (1996) who see them as a means by which institutions do together what they cannot do separately, and where collaboration is regarded as better, and less expensive, than competition. Reporting on a successful partnership project between her university (Northeastern University) in the USA and its community, Spurlock (2004:174) says,

> We are contributing to the urban community and at the same time drawing on its rich resources to enhance the education of our students and the academic work of our faculty. We look to a future of university-community partnership enriched by mutual empowerment and transformation.

Table 2.2 The Array of Higher Education Benefits (Source: Chambers, 2005)

	Public	**Private**
Economic	• Increased tax revenues • Greater productivity • Increased consumption • Increased workforce flexibility • Decreased reliance on government financial support	• Higher salaries and benefits • Employment • Higher savings levels • Improved working conditions • Personal/professional mobility
Social	• Reduced crime rates • Increased charitable giving/community service • Increased quality of civic life • Social cohesion/appreciation of diversity • Improved ability to adapt to and use technology	• Improved health/life expectancy • Improved quality of life for offspring • Better consumer decision making • Increased personal status • More hobbies, leisure activities

These sentiments emphasise the focus on the university's relevance to various sections of society. Chambers (2005) provides an array of the benefits of higher education sourced

from the Institute for Higher Education Policy in the United States of America. The simplistic matrix is reproduced in Table 2.2. On one dimension are the economic and social benefits, while on the other there are the public and private benefits, producing four sections.

The public-economic section addresses taxes, productivity, consumption, workforce flexibility and reliance on government. The public-social section concerns benefits under crime rates, charity, quality of civil life, social cohesion and adaptation to technology. The private-economic section addresses benefits in salary levels, employment rates, savings levels, working conditions and professional mobility. Lastly the private-social section addresses benefits in health and longevity, survival rate of offspring, consumer decision-making, personal status and well-being. The importance of these benefits is that they spell out the relevance of higher education in the lives of communities and individuals. As universities increase their enrolments, the impact is a better society in one or more of the benefits outlined above.

2.3 University service learning

Learning in informal environments and in workplaces is not a preserve for universities and higher education institutions (HEIs) alone. The structuring of learning activities around available resources and knowledge centres found in the community occurs in primary and secondary schools in many countries and localities within countries. The arrangements are, however, often of a piece-meal or short-term or ad hoc nature. Before discussing the literature review of off-campus learning as it applies to university models, we unpack the various competing definitions and the terminology used around the broad arena of university service learning.

2.3.1 Contested definitions of university service learning

There appear to be several related terms, both in the literature and in colloquial discourses, pertaining to the processes of students going out to places of work and real life to extend or validate their classroom learning. This is partly due to the various formats and requirements of the learning process and of the institutions concerned. The discussions in the sub-sections below attempt to compare and contrast the terms that share meanings.

2.3.1.1 Industry-based learning and workplace-based learning

For purposes of this study, industry-based learning (IBL) is a pedagogy supported by a contractual agreement between the university and the body of industries within a country (or locality). The agreement is often sanctioned by government through appropriate legislation and administered through appropriate vehicles, such as the Zimbabwe Manpower Development Fund. The learner is expected to gain specified knowledge and experience from a company/organisation deemed suitable to provide such knowledge and experience. Often, then, many small or medium-sized companies are deemed inadequate to provide the requisite learning. IBL is sandwiched between the normal university study stages in any number of configurations and takes various durations to complete.

IBL appears to focus on 'industry', that is, sites of production of goods. However, some students in the subject areas such as accounting, banking, insurance, library science and others, do not deal with production. In essence the term 'industry' is not adequate for these and the better term is workplace; the whole process is better termed workplace-based learning (WBL). Workplace-based competence has a new place alongside the more traditional academic knowledge (Forsyth, Laxton, Moran, Van der Werf, Banks & Taylor, 2008). In the IBL set up, the student is the needy partner. The student is obliged to gain the needed experience as part of his/her course requirements and assessment. The company may not necessarily need the particular student, thus there is little or no community service assumption.

2.3.1.2 Service learning

A broad array of arrangements that fit the description of service learning exists. The underlying principle is that students are doing a service to the community, and while doing so they gain some learning. The emphasis is on the service to the community and the discussions below attempt an elaboration of this broad concept.

2.3.1.2.1 Understanding Service learning

Berman (2006) defines service learning as a bi-focal concept in which in-context learning connects specific educational goals with meaningful community service. Service learning projects thus include a dual focus: the goals of academic learning and the goals of authentic volunteer projects. Students master applicable learning outcomes, strengthening their capabilities as they develop empathy, personal ethics and the habit of helping their

communities as implied in their attitudes and virtues. Doing service learning helps students understand their connectedness to and importance in their communities as they experience the role of service provider (rather than recipient) (Berman (2006:XXI). As students do service learning projects, Berman (2006) observes, they not only experience learning, but they go on to experience a commitment to doing meaningful and authentic work. In the process they experience a sense of empowerment and joy in doing service that needs to be done, and a sense of community that results in providing help to others.

On the administration of service learning by institutions, Berman (2006) describes the procedure as follows,

> At the beginning of the project, the teacher (sic) identifies the educational goals of the service learning project and content concepts, processes, and skills that help students reach those goals. Also the teacher (sic) discusses those goals, concepts, and skills with the students and structures the service learning project to ensure their safety. Teachers (sic) verify that adequate supervision is always available, and they make arrangements for students to be transported or escorted to and from the service site. (p. XXV).

Service learning is also defined as a course-based, credit-bearing educational experience in which students participate in an organised service activity that meets identified community needs and reflect on the service activity in such a way as to master applicable learning outcomes, a broader appreciation of the discipline, and an enhanced sense of civic responsibility (Bringle, Games, Foos, Osgood & Osborne, 2005). One would think that apart from mastering learning outcomes, students get involved in experiences that link course objectives, the content and the learning outcomes. Such an integrated approach is reminiscent of problem-based learning, discussed in a later section below.

An avid proponent of service learning, Jacoby (2003:3), defines it as:

> … a form of experiential education in which students engage in activities that address human and community needs together with structured opportunities intentionally designed to promote student learning and development.

Reflection and reciprocity thus become the key concepts of service learning. Learners continually reflect on what community needs they are expected to address and these guide their excursion away from the lecture halls of their university. And while doing so, calculated benefits accrue to both the community and the learners concerned.

Bellner and Pomery (2005) initially describe service learning as a powerful yet challenging method of teaching. I would rather describe it as a strategy for facilitating learning. It is credited for its potential to transform learners, deepen their understanding as well as to promote the professional learning of academic staff, bring community and campus into closer partnerships and provide additional assets to meet community needs. In Bellner and Pomery's (2005) later description, service learning is viewed as a programme, philosophy and a pedagogy whose multiple facets of learning, coupled with the differing ways in which different people understand knowledge, higher education, and society may go a long way to explain why it is a topic worth exploring.

It remains to be critically determined whether or not in doing service learning students go out with the mindset of 'helping out' or providing a service as they learn. It is to be ascertained to what extent the community is 'in need' of the service, and whether it accepts students because they are a lesser economic burden than employed workers to the company. Pompa (2005:189) dissociates service learning from the notion of charity, arguing that it involves a critique of social systems, challenging participants to analyse what they experience, while aspiring to take action and bring about change. He notes the following:

> Transformative events radically shift how we see things. The lens through which we previously had viewed reality is irrevocably altered. It is not just about looking at particular issues from another angle; often, an experience of this kind completely changes the perspective from which one now sees all of life. Thus, service learning provides both an incubator for and impetus toward social change." (L. Pompa, 2005:189)

The questions that demand answers might be: Is service learning suitable to some study disciplines and not others? Is service learning suitable for instance for social sciences and humanities, while workplace-based learning is suitable for science and technology disciplines? It is very likely that companies and universities have developed mutually beneficial engagements over time, since one-sided relationships would be difficult to sustain in the long term.

2.3.1.2.2 Benefits of Service Learning for Students

Although the importance of service learning is implied in the definitions above, authors have proffered a number of benefits separately. Berman (2006) appreciates what he sees as student learning expanded, together with development of life skills and the service ethic.

He further discloses that brain research says that this kind of in-context learning is deep and is long remembered, observing that students who do service learning projects demonstrate the increased self-confidence and self-esteem that result from responsible, ethical, independent action. Doing legitimate service projects in the community helps students feel useful. Berman (2006:XXVI) adds that service learning lets students have the experience of being needed, becoming more willing risk takers, opening themselves to new experiences and people. They also become more effective leaders, communicators and teammates. Service learning projects help students develop an awareness and acceptance of others from different ethnic, national, or economic backgrounds. Students become more empathetic and less judgmental, accepting their own internal locus of control and are less likely to blame others or make excuses for shortcomings. They discover that mistakes lead to growth and learning and they grow through their experiences. Other benefits to students observed by Berman (2006:XXVI) are outlined in the self-explanatory Table 2.3 below, reconstituted to show the categories of benefit.

Table 2.3 Benefits of service learning to students (Source: Berman, 2006)

Category	Benefit
General	Effective learning Increased achievement Brainstorming and problem-solving
Cognitive	Reflection leading to deeper understanding and more genuine transfer of learning Remembering hat has been learned better and longer
Affective	Motivation to learn through engagement in decision-making Increased belief in self Positive attitude towards learning
Social	Develop a social consciousness and a social conscience Awareness of community problems Develop a responsibility to help solve problems Appreciating cooperation and teamwork
Physical	Developing resilience, health and competency Developing real world skills

Another angle reinforcing the experiential nature of service learning is presented by Butin (2005) who sees service learning as a self-consuming pedagogy, a postmodern practice, providing a liberating stance for him. He states the following:

> It doesn't ask me to make my students into civic minded citizens, it doesn't ask me to solve the social justice issues facing me locally and globally, and it doesn't force me to combat (or embrace) globalisation. These may of course occur as by-products of service learning experience. But I cannot expect it; much less should I attempt to force it. What instead I can and should do is look carefully at the practices in my own shop – the enactment of service

> learning experiences – and figure out how it works. This is, it seems to me, more than enough to ask for. (Butin, 2005:103)

2.3.1.2.3 Academic Service Learning (ASL)

The University of Pretoria has adopted a version of the term for many of its programmes, probably derived from Bringle, Games, Foos, Osgood and Osborne (2005). Here academic service learning (ASL) is defined as an experiential educational approach involving curriculum-based, credit-bearing learning activities and Figure 2.2 illustrates the two-pronged conceptualisation of the process.

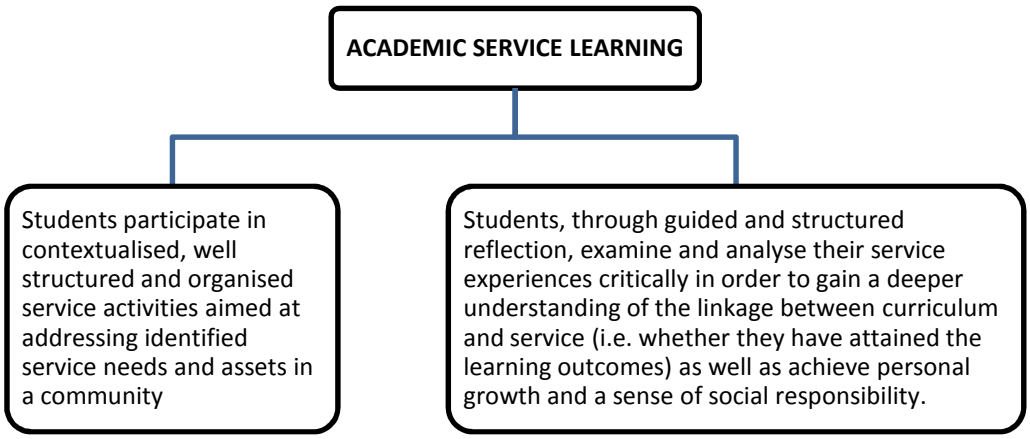


Figure 2.2: A conception of Academic Service Learning (University of Pretoria)

On one angle, the idea of service to the community is duly implied, on the other, it is the link to the curriculum and the attainment of requisite learning outcomes that appears to drive the engagement.

2.3.1.3 Experiential learning

This is an umbrella term for all learning that takes place through real life experiences whether in a formal situation in an institution or under informal circumstances, although the former is more applicable. Venkatesh, Small and Marsden (2003) write about active learning or 'learning-in-community' in which learners take classroom learning out into the local community and apply it to real problems faced by real organisational clients. In this description the interplay between the classroom and the real world outside the classroom is emphasised. Classroom activities are meant to organise learning into manageable and integrated parts, to achieve completeness in the learning domains, while learning in the community brings out the relevance of mastered competences and also qualifies the reality. Dennison and Kirk (1990) point out that experiential learning or learning by doing

is also referred to as action learning, humanistic learning, and holistic learning, all for the reason that they provide shared experiences and foster a learning community where tutors and learners alike exchange roles.

I would like to add to the above array of synonyms by including the concept of *authentic learning* as described by Bonnet (1997). Authentic learning enables the student to relate what is being learnt to his/her own existence, to acknowledge personal responsibility for how he/she lives his/her own life, and to achieve a degree of authorship of his/her understanding. It is the depth of personal significance attached to learning, evoking a rich subjective response, personal perspective and meaning, interpreting material in the context of one's own concerns. Consequently, as Bonnet (1997:150) puts it, authentic learning is:

> … not merely dealing with purely intellectual or cognitive capacities but broad ways of relating to the world, which include attitudes, dispositions and emotions. We are dealing, not with sets of neutral procedures or processes, but with highly value-laden stances to life.

2.3.1.4 Problem-based learning

Problem-based learning is yet another pedagogical innovation to learning that has been developed and used widely in the teaching of practically-orientated disciplines such as medical studies where use is made of academic hospitals. Instead of following pre-planned and sequenced teaching formats, problem-based learning is essentially guided by real life and real time discipline-related problems that arise in environments which serve both learning and real life situations. Problems that arise in these environments are fully exploited to provide desired learning outcomes for learners. This process might be similar to the concept of apprenticeship except that the latter is often a one-to-one association between learner and mentor while the former is a one-to-many or many-to-many.

One of many lessons in Michael Fullan's *New Paradigm of Change* (Fullan, 1993) is that problems are our friends, and are inevitable, but the good news is that one cannot learn adequately or be successful without them. Problems are endemic in many serious change efforts, both within the effort itself and via unplanned intrusions. Problems are necessary for learning, but not without a capacity for enquiry to learn the right lessons (Fullan, 1993:25-6).

2.3.1.5 Internship

While workplace-based learning and service learning apply to a student who is enrolled in an institution who would normally or traditionally learn all subjects through theory or a contrived situation, internship refers to someone who has completed the theoretical part of his or her studies in an institution and is in a workplace to do the practical component, both parts contributing to the full qualification under consideration. However, it is one of my concerns that theory and practice are separated and not an integrated whole which would promote constructivist and authentic learning.

2.3.2 Cooperative Education

Cooperative education is one of a number of programmes developed by universities that capitalise on the learning taking place in workplace contexts (Garrick, 2000:242). It is exemplified in undergraduate sandwich courses where students spend extended periods of time in work placement intended to provide them with experience in particular forms of work that may be practised after graduation. In these instances the link between the university curriculum and the learning that occurs in the workplace is critical but often unclear (Garrick, 2000:242). This concern follows the realisation that workplace assignments and duties rarely follow a plan or programme that ensures systematic coverage of desired learning outcomes. Moreover, students in different workplaces undergo different learning experiences. In South Africa the practice is common, and in a study carried out to evaluate the programme by Wessels and Jacobsz (2010), industry supervisors and heads of higher education institutions applauded this learning strategy they considered beneficial to both industrial and educational environments.

There exist many models of cooperative education featuring various forms of experiential learning activities. The ‘articulation programme’ is one such model characterised by a partnership between institutions (secondary school to tertiary level) and involves the coordination of curricula across two or more of these institutions formalised by ‘articulated agreements’ Cantor (1995: 201). The benefit is a sharing of resources for workplace education and professional development, and a greater recognition of the advantages conferred by cooperation between educational institutions at several levels. The philosophical basis is a structured plan for education in preparation for life and work, beginning as early in the learner’s journey as possible. Cooperative education may be confused with cooperative learning.

2.3.3 Cooperative Learning

Cooperative learning or learning in groups emphasises the socialising effects of engaging others in developing an independent learner's holistic growth. Du Toit (2008) identifies three types of learning group: base, formal and informal. These three groups occur in classrooms and learning spaces, providing each learner with academic and personal support in their learning journeys. According to Leonard (2002) cooperative learning is characterised by four elements: positive interdependence, individual accountability, group interaction and social skills. Du Toit (2008) reorganises these into five, namely, positive independence, face-to-face promotive interaction, individual accountability or personal responsibility, collaborative skills and group processing. There is a perceived link between group processing skills and learning strategies in adults. Scott's (2006) findings with bilingual church leaders-in-training in Mozambique concur with the view by Copley in Du Toit (2008) that holistic learning strategies that emphasise contexts, relationships, whole persons, and whole brain learning enhance the quality of adult learning in cooperative learning environments.

Both cooperative education and cooperative learning have a place in industry-based learning. If the university does not insist on its students going to various workplaces for their industry-based learning, some of them might be led to follow the route of cooperative education that may not lead to clear outcomes comparable from one company to the next. Cooperative learning would allow students to move into companies in groups so that they carry out common and complementary tasks that may lead them to produce shared outcomes such as joint projects and reports. In such activities they learn to appreciate one another's skills, valuing them rather than competing or plagiarising one other.

2.4 Learning theories and principles aligned to service learning

The available literature discusses some of the popular theories of teaching and learning in the general sense and the literature is dominated by learning for young children and adolescents. A few sources address the aspects that apply specifically to the university or to higher education. Some aspects can be applied across all types and levels of learners, as well as specific purposes of learning, and the discussions that follow below attempt to bridge the gap and contextualise the theories and principles applicable to university environments.

2.4.1 Learning Theories and Principles

The dominant theories of learning presented in the literature include behaviourism, cognitivism, constructivism and humanism (Leonard, 2002). Although this assumption might be contested, these theories are useful because they open our minds to many possibilities and ways of seeing the process of learning. Learning initiatives and processes are often based on our knowledge of learning theories (Mergel, 1998). While behaviourism and cognitivism are both objective in nature and both support the practice of analysing a task and breaking it down into manageable chunks, establishing statements of intention and measuring performance based on those, constructivism promotes a more open-ended learning experience where the methods and results of learning are not easily measured and may not be the same for each student. Cognitivism shares some similarities with constructivism such as the analogy of comparing the processes of the human mind to those in a computer (Mergel, 1998).

The growing knowledge of learning styles has opened up ways in which educators view and interact with their learners. Martin and Potter (1998) write from their earlier observations that 'an individual's learning style is the way that person begins to process, internalize and concentrate on new material'. Each person learns in a unique way. There are similarities, of course, but 'every person has a learning style – it is as individual as a finger-print'.

It has later been established, however, that learning styles are not as restrictive or as fixed as 'fingerprints'. Learners have a potential to develop and adapt with age, expanding their learning style repertoire, a phenomenon termed, 'learning style flexibility' based on the work of Herrmann as cited in Du Toit (2008:37).

Martin and Potter (1998) also note that Howard Gardner's theory of multiple intelligences stresses the importance of not viewing intelligence as a uni-dimensional construct, like the 'general-factor', but rather as a series of independent intelligences, namely: verbal/linguistic, logical/mathematical, visual/spatial intelligence, bodily/kinaesthetic, musical/rhythmic, interpersonal, intrapersonal, and naturalistic. Some authors have confined the arguments on intelligence to cognitive aspects only. Understanding that the brain is a complex adaptive system, is social, and uniquely organised, and that learning is developmental, assists us to locate our learning experiences in view of prevailing learning

theory, and leads to creating new theory. Kornhaber, Fierros and Veenama (2004) underscore the uniqueness of brain organisation, adaptability and output in more ways than just the cognitive dimension. The influence of emotions on thinking (and perhaps vice versa) has pointed to a link between mental (IQ) and emotional (EQ) intelligence. Jennings and Caulfield (2005) note that tension, anxiety, and fear override the great thinking brain in all of us. Increasingly researchers have written on the impact of emotion and how it short-circuits thinking.

Reporting on adult multiple intelligence (AMI) theory, Viens and Kallenbach (2005) found out that learning activities that drew on multiple intelligence (MI) theory and its central tenets were characteristically authentic, were typically relevant and meaningful to students, and MI-informed classrooms became increasingly less lecturer-centred and more student-directed with time. These findings concur with the epistemology and underpinning assumptions of constructivism discussed earlier. The concept of multiple intelligences discussed above connects to a related construct: students' thinking and learning styles, discussed in a later section below.

2.4.2 Constructivist Learning

The literature on the connection between learning in adults and the epistemology of constructivism is limited. As an epistemological theory about knowledge, constructivism helps practitioners to derive implications for learning rather than prescribe a specific approach to learning (Geelan, 2006:51).

Geelan (2006) proposes several different brands of constructivism - six according to him, namely: personal, radical, social, social constructionist, critical and contextual. Realising the inter-relationships and overlaps, Geelan (2006:62) provides a four-quadrant scheme to organise the six forms of constructivism (Figure 2.3) according to their proponents.

More study and writing are awaited on the relationships between constructivism and the learning of older students and adults. Peddler et al. (1997:59) note that the non-positivist definition of learning as unhampered participation in a meaningful situation shows the shift from 'seeing learning as an individual phenomenon to seeing it as something that happens in people in relationship with others; from the individual making isolated sense in

a concrete world to the person immersed in a collective social process of sense making and meaning creation'.

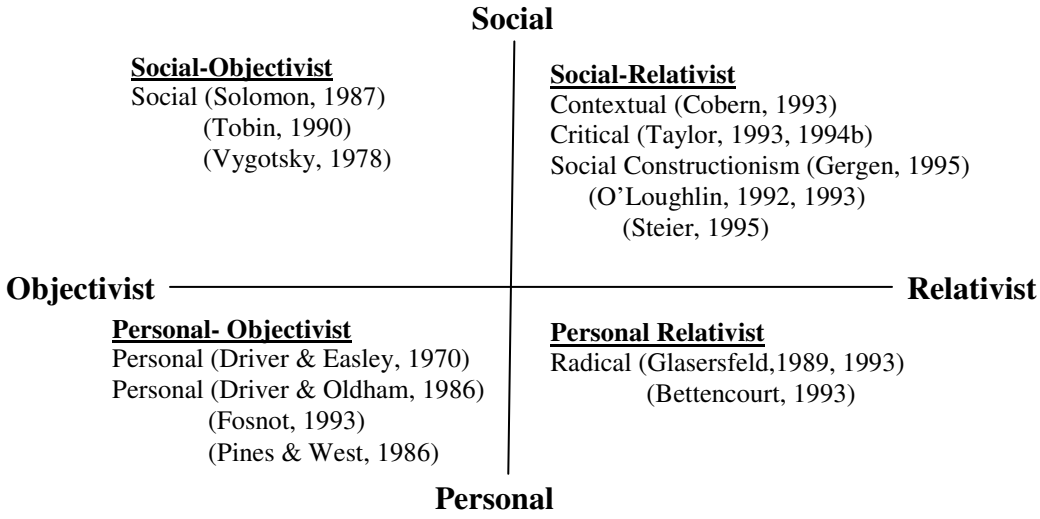


Figure 2.3 Organising many forms of constructivism
(Adapted from D. Geelan, 2006)

Conceptual and theoretical gaps, in my view, exist in the literature with regards to tenets of constructivist epistemology. As hinted above, scant explanation is given or implied on the mechanism of knowledge construction in knowledgeable and experienced adults. Of greater significance is the paucity of investigations and writings on the link between knowledge construction and the existence of natural physical phenomena, for which manipulation, rather than construction, would seem more appropriate. Moreover, the argument between knowledge construction and knowledge acquisition (the learner as an empty vessel analogy) particularly in the learning of psychomotor skills requires clearer articulation and authentication.

2.4.3 Hermeneutic Circle of Curriculum Theory and Practice

The relationship between learning and curriculum theory and practice emerges as the best to inform our action in and outside formal learning situations. Danner (2002:194) has observed that understanding and interpreting happen in a circular pattern. It goes back and forth from what is known to what is new; the new insight enlightens the pre-existing knowledge, and this in turn helps understand the new better – and so on. Curricula must therefore be planned and delivered to facilitate both the 'understanding' and the 'interpreting' portion of action learning. Sohnge and Van Niekerk (2005:171) allude to the notion that interpretation of text (i.e. curriculum) consists of five acts constituting the

'hermeneutic arch'. These acts are understanding, explanation, comprehension, appropriation and world projection. They are descriptive of interpretation because if either the lecturer or student fails to come to self-understanding eventually education becomes a failed practice.

Self-understanding includes knowing and interrogating not only what one knows and should know, but how that knowing can be regulated and be best utilised for survival. This in recent years has necessitated a redefinition of curriculum from 'subject-bound content' to curriculum as 'learning experiences'. And as Skilbeck (1984) writes, this re-definitional move did shift curriculum away from 'something articulated, definite and pre-planned' towards the nature of experience and the process of experiencing. Implementing an 'experiential' curriculum at university is highly possible and recommended, as observed by Masebe (2007:26) whose study on utilising meta-evaluation for reviewing a university curriculum programme consolidates views on practitioner self-understanding.

2.4.4 Outcomes-based Education

One of the most noticeable pronouncements in the South African education systems in recent times is the outcomes-based education (OBE) philosophy. A programme of comparable prominence in Zimbabwe has been the *education with production* (EwP) programme of the post-independence period. OBE lays the ground for educational transformation in South Africa (Department of Education (DoE), South Africa, 2003) and supports 'seamless learning', i.e. learning in both formal and informal contexts. Policies propose that students can move between formal education settings and workplaces, and credits and qualifications can be obtained and transferred from one situation to another. However, in practice little evidence of this is to be found (DoE South Africa, 2003). In OBE the (learning) institution is less relevant to the performance of specified outcomes than the socialisation, culture, diversity and freedom of expression in that institution. Learning processes are contextual and are aimed at the mastery of clearly specified outcomes. OBE has links with recent changes and restructuring in the global economy where competitive value-laden production has replaced in importance the production of primary goods in international trade. This requires facets of holistic learning such as creative thinking and problem-solving skills in settings where teamwork is important. It also underscores the redefinition of the lecturer's role as a facilitator of learning.

Smith (2006:44) alludes to the conviction that critical cross-field outcomes (CCFOs) are life competencies and abilities that people require to become active, responsible and successful members of society, and as such should be developed during learning processes so that learners are able to deploy them when achieving work-related outcomes. Desirable universal outcomes of university-industry collaboration are expressed by Kruss (2005:197) who writes:

> … if institutions are to contribute to a national system of innovation, it is essential that they all raise their research capacity and levels of productivity. And it is desirable that all develop the institutional capacity to harness the potential for innovation inherent in their research. Network and collaboration forms of partnerships are critical vehicles and the scale on which they exist will need to increase dramatically. However, institutions have to contribute to innovation in a differentiated manner that draws on their historical strengths and focus. The creation of new comprehensive universities adds to these complexities, as the new institutions define their mission and the balance between teaching, research and outreach.

2.4.5 Self-directed and Self-regulated Learning

Involvement in and control of one's own actions is a key determinant of the outcomes of learning described above. Historically schools and other educational institutions tend to decide for the students both the learning outcomes and the processes of learning, leaving the students powerless and sometimes frustrated. Straka (1997:1) states that self-directed learning describes a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies and evaluating their own mastery of the learning tasks. He also informs that the product of such learning is the ability to make autonomous decisions about goals and processes of learning, as well as to adapt to given teaching-learning environments.

Boud (2006:24), who gives self-directed learning the alternative name of 'negotiated learning' links it with student projects common in education and the health sciences where it provides a way of managing curriculum. It has also been used as a frame for work placements and practical activities in which there is typically less direct lecturer control over what is to be learned than in conventional coursework.

On the other hand, self-regulated learning refers to the deliberate planning and monitoring of the cognitive, psychomotor and affective processes that are involved in the successful

completion of academic tasks (Kerlin, 1992). In essence, students at almost any age are capable of taking charge of at least some of their own learning, like babies seem to do when they play with their crib mobiles. Self-regulated students are always becoming flexible and proficient in organising what they themselves have planned and what has been planned for them by others, including their lecturers.

While the success of self-regulated learning may be doubted when dealing with young children, it is quite suitable for adults at higher levels of learning. In many cases especially in the university context, self-regulated learning can be elevated to action research through which new knowledge becomes documented and disseminated. Adult learners have influence on both their cognition and other capabilities and the learning environment in which they operate. Through action research adult learners contribute to the body of knowledge within a specific field of study.

Some counter arguments suggest that in natural settings and given the choice, both adults and children invariably engage in self-regulated learning (SRL) for a good number of their engagements. They choose where to go, who to listen to, what to concern themselves with and much more. However, some of these free choices lead to situations where they have to be controlled and regulated by others. For example, when someone has chosen to undertake professional development in a particular career, they later have to abide by the dictates of that professional development and this entails being regulated by those in charge and other participants. It could be argued that in choosing to be controlled by another person one has still exercised self-direction. Du Toit (2008:62) alludes to the metacognitive learning approach, a process of thinking and learning about one's own learning, leading to the ability to pilot and regulate that learning and its output and the effect it has on the learner. Metacognition, in my view, enables students to be self-sufficient in the skills of understanding, monitoring and evaluating their own thought processes.

Related to self-regulated learning is the concept of flexible learning. Garrick (2000:240) observes that one of the innovations sweeping through higher education institutions and workplaces is the promotion of 'flexible' approaches to learning. This innovation includes both a drive to prepare students for the workplace and a recognition that 'valid' learning occurs in the workplace itself. Work-based learning has become a critical dimension of

'flexible' learning, cultivating divergent thinking and doing among students. It is important to note that work-based learning emerges from the demands of work rather than from predetermined academic content. Flexible learning promotes rapid growth in intellectual capital, the 'hot currency' concept sweeping contemporary higher education discourse that emphasises knowledge creation and management. Flexible learning is a form of outcomes-based learning combined with problem-based learning where students are guided as they decide what to learn, where, when and how, during contact hours or online. Implementing flexible learning in many current learning situations poses a challenge to both the student and the lecturer because it requires a shift in beliefs and in learning styles and styles of facilitating learning. It also requires a huge overhaul of processes from early childhood right up to higher education. Wilkie (2004:83) affirms that in a facilitative learning environment, the lecturer adopts one or more of the roles of liberating supporter, directive conventionalist, nurturing socialiser, and pragmatic enabler.

Self-regulated learning is principally initiated and managed by the student and may be quite informal in nature, such as in learning a language (Telford, 1995). Winne, Jamieson-Nod and Muis (2002) present a conceptual model in which SRL is a form of cognition that depends on long-term memory, is an expression of agency, and can be analysed as either metacognitive monitoring or metacognitive control. The apparent implication in the literature is that self-regulated learning is, in itself, a sufficient solution to learning challenges for all subject disciplines and for all learning outcomes. Considering one example of extreme learning environments, the military academies, one would be led to believe otherwise. The awareness of best opportunities for both self-regulation and obedience to an instructor provides a more holistic approach to viewing younger learners.

2.4.6 Thinking and Learning Styles

Studies have shown that people possess and display different styles of thinking and learning. Both thinking and learning have been linked with intelligence. The work of Herrmann has been cited as one of the leading studies in the field of brain-based learning styles, building on previous research on left and right brain theory (Du Toit, De Boer & Steyn, 2007:37). The Herrmann whole brain model and the Herrmann Brain Dominance Instrument (HBDI) are now widely used. Acknowledging Herrmann's four-quadrant model, Lumsdaine and Binks (2007:34) reiterate that whole-brain thinking is the ideal. They note that despite the four distinct 'ways of knowing' depicted by Herrmann's model,

> … only five per cent of people have a single strong dominance; 58 per cent have a double dominance, 34 per cent have a triple dominance, and only three per cent equally strong dominances in all four quadrances. Each person represents a unique coalition of thinking preferences. Imagine having a team of players inside your brain. You send out specialists for specific tasks: you send out one, two or maybe even three star players more often than the others, but to function well, the whole team is needed.

Recent breakthroughs in neuroscience (the study of the human nervous system, the brain, and the biological basis of consciousness, perception, memory, and learning) are reshaping the understanding of learning and taking it to a new level. The nervous system and the brain are the physical foundation of the human learning process. Neuroscience links our observations about cognitive behaviour with the actual physical processes in the brain that support such behaviour. This is the thesis of the *neural learning* theory, still 'young' and undergoing rapid, albeit controversial development. Jennings and Caulfield (2005) allude to the fact that learners have a great learning potential (brain capacity) which never gets exploited fully, '…like race cars gunning their engines at the starting gate – but the flag never falls'.

Stein (2005) gives a description of the connections between the brain and learning, including such concepts as brain plasticity, hemispheric specialisation, et cetera. He surmises that given appropriate brain stimulation, an individual can learn anything well enough. He writes:

> Structural changes in the brain continue in response to experience throughout life, though at a diminishing rate after puberty. What this implies, therefore, is that education really does not matter a great deal, because it actually helps to determine the structure of the pupil's brain. Each thing a child learns does indeed alter his brain a little bit. Therefore we should worry even more about the 1 in 5 people who reach adulthood and say that they gained little or nothing from their education. We should think hard about this indictment of modern education. Why do current educational practices serve so many people so poorly? (p. 39).

Studies and discourses have gone on for decades now on the *right brain* versus *left brain* theory that suggests that the two sides (hemispheres) of the brain control two different "modes" of thinking. Some individuals might appear to display one of these modes of thinking more than the other. Others, however, are whole-brained and equally adept at both modes. In general, education institutions tend to favour left- rather than right-brain modes of thinking. 'Whole-brain' students give equal weight to the arts, creativity, and the skills of imagination and synthesis. There is clearly a role for curriculum development, implementation and evaluation in creating and nurturing whole-brained individuals.

Learning styles have been discussed thoroughly in recent literature, and I am not going to discuss them in depth here. Illeris (2005) describes four types of learning: cumulative, assimilative, accommodative, and transformative. Kolb's experiential learning cycle (Du Toit, De Boer & Steyn, 2008) maps out four stages through which we go if we learn in a natural way: feeling, watching, thinking and doing. Kolb's other four-type learning style model includes the following styles: accommodator, diverger, converger and assimilator.

2.4.7 Competence-based Education and Training

Another pertinent learning strategy in higher education involves competence-based education and training (CBET). Community-engagement in the process of learning renders itself amenable to CBET. Seen as an alternative to institution-based vocational education where development of cognitive and practical competences is emphasised, CBET gives the learner credit for the competent performance of a task in a work setting following an assessment procedure in the workplace. The claimed virtues of CBET, says Winch (2000), are that it focuses on what workers (and trainees) need to do in the workplace and not superfluous extras, and gives workers credit for what they already know without having to go through a further, unnecessary period of professional development. According to Hyland (1994) CBET is closely associated with national vocational qualifications frameworks (NVQs), whose model is based on and informed by behaviourist learning theory.

It has been described earlier how universities in less industrialised countries tend to be rigid, hierarchic, traditional, and lacking autonomy in sufficiently engaging industry particularly in R and D processes. This is of concern in the light of many engagements that are possible that can improve the learning of university students in various disciplines. Bowden and Marton (1998: 100-101) note that competency-based education seeks to address concerns over the workplace relevance of much of the content of formal educational programmes that often emphasise theoretical or 'book knowledge' at the expense of knowledge application to perform practical tasks and to fulfil workplace roles, adding, "under competency-based approaches, the design of curricula to make them more relevant to workplace requirements normally begins with an analysis and identification of workplace 'competencies' which are then organised into a set of 'competency standards' for an occupation". A major concern with competence-based education is that it is of limited scope and is suitable only for specialised manual competences such as those for

technicians or artisans. A person with such a qualification is very efficient at technical work, but is often narrow-minded, with little or no theoretical backing to his/her astute manual skills.

2.5 Quality implications of university service-learning

Certain measures taken as innovation in education emanate from a desire to achieve competitiveness and success in mission. The introduction of a pedagogy such as service-learning appears to be driven by a desire for better achievement and for effectiveness, and this disguises the inherent quest for quality. To gain insights into the extent of appreciation of quality by participants in an educational undertaking, a good starting point is the assessment of students' various attributes to gauge their fitness for the tasks and responsibilities laid out before then under the pretext of learning.

2.5.1 Student Assessment in Experiential Learning

Learning and teaching are inevitably linked with assessment. Learner-centred and self-directed learning environments are the natural precursors to participative learning. Current assessment practices (continuous and summative) do not assess adequately the life-supporting qualities of students such as independent and critical thinking, creativity, practical knowledge and competences, et cetera. In many instances lecturers utilise unilateral intellectual authority over students. Participative assessment involves forms of assessment where the lecturer/facilitator seeks to involve and share the responsibility for assessment with learners directly (Hodgson, 2006:34). Student-centred learning approaches are more compatible with participative assessment. Is there room for participative assessment in university learning and with the use of industry-based learning? Except for the assessment of written reports on the experiences of students during industry-based learning, the assessment of physical engagement at the workplace is often subject to criticism since the working environments of companies differ considerably, and the students are scattered in different companies where it is inconceivable to think of uniformity and comparability.

Hodgson (2006:34) says that participative assessment approaches are an important potential tool to be used by universities if they produce intellectually confident graduates able to take responsibility for their personal development of knowledge, practical competences, attitudes, values and virtues. But can learners be trusted to create or agree to

create assessment practices that are impartial and neutral, seeing that the learners are fundamentally very diverse among themselves in both learning and assessment capabilities? In the final analysis, the competence of the learners in determining the what, how and when of their assessment is as much a point of contention as is the imposition of the same by so-called knowledgeable and experienced lecturers.

Development of appropriate tools and techniques for the assessment of student experiential learning in industry-based learning has often included appointing a supervisor at the workplace to assist the institution-based lecturer and assessor. The challenge is in the comparative standards and capabilities of workplace supervisors, which are often difficult to regulate. Purposes, formats and procedures of student assessment at university have been debated and researched widely. When advocating a significant change in university academic processes such as university-community engagement, assessment of students (and of staff) becomes an issue of concern. O'Toole (2007) identifies five assessment strategies (Figure 2.4) suitable for experiential learning at the workplace.

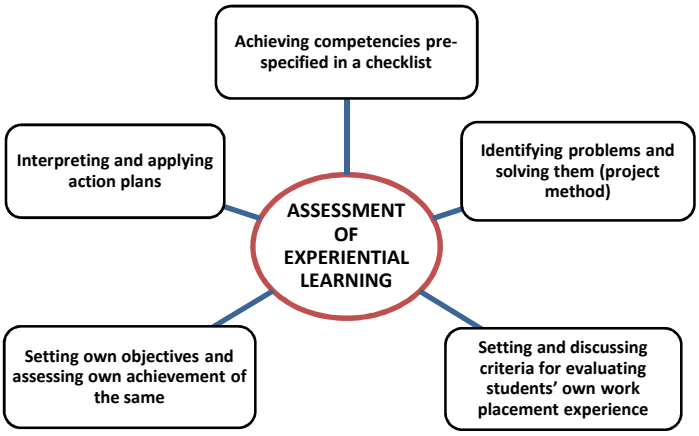


Figure 2.4: Assessment strategies for experiential learning (Source: O'Toole, 2007)

The strategies above address mainly the higher levels of the hierarchies of learning objectives (Bloom, 1956; Marzano & Kendall, 2007) or learning outcomes as used in outcomes-based education. They implicitly incorporate assessment of knowledge constructed by students based on their own concrete tasks and problem-based learning rather than spoon-fed knowledge and skills acquisition.

In advocating for increased research on assessing for both the quality and quantity of social change derived from what they call 'community service learning' endeavours, Cooks and Scharrer (2006:53) recommend 'social' methods of assessment that correct the notion that learning may happen in social contexts while assessment does not. They recommend a description of assessment in these circumstances as "…the evaluation of the effectiveness of social contexts in community service learning for rearranging what we have always known…". Thus some assessment of the social environment in which the student is a participant ought to accompany the assessment of the student, more so since environments in work places and in real world situations are all unique. To compare two students' assessments, one coming from a rich background, and the other from an impoverished one, would require some careful consideration, an issue hinging on quality assessment and management, discussed below.

2.5.2 Quality Management in University Education

Universities ascribe to the importance of quality and standards of excellence both within themselves and in comparison to other systems around them. Bouge and Hall (2003:9) observe that quality in college and university education has been viewed in terms of excellence as reputation, resources, outcomes and content, adding that the most excellent institutions are those that have the greatest impact, add the most value on the student's knowledge and personal development and on the faculty members' scholarly and pedagogical ability and productivity. The definition of Bouge and Hall (2003:9) of quality in higher education institutions crystallised from many perspectives found in the literature states that, "Quality is conformance to mission specification and goal achievement – within publicly accepted standards of accountability and integrity." This definition indeed observes diversity of institutional purposes, requires operational expression of mission and goals, focuses on purpose, encourages public disclosure of mission, goals and results and contains an ethical test, according to its proponents (Bouge & Hall, 2003:14). On the other hand, Biggs (2003) quoting Harvey and Green defines quality in terms of value for money, fit for the espoused purpose, and as transforming.

Approaches to quality assurance and quality enhancement in university-community partnerships vary, and the approach that characterises a particular partnership is largely determined by the university concerned (Hilborne, 1996:63). Every university has a

potential for excellence within its own mission (Bouge & Hall, 2003:7). Commitment to quality can be encouraged by the adoption of rigorously tested processes of validation, of monitoring and of periodic review (Stennett & Ward, 1996:130). Quality higher education in the modern world encompasses innovativeness and entrepreneurship, and in the case of a university, an ability to attract industry through action learning that mirrors business imperatives and promotes change (Teare & Prestoungrange, 2004:16). Innovative universities in the current knowledge era are those that contribute to the social good through the production, acquisition and application of knowledge, capable of securing and advancing high-level research capacity to ensure both the continuation of self-initiated, open-ended intellectual inquiry and the sustained application of research activities to technological improvement and social development (Kruss, 2005:190).

In industry, quality is linked to productivity. The question is whether productivity and its measurement in education are as reliable as in industry. Walberg (2006:104) describes what he calls the 'productivity predicament' in education, noting that unlike other sectors of the American economy, and despite increased spending and numerous education reforms, schools become less efficient over time, failing to diminish the poverty gap between poor and middle-class students, and recording higher dropout rates (particularly among minority groups). Yecke (2003:1) also laments the 'rising tide of mediocrity in America's schools where increasing opinion at one time was that school practices tended to work against gifted and talented learners particularly in the middle school level. In short, high costs and new policies were not being translated into significant improvement in both quality and quantity in American education. A greater cause for concern therefore exists for developing countries where funding problems prevail. In the case of universities in developing countries productivity is bound to be measured in terms of the qualitative impact of graduate and research outputs in society over time, rather than the numbers of graduates passing through the institutions (Hiborne, 1996).

In analysing entrepreneurship in educational institutions, writers have tended to emphasise the tangibles such as infrastructure, advanced telecommunications and sound legal systems, while neglecting the intangibles such as novel ideas, role models, informal forums and executive leadership (Urban & Barreira, 2007:579). Ultimately it is human capital that ensures and maintains the shift towards an entrepreneurial culture. Calling for partnerships that enhance local competitiveness for small-, medium- and micro-scale

enterprises (SMMEs), Kruss (2005:198) says institutions should strategically harness innovation potential at multiple levels and in differentiated ways within their own zones of 'proximal development'. This must be more applicable to developing country universities.

There are various terms that apply to the notion of quality in organisations. These include quality assurance, quality control, quality enhancement, quality feasibility, quality management, total quality management, et cetera. Some of these are described below. Bowden and Marton (1998) make a point about the use of some of the terminology on quality and effectiveness in education as compared to other business organisations. They note that the idea of quality control is not easily applied to learning in universities because quality assurance norms for evaluating teaching and courses are complex. Using the notions of product, manufacturer, supplier, and customer are the common parlance of TQM systems outside educational contexts, which do not readily translate into university functions, even though attempts are made to use them in higher education. It is therefore argued 'that a fundamental aspect of quality management at universities is the process of finding out what we want to produce, that we cannot take the product as given' (Bowden & Marton, 1998:217). It is interesting to analyse what industry-based learning programmes want to produce.

Boud et al. (2006:4) note that sustainable development of organisations demands that management balances the needs and ambitions of key stakeholders: customers, investors and personnel.

> Management's efforts to achieve this must address not only static efficiency and effectiveness, such as productivity, profitability and competitiveness, but also dynamic efficiency and effectiveness, such as learning, competence development, creativity and innovation. While faced with growing complexity and unpredictability, many current management strategies and methods, such as lean production, lead to increased intensity in the workplace and decreased opportunities for learning and development and thus adverse long-term consequences.

Biggs (2003:263) writes about the 'reflective institution', asking the question, "Can institutions reflect on what they are doing?" He goes on to espouse two forms of quality assurance: retrospective and prospective. He describes 'retrospective' quality assurance, which is about value for money, as that which looks back to what has already been done, making summative judgement against external standards. Such a focus, says Biggs, has a managerial rather than an academic agenda, prioritising accountability, using top-down

and bureaucratic procedures in an adversarial rather than collegial climate. In retrospective quality assurance, quality indicators are used. On the other hand, 'prospective' quality assurance is concerned with assuring that teaching and learning fit the purpose of the institution now, with commitments to upgrade and improve teaching in the future by requiring that procedures are in place that lead to quality enhancement (QE). Quality enhancement 'is concerned not with quantifying aspects of the system, but with reviewing how well the whole institution works in achieving its mission, and how it may be improved, which is not to say that there may not be external imperatives to meet' (Biggs, 2003:268). The institution must operate from an espoused theory of teaching, and try to match practice to the theory. In short, prospective quality assurance (or quality enhancement) is concerned with fitness for purpose and with transforming, designed to meet the institution's own standards developed internally, looking at the present and the future educational priorities, a bottom-up collegial and supportive climate, open qualitative and formative descriptors of best practice.

2.5.3 Quality Indicators (and benchmarks) in Higher Education

Around the early nineties the quest for definition and utilisation of quality indicators received much attention in Europe. For example, Cave, Hanney & Kogan (1991) proposed three categories of indicators, namely effectiveness, efficiency and economy, all centred on input, process, output and context. Among the indicators that Cave et al. (1991) found, were those relating to teaching such as degree results, value-addition, employment on graduation, and those related to research such as research output, incomes, and reputational rankings. Dochy, Segers and Wijnen (1990:143) have also listed several indicators under the three functions of higher education, namely education (teaching and learning), research and services. Sizer (1990:9) has produced a list of 16 indicators in general use in universities, among them employability of graduates, research studentships awarded by particular bodies and records of publications. It is worth reiterating that for industrialised Europe with a low unemployment rate, it is understandable to talk only of 'employability of graduates'. For developing countries, retention and relevance to local needs would be an added feature.

Bunting and Cloete (2004) have noted that indicators can be used as an instrument for stimulating the exchange of good experience and new ways of thinking about policy approaches. This ensures that universities, though autonomous and working to achieve

individual excellence, cannot dispense with positioning themselves against one another. Moreover, success of service learning includes reciprocity, collaboration, needs assessments, alignment of service and learning goals, student placements, student orientation, role clarification, reflection and logistics (HEQC, 2006: 18-19). Bogue and Hall (2003:5) highlight the following six conventions and assumptions held about quality in higher education institutions (HEIs) shown in Table 2.4 below:

Table 2.4 Six Assumptions about Quality in HEIs

Feature	Assumption
Financial	Only high cost colleges have quality
Institution Size	Only large and comprehensive colleges have quality
Admission procedures	Only highly selective colleges have quality
Status	Only nationally recognised colleges have quality
Prevalence	Only a few colleges have quality
Resources	Only colleges with impressive resources have quality

Bogue and Hall (2003:6) quickly dismiss these assumptions and pose the question: Are quality and excellence in limited supply? They add that "any campus without quality in its mission has no reason to exist" and "… each college or university has the potential for excellence within its own mission" (p. 7). The element of competition and competitiveness needs to be factored in into the arguments above. While institutions of learning may exist due to popular demand or social pressures, it must be monitored how they compete with peers for seeking quality delivery and self-improvement in regard to the overall goals of university education. This way, no institution will be forgiven for remaining stagnant in all its functions over extended periods of its existence.

In the analysis of the rationale and reliability of using quality indicators, Bogue and Hall (2003:243) conclude that no single indicator or measurement of quality can stand without some criticism or scrutiny. It will be rare to find an indicator or evidence of quality that may not be assaulted for some philosophical or technical frailty. In the words of Bogue and Hall (2003):

> Outcome measures may not tell us about the value-added contribution of the collegiate climate. Student opinions and satisfaction indices do not tell whether students have learned anything. Students can be happy and ignorant. Reputation and ranking studies are sometimes

> viewed as 'quantified gossip' and often do not furnish useful information for improving programs and policies. Accreditation can be an exercise in professional back-scratching, a cost-and-time burden serving only the interests of various professions and disciplines. Licensure examinations can be subject to the changing interests and standards of a profession and the profession's own self-interests. Academic program reviews can become paper producing burdens and busywork for administrators needing occupation. Alumni opinions can mellow and modify with time.

The fallacy regarding indicators leads Bogue and Hall (2003) to suggest the need for multiple indicators for this conceptual challenge and for other reasons as well, because individual and institutional performances are too complex and too precious to be captured in a single point of evidence. Likening it to a physician who at best uses not a single indicator of our physical or emotional condition to ascertain our state of health, Bogue and Hall (2003:243) call for diagnosis and prescription built on analysis, evaluation and interpretation of multiple indicators. Bowden and Marton (1998) outline the qualities of universities that affect the quality or excellence of their service of which the following three stand out: helping students develop an interest in lifelong learning or focusing students' attention on their first job on graduation, having a strong or weak research profile, having strong connections with business and industry, or not.

Further, Bowden and Marton (1998) note that the 'quality movement' has not always been happily embraced at universities. Most academics feel that more things are being added to their already heavy workload of teaching, research and administration. However, in my view, a further pertinent point is that the 'quality' being referred to is the quality of what one is doing, or rather the quality of what one is achieving; the quality of the learning brought about and of the research carried out. So, in this way, improving 'quality' is simply doing better what you are doing and have to do anyway.

In a nutshell, the diverse conceptions and views discussed above about the facts and myths of quality spell out the organisation's road map towards its desired actions and learning. The university's unique definition and understanding of quality will undoubtedly affect its attempts at achieving that quality. The various quality indicators cited above and that have been shared by scholars in the literature serve as a guide to what a university seeking its niche in the competitive playing field can select and adopt. A young university such as NUST stands to benefit by selecting appropriately those aspects that will enhance its business and its image into the future as it matures. Learning with and from others

becomes crucial, and in the next section I explore more elaborately the concept of learning.

2.5.4 Quality through knowledge and its application

Applauding the emergence of knowledge and learning as major organisational assets, and suggesting that 'work equals learning', Marquardt (2002: 14) says,

> Increasingly, work and learning are becoming the same thing. Because the new global economy is based on knowledge work and innovation, there is a convergence between work and learning. While you perform knowledge work, you learn. And you must learn minute by minute if you are to perform knowledge work effectively.

Knowledge work is the occupation of people who create, manage and disseminate knowledge. Marquardt (2002:11) goes on to reiterate that knowledge has become more important for organisations than financial resources, market position, technology, or any other company asset. As the organisation's main resource, the company's traditions, culture, technology, operations, systems and procedures depend on it. It is necessary to increase employees' abilities to develop and implement improvements, thereby providing quality service to clients and consumers. Knowledge is required for updating products and services, changing systems and structures, and communicating solutions to problems. Development and pursuit of knowledge is required of all individual members in a modern company, and 'the job of the leader is to create an environment that allows workers to increase knowledge and act on it' (Marquardt, 2002:11).

Progressively brainpower is becoming a company's most valuable asset, which creates a competitive edge in the marketplace, according to Marquardt (2002). "We are challenged to find and use it. [Brainpower] has never before been so important for business. Every company depends increasingly on knowledge; patents, process, management skills, technologies, information about customers and suppliers, and old-fashioned experience…. The location of the new economy is not in technology, but in the human mind" (Marquardt, 2002). In developing countries, physical labour and material assets are still regarded highly as the wealth of choice. This is because material and infrastructural development have not reached the levels that are seen in industrialised countries. Less knowledge has been transformed into visible physical structures and thus it is difficult to advance that scarce knowledge further. The ideal gift to such nations would be rapid socio-economic transformation within a reasonable period to allow for the matched growth of both physical and intellectual capital. The role of universities through their research

outputs, outreach activities and graduates is to create and disseminate appropriate knowledge that promotes rapid socio-economic transformation.

But to generate relevant knowledge for use by wider society the university has to handle its own internal knowledge skilfully. This is the knowledge about its own goals, processes, structures and the inherent limitations. This study partly aims at expanding the university's knowledge about industry-based learning in order to inform present and future plans and decisions pertaining to the application of the pedagogy. Through research sub-questions such as (a)(ii): *What contributions are perceived to be attributable to industry-based learning in knowledge growth and holistic economic development of the country?,* this study seeks to bridge knowledge gaps found in the literature about how internal knowledge within the university informs broader knowledge applicable to wider society. In this way, the study has the potential of being a tool for reflection and self-correction, and an encouragement towards transformative learning discussed below.

2.5.5 Transformative Learning

In creating a transformational philosophy and rationale, Spady and Schwahn (2010:48) ask educators to expand their empowering learning communities' knowledge bases (so that their paradigms shift), adding, "As you consider the exciting possibility of moving from an educentric to a transformational approach to educational change, keep going back to what you really know and keep expanding your understanding of what it means to learn, educate, and live in the age of empowerment.

Transformative and transformational learning is directed at accepting change and maintaining it. In providing students the opportunity to interact with the world through guided hands-on experience, and then reflect upon it, we are encouraging them to become agents of change, ready to meet the challenges of an increasingly complex world. In this approach participants are engaged on many levels, increasing the likelihood of deep, lasting learning – through a blend of theory and practice in a real world setting – that can have far-reaching implications (Pompa, 2005:168). The pedagogies of industry-based learning and service learning provide for transformative learning, and as Pompa (2005) says,

> … have the power to turn things inside-out and upside-down for those engaged in it. It provokes one to think differently about the world, and consider one's relationship to the world in a new way. This approach to learning captures and communicates a dynamism that

> inspires everyone involved to explore, inquire, and analyse. It is transformative education at its best' (Pompa, 2005:191).

Ferrer et al. (2010:80) observe three basic elements of learning (or three types of pedagogical emphasis) which are outlined in Figure 2.5 below:

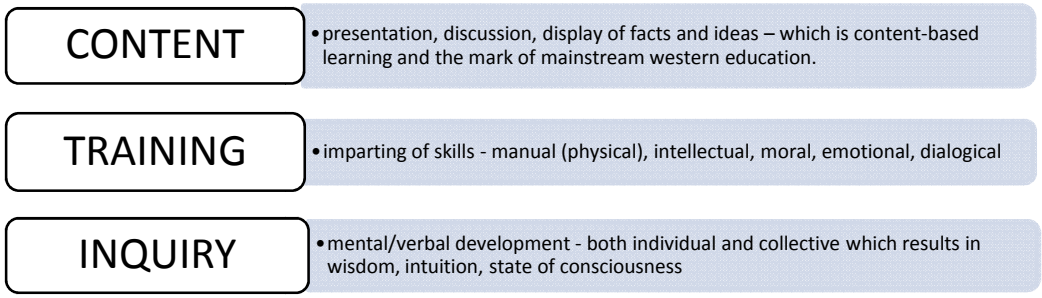


Figure 2.5 Three elements of Learning (Source: Ferrer et al., 2010)

All three elements shown above are not mutually exclusive, and are important in varying degrees to students at different levels of development. Ferrer et al. (2010) believe that as students move from lower school to college, and from college to university, from undergraduate to graduate education, and from master's to doctoral levels, there needs to be a gradual but increasing shift of emphasis from an educational praxis that is based mainly on content/professional development (arguably more appropriate for children and young adults requiring epistemic foundations) to one based mainly on inquiry/professional development (more appropriate for adults who aspire to contribute new knowledge or practical service to the world). Ferrer, Romero and Albareda (2010:93). provide basic features of integral transformative education:

> Integral education fosters the cocreative participation of all human dimensions in the learning and inquiry processes. A genuine process of integral learning cannot be directed exclusively by the mind but needs to emerge from the collaborative epistemic participation of all human dimensions: body, instincts, heart, mind and consciousness. All human dimensions need to be actively encouraged to participate creatively at all appropriate stages of the inquiry and learning process.

Ferrer et al. (2010) lament the idea that most Western education focuses almost exclusively on the development of the rational mind and its intellectual powers, with a

little attention given to the maturation of other dimensions of the person. As a result most individuals in our culture reach their adulthood with a somewhat mature mental functioning but with poorly or irregularly developed somatic, vital, emotional, aesthetic, intuitive and spiritual intelligence, according to Howard Gardner. This is an extreme mind-centred way of life and learning, which means that products of the mind dominate a person's life and learning. Ferrer et al. (2010) suggest that what is needed, then, is to create spaces in which these human dimensions can achieve epistematic competence according to their own developmental principles and dynamics rather than those the mind thinks are most adequate. Only when the body, instincts, sexuality and heart are allowed to mature autonomously will they become equal partners with the mind and be capable of creative participation in cocreating a truly integral process of inquiry and learning.

Trani and Holsworth (2010:1) posit that higher education is in the midst of a major transformation that is fundamentally redefining the relationship of colleges and universities to the broader community. This transformation is occurring at every level of higher education, from community colleges to comprehensive undergraduate schools, to research-based intensive doctoral universities. And it is becoming an increasingly global phenomenon as universities around the world seek to redefine themselves in ways that will enable them to become significant actors in the modern, knowledge-based economy.

Desirable transformation transcends all levels of operation from individuals through organisations to countries and continents. Trani and Holsworth (2010:184) report on their transformational analysis of requirements for the indispensable university for the current knowledge economy. They note that key among the lessons in the analysis is the positive input on economic development when governments consciously seek to foster capacities for high-level skills (human capital) and problem-solving research (intellectual capital), and align those capacities with national economic strategy objectives. While the nearly 6 percent growth rates in much of the sub-Saharan Africa from 2000 through 2008 have been encouraging, the World Bank report posits that higher education institutions in Africa will need to transform themselves into a different type of educational enterprise – a 21st century version of the African 'development university' – in order for the region to be competitive within the new rules imposed by a global knowledge economy.

2.6 Conclusion

The broad array of ideas and viewpoints discussed in this chapter has provided support for the theme of industry-based learning in as far as the objectives and the scope of this study are concerned. A close understanding of the theoretical and practical issues around workplace-based learning and quality assurance has aided the appropriate emphasis in higher education discourses, particularly in local developing country settings. The literature surveyed has aided the refining of the research questions and the design of the study, and has pointed to the ways of analysing the data collected.

It is noted that, in general, all the literature sourced and surveyed supported the principle of industry-based learning in its various formats and versions. None of the sources found were critical of the pedagogy and calling for its suspension or scrapping in the agenda of preparing human resource needs for contemporary economies, not the least for developing countries. Interest in and publishing on university-community engagements for learning have existed for over a few decades but have become more common and focussed in the past decade. In particular, the rise of new technologies and methods of production has precipitated the need to put students on work placements in complex situations where they get exposure to certain processes to aid their learning about those processes. The mandate of the university as a key player in shaping occupational contexts of modern societies was portrayed as the function that brought the university and industry together in facilitating business innovation to start new companies, assisting small and growing companies, collaborating with large established firms, and assisting mature industries. Much of the literature dwelt on large established companies and less on small and medium scale enterprises.

The accessed literature has been scant on detailing the methodologies used and usable in carrying out inquiry on aspects of service learning or workplace-based learning. Qualitative and quantitative methods seem to have been the choices, as none of the studies used mixed methods approaches in this area of study. The presentation of workplace-based learning as a pedagogy with contested conceptualisations and formats captured the variations in ascribing standards to learning as viewed from different contexts, such as developed and developing countries, resourced and under-resourced environments, and geographical disparities, among others. The literature fell short of stating that developing

country universities needed a special programme to address higher learning which differed from that which has brought success in industrialised country contexts.

On the theories and principles of learning that apply to industry-based learning, there is much generalisation in the literature which applies mainly to school and college set-ups, with less focussing on the university. Classical theories such as behaviourism, cognitivism, humanism and constructivism hold the debates that attempt unravel how the acquisition and management of knowledge and skills occurs and can be best exploited. To qualify traditional learning theories, research and experiences in other related principles such as outcomes-based education, thinking and learning styles, flexible models and competency-based learning and training are applied to the higher education cause.

Central to this study is the identification and description of a sustainable quality drive in delivering university education using one particular pedagogy, industry-based learning. Early writers have been benevolent in publishing works on determinants of quality such as the indicators and benchmarks used in higher education in accounting for the often huge expenditure and investment in this sector. The more modern literature emphasises the importance of higher education in knowledge development and management, and justifies any rational expenditure or investment in the field as this becomes the vehicle for social growth and transformation to address pressing global concerns.

The identifiable gaps in the literature expressed above, and also earlier in section 2.4.2, contribute to the motivation for this study. In the next chapter, the principles, procedures and techniques of the quantitative-qualitative case study and the need for action research in the area under study are presented and reflected upon. The strengths and the justifications of the mixed methods approach are discussed, as well as the challenges and the constraints encountered in the key stages of the research process.

CHAPTER 3: THE RESEARCH DESIGN AND PROCESS

3.1 Introduction

So far in this research report I have attempted to underscore foundational issues inspirational to my research relating to the research problem and its context (Chapter 1). I have also surveyed related literature and attempted to position my own thoughts and understanding in the broad discourses reported by other scholars near and far (Chapter 2). It has become apparent, in the previous chapter in particular, that learning and experience jointly remain the most compelling and engaging pursuits for enhancing human development and well-being, both individually and collaboratively. In this chapter I would like to divulge and make known my further learning and experiences that have been facilitated by my interaction as the originator and coordinator of the study with colleagues and other participants, and the processes that generate knowledge to be shared and exchanged between us.

This research was conceived and carried out at a time when Zimbabwe was experiencing severe socio-political and economic upheavals now loosely referred to as 'the lost decade'. In particular, the fieldwork took place towards the end of 2010 and early 2011, when universities countrywide were only just experiencing a turnaround from their worst moments of lean operations where classes were badly disrupted and programmes delayed as students and staff got sidetracked into concentrating on their survival often by doing very little with and in the university. This is not the central issue of investigation in my research. It is incumbent upon me, however, to state that the situation affected the research in many ways, especially in the processes and outcomes of data collection. These effects will be explained and the measures employed to neutralise them will be reported.

The discussions below underscore the theoretical and practical underpinnings of the research study with a view to providing empirical support to claims that will emerge at the end of the study. It is my personal opinion that as a researcher I have an obligation to reveal my philosophical launching pads to justify the persuasive strategies that I use to attract and retain my audiences. I will therefore start by explaining my working paradigm before going on to reporting how it influenced the rest of the processes from

the research design through the actual engagement in data generation and collection to the analysis and interpretation of findings.

3.2 Research Paradigm and Underpinning Assumptions

The foundation for inquiry in this research study is the constructivist paradigm or worldview which, according to Creswell and Clark (2007:22), is characterised by the seeking of "understanding or meaning of phenomena, formed through participants and their subjective views". This worldview, also called the *constructionist* worldview by Dawson (2009), is typically less obtrusive, permitting participants' voices to be spoken and heard, rather than privileging only the researcher's voice, as the participants speak from an understanding constructed from their own experiences and from social interaction with others and their environments. This 'bottom up' approach develops individual perspectives into broad patterns, and ultimately to theory (Creswell & Clark, 2007). A multiplicity of realities is thus expressed by different self-motivated participants, particularly if the data collection was conducted with the participants' cooperation, and in familiar surroundings such as at the participants' own workplaces, as was the case in this study.

A paradigm may be understood to be "… a picture of reality that profoundly influences what people view as true, possible, and desirable … a whole way of believing and living as if a particular set of understandings and dynamics were the only true/valid/possible/good one available" (Spady & Schwahn, 2010:7). We need paradigms to create and claim space in our contested environments, and to negotiate our territories, but paradigms create in us a 'closed system', a 'fixed mindset' or make us somewhat 'closed-minded'. We tend to want to filter out and dismiss anything that does not fit or match the closed system's configuration of what we hold to be true/valid/possible/good. Hence we only see one given set of things as being either possible or desirable, or both. Only sustainable learning can bring about change or a 'paradigm shift', which transforms one closed system to another. The interesting observation is that, "When a paradigm shifts, everyone goes back to zero" (Spady & Schwahn, 2010:8).

The constructivist paradigm is often pitted against its main rival, the positivist paradigm, among a couple of others. A positivist worldview often confers authority to the voice of the researcher or the status quo.

A paradigm often encapsulates a set of other sub-worldviews and lenses for understanding and creating knowledge, such as theories, philosophies, ideologies, et cetera. For my purposes, and drawing from my faith in and passion for action and reflection on practice, I have combined participatory and critical interpretivist lenses to approach the collection of data for this study, its analysis and interpretation. The participatory lens allows me to view the university in my study as a playing field in which I assume the role of chief protagonist, while colleagues, students and industry staff are active and conscious players. While I take an interest in watching the holistic activity of play from time to time, and I also have to interpret individual and group performances at other times, I want everyone involved to feel and act naturally and in the way they feel is best to enable us to co-construct reality. I am counting on confident and self-motivated players who can control their game while I support them. Participatory action research is described in more detail below in Section 3.3.2.

The interpretivist perspective holds that reality (or truth) is inter-subjective and socially constructed such that it can be described and represented through diverse perspectives (Butin, 2010). In the study of workplace-based learning for instance, it can be assumed that the truth about effectiveness of such a programme is interpreted by the participants, who create such interpretation based on their experiences and ‘substantiable’ opinions. As Butin (2010:60) puts it, there is no single or authoritative truth since every group or culture privileges the truth of their particular viewpoint. I view such a perspective as one of tolerance and non-confrontation, for in the end no single group can be justified to privilege their knowledge to override another.

My personal understanding of the nature of truth (ontology) inherent in academic discourses is that truth resides in the dynamic knowledge of people in their individual and collective capacities. I illustrate my personally constructed view of this understanding diagrammatically in Figure 3.1. The universal knowledge of a society is composed of personal knowledge of individuals (A-J) and public or shared knowledge (sub-set) found in institutions, organisations, social groupings, et cetera. Some of the

individuals' knowledge overlaps with the public knowledge (A, B, C, E, F); some is completely embedded in public knowledge (D, G, I), while other knowledge falls completely outside (H, J). The knowledge of some individuals overlaps (C and D, G and I, F and H). The illustration below can also apply to a single organisation in which sections, departments, year levels, et cetera. are the sub-groups. Insiders in an organisation or society share some knowledge and thus are likely to have a common ground for truth or reality. The illustration also helped me to understand that my participants were in different positions as they provided their responses to my questions, and thus the multiplicity of realities (Creswell & Clark, 2007) that manifest in the numerous quotes of participants' voices that are used in the next chapter on the research findings.

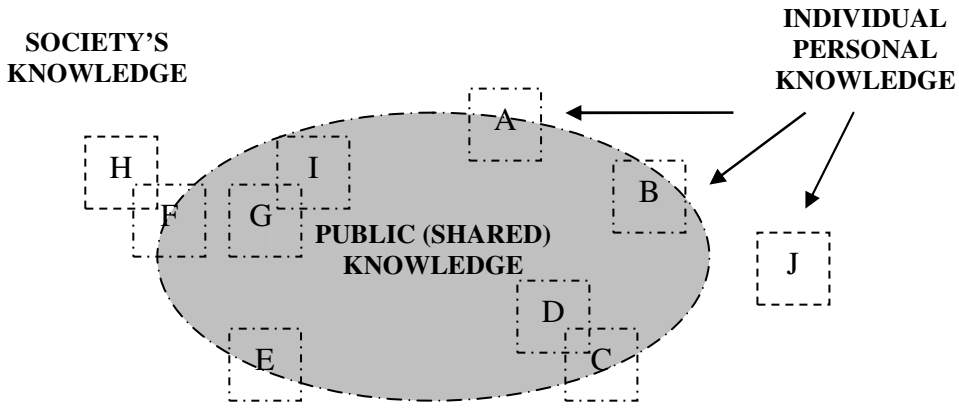


Figure 3.1 A hypothesised relationship between personal knowledge and public knowledge in society

In elucidating my conceptual framework for this study earlier (Section 1.5) I alluded to my belief that understanding industry-based learning in a university's programmes necessitates an understanding and application of learning theory. Apart from being regarded as a paradigm, constructivism has been treated as an epistemology or way of knowing. This means that two people may have the same knowledge but we may be interested in how they came to know what they know. It is much like the analogy that various people might own cars, but how did they come to have them? Some will have bought them, some given as gifts, some acquired through work, some inherited, and yet others stolen. Theories around constructivist learning help to explain the 'how' of knowing and construction of reality, and in my conceptual framework I link these with concepts such as self-regulated learning, lifelong learning, cooperative learning and

learning and thinking styles, all these being routes, in my view, to reaching multiple voices of participants busy constructing their own knowledge, albeit at my insistence, and perhaps, more for my short term benefit. How does all this contribute to my study? The constructivist epistemology (way of knowing) has helped me to remain socially and professionally connected to my respondents and their environments. I want to lay my claim to knowledge not only on my own observations and perceptions but also on the voices, views and reflections of the people who I interacted with and got some knowledge from. In this way I combine objectivism and subjectivism, and thus rely for my deliberations on a hybrid of facts and opinions. Research that prepares for change and change management is positioned to influence inevitable organisational transformation, or the 'ontology of becoming' (McNiff, 2000). Organisational transformation rests on learning primarily by adults who engage in communicative learning, which involves understanding what others mean when they communicate with us (Mezirow, 2009).

Thus, as I went through the processes of organising my knowledge throughout the process of generating and collecting data and analysing it, the constructivist perspective guided my assigning of meaning to both facts and events, rather than hang around only the facts themselves, alluding to the fact that all knowledge is a matter of human interpretation, and that knowledge is not just something existing independently in the world waiting to be found out, but it comes into being only when a human being examines data and assigns meaning to it (Hinchey, 2010). I am the learner and the knower in this instance and my current and constructed knowledge guides my analyses and interpretations of unfolding facts and events.

3.3 Research Methodology and Design

This being a research study in the social sciences, a plethora of research methodologies, research designs and methods are available in literature and in practice for it. In this study, 'enhanced' case study and the embedded concurrent design of the mixed methods are used. I explain later all the facets of this description, but first let me attempt to situate my approaches into context.

The distinction between and among the terms used to identify the various processes and sub-processes that researchers undertake to transact the business of inquiry and the search for solutions to problems remain very implicit to me. What, for instance, do the following terms refer to and what are the relationships between and among them: *paradigm, epistemology, methodology, design, methods, strategies, techniques, tools,* and *instruments*? Although some are clearer to explain, I find that others are used interchangeably even in some of the well-celebrated literature on research methodology. For instance, in some of the literature, qualitative and quantitative methods are referred to as paradigms, the questionnaire is referred to both as a method and a technique, case study as a research strategy rather than a method (Punch, 2009:119), mixed methods as a design and methodology, and so forth. Some authors allude to the same confusion that I have. For example, Dawson (2009) discusses feminist research, which many authors would call a paradigm, and writes, "There is some argument about whether feminist enquiry should be considered a methodology or epistemology, but in my opinion it can be both."

Table 3.1 Research study characterisation

	1	**2**	**3**
Paradigm	Constructivist	Constructivist	Mixed Methods
Methodology	Mixed methods	Case study	Case study
Research Method(s)	Case study	Mixed methods	Survey
Research Design	Concurrent embedded	Concurrent embedded	Concurrent embedded
Research Technique(s)	(qual/quan)	(qual/quan)	Questionnaire
Research Tool(s)	Statistics, content analysis	Statistics, content analysis	Statistics, content analysis
Research Instrument(s)	Interviews, Questionnaire	Interviews, Questionnaire	Interviews, Questionnaire

For my purposes in this study I attempt to integrate those views that I have considered from the accessed literature, and present my interpretation of the terms in a hierarchical form (Table. 3.1) to show the connection between my chosen paradigm and descriptions of all the processes under it. Three closely-related versions of the hierarchy are given.

3.3.1 Case study research method

In a research context, universities can be considered as individual cases. Although between them they are peer institutions exhibiting many operational features in

common, sharing goals and often projecting overlapping visions and missions, they strive to maintain substantial measures of autonomy that aim to keep them uniquely distinct, so that at any moment they may lay claim to accomplishments that help them outdo each other in the battle to compete for scarce resources or to leverage territorial advantage. The nature of case study has to be understood in the context of action and engagement for knowledge generation, knowledge dissemination and for competitive advantage.

As hinted at earlier, Punch (2009:119) observes that case study is more a research strategy than a method, focusing on the holistic nature of the case being studied, aiming to preserve and understand the wholeness and unity of the case. He defines a case study as "a phenomenon of some sort occurring in a bounded context. …, the case may be an individual, or a role, or a small group, or an organisation, or a community, or a nation. It could be a decision, or a policy, or a process, or an incident or event of some sort, and there are other possibilities as well". In many ways, this study fits into what Stake in Punch (2009) calls an instrumental case study, "where a particular case is examined to give insight into an issue or to refine a theory". It is also a single-case study that is 'considered unique, prototypical, salient, or revelatory to the understanding of a phenomenon or problem' (Scholz & Tietje, 2002:11). Further, it is also an 'embedded' case study in that it involves more than one unit or object of analysis, is not confined to qualitative analysis alone, and allows for a multiplicity of methods that may be applied within the sub-units.

A research case is studied also in light of, and in relation to its environment. My additional conception of this study is that it is an 'enhanced' case study because even though I concentrate on and analyse issues relating to one university, NUST, I also use data from other similar but obviously differently focused universities to enhance and enrich my understanding of the one case that is central to this study. The enhancing stories from the other universities are not complete for their own purposes, but they come into my court because they make the story of my central case more complete. The main data was collected from within NUST and from its collaborative partners in the industry. Within NUST, the larger numbers of informants were the students, the staff both at lecturing and administration levels, and partners of NUST in industry who were offering attachment places to NUST students. The original intention was to obtain

additional data from universities in neighbouring countries, but this was withdrawn because of limited financial and other resources.

I then come to the issue of what research procedures happen within a case study. Underlining the compatibility between case studies and action research, Scholz and Tietje (2002) state that many case studies are conducted in order to improve action and make better decisions. Yin (2003) distinguishes between single-case and multiple-case studies, advising that a single-case study is analogous to a single experiment, with many of the conditions that justify a single experiment also justifying a single-case study. Yin (2003:41-2) outlines the conditions for a single-case study which include the following:

- When it represents the critical case in testing a well-formulated theory
- When the case represents an extreme or a unique scenario
- When the case is the representative or typical case. Here the objective is to capture the circumstances and conditions of an everyday or commonplace situation. The lessons learned from these cases are assumed to be informative about the experiences of the average person or institution
- When the case is revelatory
- When the study is a longitudinal case

The single-case study method or strategy supports the use of multiple data collection methods within it if the population is small and the research objective is to investigate a problem that appears to be shared by a number of other equivalent cases. This could enhance the study on issues of applicability, generalisability and 'emulability' discussed later in Section 3.7.2.

3.3.2 Mixed methods research methodology

When viewed as methodologies, qualitative and quantitative research procedures have developed an intermediate between them over the years, the mixed methods approach. Mixed methods as a research methodology has found its place in research practice amid both enthusiasm and scepticism. The methodology has been developed and applied over many years as reported in the literature mainly to be used by those in the qualitative research methodology camp. Fitch (2005) uses the method to study outcomes of inter-cultural service learning with college students. Typically, a mixed method study

involves the collection and/or analysis of both quantitative and/or qualitative data in a single study in which the data is collected either concurrently or sequentially, is given a priority, and involves the integration of the data at one or more stages in the process of the research (Creswell et al., 2003). Enthusiasts such as Punch (2009:4) advocates for relaxing the qualitative-quantitative distinction, emphasising that neither approach is better than the other, both have their strengths and weaknesses, and that they can and should be combined as appropriate. He explains:

> …, rather than either-or thinking about the qualitative-quantitative distinction, or tire arguments about the superiority of one approach over the other ... the methods and data used (qualitative, quantitative or both) should follow from and fit in with, the question(s) being asked. In particular, qualitative questions require qualitative methods and data to answer them, quantitative questions require quantitative methods and data to answer them, and research that asks both qualitative and quantitative questions requires mixed methods to answer them (Punch, 2009:4).

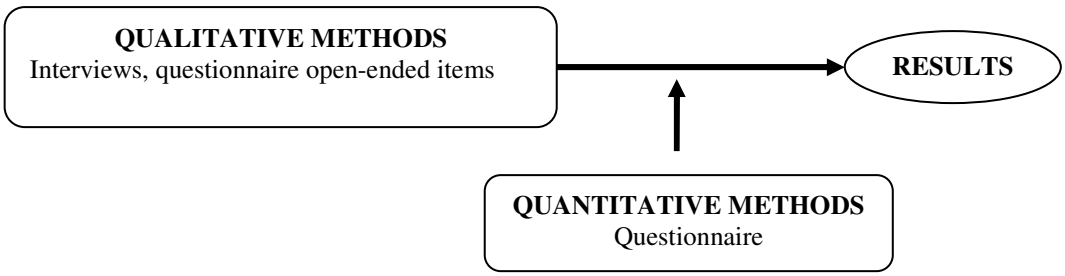


Figure 3.2: Mixed methods methodology model

The diagrammatic representation of the relationship between qualitative and quantitative aspects of a design and the results is shown in Figure 3.2. While the debate on whether or not to mix methods rages on, researchers have continued to use the technique and have tried to justify their choices in various ways. The observation by Bergman (2008) that the mixed method research design is one of the fastest growing areas in research methodology today might be encouraging to budding researchers.

3.3.3 The concurrent embedded mixed methods design

In this study I explore, investigate, describe, analyse and interpret the key processes and the accumulated accomplishments of the current industry-based learning (or industrial attachment) programme at the National University of Science and Technology as an exemplar for universities particularly in Zimbabwe, and more generally in Southern Africa and the rest of the developing world. Since mixed methods combine the

traditional aspects of qualitative and quantitative designs (Creswell, 2002) this study employs a concurrent embedded mixed methods design in data collection and analysis, using quantitative methods to identify practices considered useful by respondents, and using qualitative methods to critique and interpret phenomena on the perceptions, experiences and milieus confronting participants in industry-based learning. This confirms the dichotomous categorisation of inquiry into exploration versus confirmation (Denzin & Lincoln, 2005). Similarly the nature of inquiry is open, where I use both deductive and inductive reasoning in a continual cyclic fashion (Leedy & Ormrod, 2005).

The mixed method model used in this study is one in which quantitative methods (quan), are used to embellish a primarily qualitative (QUAL) study, giving the qualitative methods a greater priority over the quantitative, thus the use of QUAL(quan) in symbolic notation. This design is Creswell's (2003:226) concurrent embedded design (Figure 3.3). Data was collected essentially concurrently through interviews and questionnaires from the various selected participating groups and individuals at NUST and in the selected industry organisations (See also Tables 3.2 and 3.3). Additional qualitative views and data on comparable programmes were collected from other selected universities in Zimbabwe.

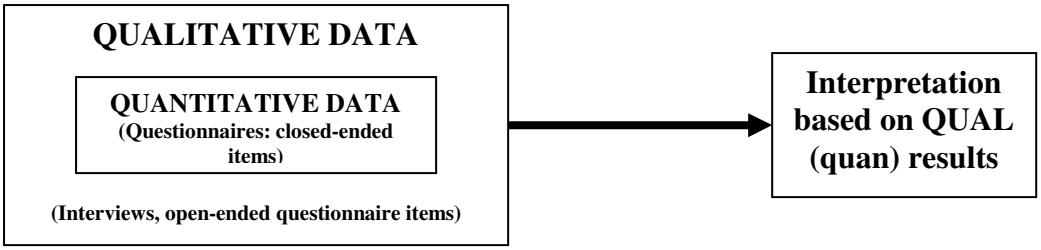


Figure 3.3 The embedded concurrent mixed methods research design
(Adapted from: Creswell & Clark, 2007)

Valo (2000:154) notes that the most common method of investigating work-based learning has been the satisfaction survey, but lobbies for the use of qualitative methods instead. He says that:

> Survey questions predetermined by the researcher tend to conceal students' own conceptions and schemata of the topic. Especially when investigating issues involved in experiential learning it is vital to capture the diversity of students' understandings of the essence of learning. Thus, research on the practicum should be carried out qualitatively and inductively, analysing students' individual experiences (Valo, 2000:154).

One underlying objective of this study was to gain new and in-depth perspectives on university industry-partnerships through industry-based learning and the inclusion of various industry players such as small- and medium-scale enterprises. Few studies address this area in any depth, yet it is a potentially important area for socio-economic development in developing countries. This study, too, only raises a few issues which may be a pointer to further research and investigation in future.

The qualitative portion of this study allowed for description, analysis and interpretation of phenomena and settings to give meanings that events had for the individuals who experience them (Lincoln & Guba, 1985). Interviews formed part of the *hermeneutic circle* of processes of developing arguments and conceptions based on experiences, thoughts and perceptions of partnership and learning by respondents. An ethnographic approach linking experiences and viewpoints or 'actors' perspectives' was preferred to a concentration on 'lived experience' rather than voice which can lead to an essentialist, romantic conception of inner meaning (Silverman, 2004:343). The qualitative aspect also allowed for gathering rich data from small samples which provided the 'thick description' of scenarios that fulfils the transferability criterion for judging the standards of qualitative research (Guba & Lincoln, 1989).

Table 3.2 Comparison of processes in qualitative and quantitative data

Qualitative Data	Phases in the Process	Quantitative Data
• Purposive sampling • Small number of participants	**Sampling procedures**	• Random sampling • Adequate samples (large)
• Central authority • Individuals	**Permissions needed**	• Central Authority (esp. children) • Individual informed consent
• Semi-structured interviews • Open-ended questions	**Information collected**	• Questionnaire responses
• Field notes • Voice recordings • Transcripts	**Recording the data**	• Data coding and capture • Data summaries
• Interview protocols • Interview environments	**Administering data collection**	• In large groups (classes) • Populated areas (streets)
• Vignettes and discourse	**Analysing the data**	• Statistical methods

Quantitative research methods (or methodology) include questionnaire surveys and experiments, which employ measurements, statistical analysis and interpretation of significant amounts of collected data. The strength of quantitative methodology lies in

its solid and objective nature that gives it 'an aura of scientific respectability' (Denscombe, 2003:236). However, the quantitative research methodology is not always the most suitable for many contexts and themes in social science studies. For a number of studies including this one, a combination of both the qualitative and quantitative techniques (mixed methods) has been found suitable (See Table 3.2). Mixed method research design is discussed in more detail below.

3.3.4 Limitations of mixed methods research

Research is a largely contested academic activity and the processes of research rarely sail through without one form of censure or other. Mixed methods is a comparatively recent methodology, having been brought into being after many years of separate and competing positioning of the two broad categories (or paradigms) from which it is composed: qualitative and quantitative. It must have taken time and effort to compose a credible hybrid to convince opposing sides to accept the proposition to merge, and to win new researchers who were prepared to put the new methodology to use.

One of the most discernible criticisms against a research study using mixed methods is that its rigour does not easily lend itself to be judged using one set of standards as in the traditional sense. When asked whether a mixed methods research study is valid or not, one has to split the qualitative and the quantitative dimensions used and test them separately before claiming that the research is a valid exercise. As an example, whereas representativeness and generalisability are central to quantitative portions of the study, they are not applicable to qualitative portions, which utilise credibility and transferability instead. To minimise this limitation in this study, a hybrid set of standards as described in the literature (Onwuegbuzie & Tedlie, 2003; Creswell & Clark, 2007; McNiff & Whitehead, 2006, etc) is used. I used concepts of legitimacy, in which both quantitative questionnaire responses and qualitative interviews were recorded and could be traceable to the respondents (without any risk to them). I also used transferability, in which data items for either one respondent (qualitative) or many (quantitative) could be adapted or personalised to other respondents not sampled.

Even with using hybrid criteria for determining the trustworthiness of a mixed methods research, there still remains the possibility of under-rating one dimension against the other. My study had the quantitative dimension with a lower priority than the qualitative,

and the quantitative was embedded in the qualitative data. It was common for me in the construction of questionnaire items, for instance, to overshadow the quantitative part and instead ask questions that would need more probing and follow-ups if a certain response of great interest arose. Questionnaire respondents are very difficult to follow up individually unless special measures have been put in place at the very onset, or unless the respondents are few in number, or tightly controlled, which then defeats the purpose and diminishes the authenticity of quantitative inquiry. I partly dealt with this by using respondent triangulation within NUST and between NUST, industry and other universities (Figure 3.4).

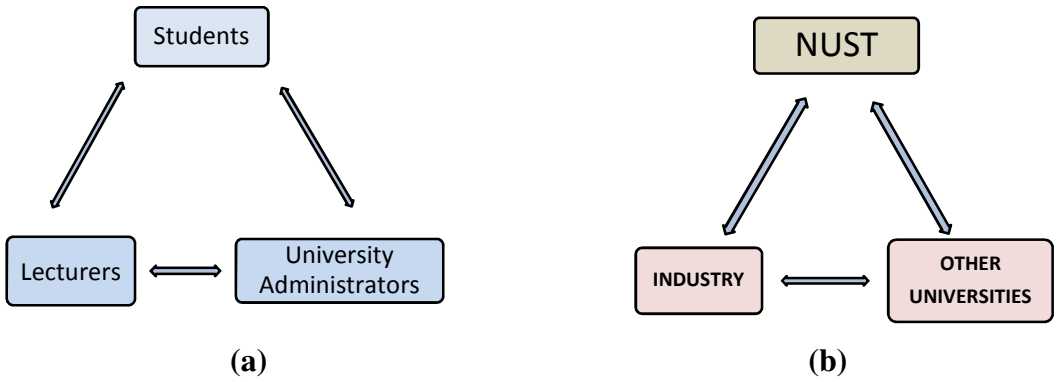


Figure 3.4: Respondent Triangulation (a) within NUST and (b) between different locations

I also enhanced the credibility of the data obtained by using two methods of data collection, that is, questionnaires and interviews. The combination of different methods of data collection, multiple respondents from both within NUST and outside produced a crystallisation of data sources which attempted to address the limitations of the mixed methods approach used in this study.

3.4 Population and Sample

The population for the study consists of three groups of members of the NUST community comprising students, teaching staff and university administration on the one hand, and industry-based supervisors of students in selected workplaces in the private and public companies that play host to NUST students on workplace-based learning, whether they be large-, small- and medium-scale, in urban and rural settings on the other. Table 3.3 gives an indication of the categories of respondents.

The selection of respondents was a combination of probability and non-probability sampling techniques, depending on the number of respondents chosen. In the norms of

qualitative research methodology, 'maximum variation sampling', a non-probability strategy, can yield detailed descriptions of visibly divergent cases and phenomena, yet also identifying any shared patterns that cut across those cases (Lincoln & Guba, 1985). I have used probability sampling where the selection was between homogeneous respondents, and non-probability sampling where prospective participants varied considerably.

Table 3.3: Proposed Participants and Respondents

Location	Designation/Office	Estimated Population	Target Sample	
			Questionnaire	Interviews
NUST	**Management**			
	Director Technopark	1	-	1
	Industrial Liaison Officer	1	-	1
	Director Research and Innovation Office	1	-	1
	Deans of Faculties	5	-	2
	Teaching Staff (Practitioners)			
	Department Chairpersons	30	20	5
	Lecturers	140	70	5
	Students			
	Final Year students	750	500	-
Industry	**Company Industrial Attachment Supervisors**	300	150	5
Other Universities	**University Administrator and/or Practitioner** involved in industry-based learning/per university	22	-	5

Purposive and convenience sampling were combined for selecting participants for the interviews, namely eight NUST administrators considered suitable for interviews, comprising the Director of the NUST Technology Park (Technopark) who is the key university officer in developing the university partnerships with industry, his subordinate, the Industrial Liaison Officer, The Director for Research and Innovation, and five deans of faculties using the mode of industry-based learning under study. Around 40 practitioners, i.e. chairpersons of departments and/or their departmental lecturers-in-charge of Industrial Attachment were identified for interviews, and convenience sampling was done to select a sample of 10 from these. For the industry interview participants I obtained from the Industrial Liaison Office a list of companies currently involved with attaching NUST students. The Industrial Liaison office could only give a rough estimate of about 150 companies involved at the time of enquiring. I made telephone calls to as many companies as possible on the list in various cities of the country, with the target of interviewing a maximum of five industry supervisors.

Eleven other universities in Zimbabwe were identified as potential data providers and letters of request to conduct interviews were sent to a purposively sampled seven of these that, like NUST, had commercial-, science-, technology- and engineering-related programmes in their curricula, and were using the full-year industrial attachment format.

For the quantitative data about 500 of about 750 registered students in their final year at the time of data collection were targeted for responding to the student version of the questionnaire and all of about 170 practitioners (i.e. lecturers and chairpersons of departments) were included in the sample. An estimated 300 industry supervisors were targeted for answering the industry version of the questionnaire and 100 copies were mailed with self-addressed and stamped envelopes for return.

3.5 Data Collection

To address the research question and sub-questions on the needs of various respondents, perceptions of their roles, practices and aspirations, and of their personal and organisational transformation in their current practices, the various research methods cited earlier employed the standard data collection methods and instruments in qualitative and quantitative research found in the literature. For interview data, opinions and views were captured through audio recording as well as note taking. Questionnaires were used with groups of students because of the larger numbers involved to give wider views. The design of questionnaires was done with the assistance of a statistician and a consultant at the University of Pretoria's Department of Statistics that provides research support to postgraduate students and academics.

I made telephone calls, often repeated, to randomly selected chairpersons of eligible departments requesting for interviews with either the chairperson personally or the lecturer-in-charge of Industrial Attachment in their departments. I went on and made appointments with the first ten available, making sure there was at least one from each participating faculty. Administrators and practitioners who agreed to an appointment were given the letter (Appendix II) introducing myself and my research.

Some success was achieved in securing appointments with companies in my resident city, Bulawayo, but telephone calls to outside cities were extremely difficult to make. For all successful calls in and outside Bulawayo, securing an appointment became a further hurdle for the identified potential respondents who gave many reasons including work pressure and unavailability during the proposed period for the interviews. I was able to travel to the workplaces of those who accepted the request for interviews. Prospective respondents were given the consent letter to organisations (Appendix III), requesting for permission to interview supervisors of students on the theme of industry-based learning, and the letter indemnifying them and protecting the data they would supply (Appendix IV).

For interviews in other universities I identified 11 universities practising industry-based learning, and I targeted any administrators and/or practitioners connected with industry-based learning, and who would be made available to me. I sent by post letters of request to carry out the interviews (Appendix V) to the registrars of these universities, giving the approximate dates on which I would be able to visit them.

3.5.1 Research instruments

Two instruments, namely the questionnaire and the interview, were used in this research study to capture both the qualitative and quantitative aspects of the study. The details of the development and administration of these instruments are explained below.

3.5.1.1 The Questionnaires

The questionnaire method is a fundamental and universal one, particularly for quantitative studies and other surveys. Indeed, questionnaires are probably a much over-used research technique because they are assumed to be easy to construct, a fallacy in the sense that what is true is that they are easy to construct badly (Gillham, 2000:78). In practice a researcher can either create his or her own original questionnaire or obtain one from off the shelf or published questionnaire, usually referred to as a scale or inventory. Bringle, Phillips and Hudson (2004:25) have provided a rationale for using research scales in general and using published or existing scales in particular. They have also published descriptions and samples of over forty different scales in the area of service learning developed and applied in the United States, and covering factors such

as motives and values, moral development, self-concept, student development, attitudes, and critical thinking. While not writing off the possibility and the temptation by novice researchers to develop their own scales, they show preference for published ones, and they write:

> Using existing scales has many advantages over developing original scales. Existing scales take less time to incorporate into research, are usually prepared by researchers who have professional expertise, may have norms available against which a particular sample can be compared, and have a known record of psychometric qualities (although these may vary from sample to sample).

It is to be noted that existing scales may be modified, usually with permission of the author(s). The modification is an attempt to adjust the pre-existing scale to suit a particular research context or question associated with identified respondents. For a learner researcher, adapting a scale appears to offer the advantage that most of the work has been completed and the resulting scale may be more appropriate than an original scale crafted specifically for the research at hand. Modifying a scale, however, runs the risk of changing a known quantity in unknown ways (Bringle, Phillips, and Hudson, 2004:25). The option of developing one's own original questionnaire is often reached when one analyses the other options above and finds them unsuitable. (Bringle et al., 2004:25) further write:

> Developing an original scale allows the researcher to design a scale for a specific need. However, developing a new scale takes time and resources (e.g. literature review, pilot testing), requires knowledge of scale development procedures, and runs the risk that the result may not be a good scale. The rudiments for scale construction are found in the nature of construct validity. Constructing a good scale requires articulating a clear theoretical statement for the construct, delineating the content domain, evaluating the uni-dimensionality and factor structure of a preliminary pool of items, and obtaining evidence of construct validity.

3.5.1.1.1 Questionnaire construction and design

This study has employed three matched versions of the same questionnaire for three groups of respondents: one version each for students, university lecturers and industry supervisors. I chose to develop my own questionnaire because the existing ones that I gleaned in the literature did not appear to answer my research question or sub-questions adequately. I wanted to address particular questions relevant to my line of enquiry in my study in a way different from the published scales. Also I wanted to develop my own skills of developing a research instrument, such as a questionnaire, and I leaned on the expertise of my research promoter and statisticians for guidance in this.

I developed the student version (Appendix V) of the questionnaire first, working progressively on the questionnaire items derived mainly from the research question and sub-questions (See Table 3.4). In the end I would use the student questionnaire as a base to convert most of the items on the lecturers' and industry staff questionnaires accordingly to match those on the student template. The objective of this was to compare the congruence of opinions and views obtained from the three groups of respondents.

The questionnaire was administered anonymously to all the respondents. It is divided into two sections: Section A for background information on the respondent, and Section B for information pertaining to the theme of the study, i.e. industrial attachment (or industry-based learning). The overall questionnaire required five types of response in different item categories: select and mark the appropriate option (items 1 – 6 and 33), a 4-point Likert scale (items 7 – 25), Yes/No (items 26 – 31, 34, 35 and 36), ranking (item 32), and open-ended responses (items 33-37).

Items 1 to 6 in Section A of the students' version of the questionnaire solicited information on selected background attributes of students such as faculty, year of study, age, gender and work experience prior to enrolling at university. The same section on the lecturers' version (Appendix VI) solicited information on their faculty, year levels of students they taught, age, gender, and previous non-educational working experience; the industry staff's version (Appendix VII) sought information on the organisation's location, sector, size and type of business as well as sources of industrial attachment students and preferred duration of student attachments in their companies. The response type in Section A was to select and mark the appropriate option.

Section B consists of four groups of item that are matched in the three versions of the questionnaire. These groups of questions are an attempt to 'vary the type and length of questions as variety provides interest' (Dawson, 2009:97). The largest group consisting of items 7 to 25 makes use of the 4-point Likert scale response type with the following response choices and codes:

1 – not at all; 2 – slightly; 3 – moderately; 4 - greatly

Items 26 to 31 and the first parts of items 34, 35 and 36 employed the dichotomous yes/no type of response, itself a type of two-point Likert scale but of the nominal or categorical scale of measurement. Item 32 required respondents to rank and indicate the top three choices, with the provision to add more options if desired. Item 33 is another select and mark, while the second parts of items 34 to 36, and item 37 are open-ended response types, requiring respondents to write responses in their own words.

3.5.1.1.2 Choice of Likert scale

In choosing the number of response choices in the Likert scale for items 7 to 25, a consideration of the literature and consultation with contemporary researchers revealed a diversity of opinions based on their experience and subjective judgements. The question was: Should I use few (two, three or four) or many (six, seven) choices, and should I make use of an odd or even number of response choices, giving the respondent an opportunity to offer a neutral response or not? Anderson (1998) concedes that the Likert scale is one of the most useful question forms in eliciting vital grades of information from respondents using a questionnaire. In its most popular form the respondent is presented with a sentence and is asked to agree or disagree, usually on a three, four, five, six or seven-point scale. Anderson (1998) notes further:

> While Likert scales can have many response points (three to seven being most common), a 5-point scale is the most practical for most common purposes. It is easy to respond to, straightforward to analyse, and sufficient for most needs. Young children, however, are more comfortable with a 3-point or even a two-point scale. The issue of whether or not to have a neutral mid-point is often debated. I lean to having a neutral position for two reasons. Without one, some people will leave the item blank or mark a mid-point anyway, and second, research has shown that the proportion of people responding to non-neutral positions when there is no neutral position is similar to the proportion so responding when there is a neutral point and the neutral responders are discarded.

DeVellis (2003) reports that a common practice is to include six possible response options; “strongly disagree”, “moderately disagree”, “mildly disagree”, mildly agree”, “moderately agree,” and “strongly agree.” These form a continuum from strong disagreement to strong agreement. A neutral point can also be added. Common choices for a midpoint include “neither agree nor disagree” and “agree and disagree equally”. It would appear to me that choices based on the foregoing would require clear understanding and control of the English language, something that cannot be taken for granted especially with younger respondents of first language other than English. Lewis-Beck, Bryman and Liao (2004:573) writes:

> There has been some debate with bipolar scales about whether there should be an odd number of response choices with a neutral response in the middle (e.g. neither agree nor disagree) or an even number without the neutral response. Those advocating an odd number argue that one should not force an ambivalent person to make a choice in one direction or the other. Those advocating an even number point out that the neutral response is often misused by respondents (e.g. to indicate that the item is not applicable) and that it may encourage people to be non-committal. There is generally little practical difference in results using even or odd numbers of response choices.

Gray et al. (2007) concur that usually Likert response formats contain between three and seven alternatives as more choices might be confusing to subjects and also probably futile because there is a limit to the subtleties of opinion that people have, or think they have. The number of categories for responses should always reflect as closely as possible the estimated or expected variation in the answers to be given. The choice of answer format can be difficult. If the range of answers is too restricted, information loss may result; on the other hand, generating a large number of response options that are not chosen does not usually add much to what we know about the respondents. Teddlie and Tashakkori (2009) underscore the tendency to go for the 5-point scale:

> The traditional Likert scales are 5-point scales with a variant of 'neither agree nor disagree' as the midpoint of the scale … Some researchers prefer 4- or 6-point scales because there is no neutral option.

Maree (2010) says that, to his knowledge, there is no one single or prescribed format in the literature or at the University of Pretoria; it is a matter of choice of the researcher, as long as the scale suits the needs of the researcher. For my questionnaire in this study my supervisor and I in collaboration with the statisticians involved agreed to settle for a 4-point scale.

3.5.1.1.3 The Content of questionnaire data

As stated earlier, section A of the questionnaire sought for general and biographical data from all the three groups of respondents. The content or substance of the items in Section B of the three versions of the questionnaire is to answer research sub-questions of the study (see Table 3.4).

Items 7 to 31 were created to answer the first sub-question: (*a)(i) To what extent has the NUST brand of industry-based learning been jointly perceived as significant in enhancing quality academic practices in university teaching and learning by participating students, lecturers and industry supervisors?* In these 25 items, seven factors indicating quality practices in teaching, learning and research were identified

and anticipated, namely, curriculum coherence (CC), active learning (AL), self-directed learning (SDL), cooperative learning (CL), learning styles (LS), assessment processes (AP), and learning processes (LP). The open-ended item number 37 would also provide the opportunity for those respondents who wanted to add more information to address sub-question (a)(i).

Table 3.4: Research data collection matrix

	Research Questions/Sub-question	Sources of data	
		Questionnaire Items	Interviewees
a)	***What understanding do participating students, lecturers and industry supervisors wield on the nature and quality of academic practices realised through industry-based learning at NUST?***		
a)(i)	*To what extent has the NUST brand of industry-based learning been jointly perceived as significant in enhancing quality academic practices in university teaching and learning by participating students, lecturers and industry supervisors?*	7 – 31, 37	NUST Lectures
a)(ii)	*How do the participants' views on the potential for, and the achievement of, research-driven learning and learning-focused research and development (R&D) in the current industry-based learning format indicate concern for an effective university service?*	37	NUST Lecturers and Management
a)(iii)	*How is the proposed and developed model for university-industry engagement conceived by lectures as a contributor to sustainable transformative learning and mutual benefit to both partners?*	36,37	NUST Lecturers
b)	***How do the views of participants inform analysis of the local relevance and impact of university education on national socio-economic development?***		
b)(i)	*How does the perceived value added by industry-based learning indicate an upturn on the traditional and prevailing modes of university teaching and learning, as well as on the subsequent performance of graduates in the workplace?*	37	NUST Lecturers and Management
b)(ii)	*What contributions are perceived to be attributable to industry-based learning in knowledge growth and holistic economic development of the country?*	32 – 35, 37	NUST Lecturers and Management
c)	***How do opinions shared between NUST and other Zimbabwean universities engaged in industry-based learning indicate awareness and personification of qualitative, relevant and responsive university education suitable for a developing country?***		
c)(i)	*What motivations have popularised the NUST brand of industry-based learning among sister universities and why?*		NUST Staff Staff of other Universities
c)(ii)	*What quality academic practices are expressed and how do they signify goal-directed university education?*		NUST Staff Staff of other Universities

Some of the open-ended responses to item 37 were also expected to answer the second research sub-question: (*a)(ii) How do the participants' views on the potential for, and*

the achievement of, research-driven learning and learning-focused research and development (R&D) in the current industry-based learning format indicate concern for an effective university service? This sub-question was going to be addressed mainly during the interviews.

Research sub-question (a)(iii), which seeks information on the proposed model and changes and improvements of the current industrial attachment system was partially answered by questionnaire item number 36, as well as the open-ended item number 37. The research sub-question reads: *(a)(iii) How is the proposed and developed model for university-industry engagement conceived by lecturers as a contributor to sustainable transformative learning and mutual benefit to both partners?*

Sub-question (b)(i) is partially addressed by the open-ended questionnaire item number 37, but most of the information would come from the interviews. The sub-question reads: *(b)(i) How does the perceived value added by industry-based learning indicate an upturn on the traditional and prevailing modes of university teaching and learning, as well as on the subsequent performance of graduates in the workplace?*

Sub-question (b)(ii) reads: *What contributions are perceived to be attributable to industry-based learning in knowledge growth and holistic economic development of the country?* Questionnaire items 32 to 35 both closed-ended and open-ended sections, as well as item 37 would answer this question.

To conceptualise the contribution of both the questionnaire and the interviews in answering the research questions and sub-questions and to indicate the sources of data, Table 3.4 has been constructed. The table shows the instruments and the respondents that addressed each particular research sub-question.

The development of the student and lecturer versions of the questionnaire took place in a series of iterative steps between me and my supervisor in the initial stages with items being drafted and revised. Finally the questionnaire was referred to statisticians at the Department of Statistics. The qualified statisticians recommended further amendments to some items in a bid to improve them to reduce ambiguity and so that the responses would be easily captured by the computer packages that would be used. While the

original idea had been to have only two versions (student and lecturer) of the questionnaire, the statisticians advised the development and inclusion of the industry supervisor version as well.

3.5.1.1.4 The Pilot testing of the questionnaires

When the questionnaire (student version) had passed the content checks and had achieved the desired structuring and wording format, it was administered to a small sample of a population similar to the target population, i.e. the final year NUST students who had returned from their prescribed industrial attachment in mid- to late 2009. These students were one year ahead of the target group. Some of the objectives of administering the pilot questionnaire were to do the following:

- Identify items that were ambiguous or unclear to the respondents
- Identify language errors and inaccuracies
- Estimate the reliability and validity of the questionnaire
- Give an indication of the nature of responses and subsequent data analysis

The results of the pilot test provided the grounds for rewording and restructuring some of the initially created items, such as item 32 which was altered from requiring an open-ended list to providing the top three ranked options. There was room for adding more options to the suggested responses.

3.5.1.1.5 The administration of the questionnaire

Permission to start the data collection within the university was sought through the University Registrar and this was granted (Appendix XIII). The timing of administering the questionnaires to the target students and the lecturers coincided with a time when there were unanticipated alterations to the normal academic calendar of the university and many programmes were running behind schedule by close to three months. Because of the prevailing harsh economic situation in the country at the time, many of the students were visibly not in attendance in their classes since they had to juggle between attendance and going out looking for money for tuition and other fees as well as for general living expenses.

With permission from the university granted, I proceeded by verbally asking permission from my colleagues, Chairpersons of departments and from Deans of Faculties where it

was necessary to access both the students in their classes and the lecturing staff. The ultimate permission was sought from the individual lecturers who had accepted to participate and whose lecture time slots were to be used to distribute or even to administer the student questionnaire.

- *Questionnaire to students*

The estimated population of about 750 registered final year students in five different faculties targeted for responding to the student version of the questionnaire was scattered in different departments. These were the students who had just returned from their industrial attachment in the previous academic year and who were in their final year to complete their degree programmes. The majority of those were in the faculties of Applied Sciences, Commerce, Communication and Information Science and were in their fourth year while those in the faculties of the Built Environment and Industrial Technology were in their fifth year.

All 750 odd students were targeted as the sample for questionnaire administration, thus a census. This was done so that the numbers of respondents could be reasonably large. Once a period of about a week to a fortnight had been earmarked for questionnaire administration, a working schedule was drafted for the orderly administration by class. With the first scheduled classes I handed over the appropriate numbers of questionnaires to chairpersons of departments from whom I would later collect the completed questionnaires. However, on noticing the very poor or nil returns that followed from this arrangement, I proposed and proceeded further by requesting for time (the first 15 to 20 minutes of a lecture) at specified and agreed timetable slots to administer the questionnaires to the classes. This worked better although there still were some students who would come late into class, thus missing the questionnaire administration. I also missed completely some classes whose lecture time-slots had been re-scheduled or had their lecture venues changed.

Most students were willing to fill in the questionnaire while I waited but there were instances where students specifically asked for more time to study the questionnaire after class to respond at a later time. Noticeably, the majority of these did not return their completed questionnaires to me. Thus it was very difficult to obtain a high return rate of the questionnaire. I noted that sometimes, even when I waited for the

questionnaires, there were some students who opted not to fill them in, withholding them or handing them back to me blank, usually avoiding being noticed. I accepted this as a manifestation of their freedom to choose whether to participate or not to participate in my research.

The normal procedure with each class of students was to start by explaining briefly the objectives of the study, moving to the contents and the structure of the questionnaire. In this I would alert them of the cover letter (Appendix V) which spelt out their right to participate voluntarily and to withdraw at any time when they felt like it. In a few cases students sought further clarification to some items in the questionnaire which they said they were not sure about.

- *Questionnaire to lecturers*

The lecturers are the university staff members directly involved in the planning, implementation and assessment of student industrial attachment, interacting with the students and with industry personnel each year for different groups of students. The chairpersons are partly administrative officers in the university's organisational structure, but they perform most academic duties in much the same manner and frequency as the lecturers they supervise in their departments. For purposes of the questionnaire administration I have treated chairpersons and lecturers as one group, designating them the practitioners. Among this group were teaching assistants, who are basically learner lecturers so to speak. A number of departments have had a substantial complement of teaching assistants in their establishments, doing lecturer duties, largely due to the prevailing academic staff shortage in some disciplines caused by the brain drain. I specifically requested chairpersons to include in the questionnaire distribution only those lecturers and teaching assistants who had been practically involved in the conduct of industrial attachment through participation in the key processes that included preparation of students, follow-up visits to industry, assessment of students' written and oral reports, processing of student results and overall student assessment. These would have experience of the type of information I needed in the questionnaire

The estimated population of the category of practitioners, i.e. chairpersons, lecturers and teaching assistants eligible for responding to the lecturer version of the questionnaire was about 170. Thus there was no sampling as I had prepared enough questionnaires for

all of them. Questionnaires were handed out to chairpersons or their department secretaries for distribution to eligible lecturers and teaching assistants, and in a few instances they were given directly to the individual lecturers. I would personally make follow-up queries and reminders by telephone or physically visiting some of the practitioners in their offices.

- *Questionnaire to industry supervisors*

It was difficult at the time of collecting data to establish the accurate number of all industry organisations involved in attaching students at different locations around the country. Estimates were put at around 150 for practical purposes.

The first step I took was to approach the director of Technopark who agreed to take copies of the questionnaire to administer at scheduled meetings, seminars and conferences of organisations that brought together representatives of commerce and industry such as the Zimbabwe National Chamber of Commerce (ZNCC) and the Confederation of Zimbabwe Industries (CZI). We relied on our knowledge that among those attending those meetings were supervisors of some of students on industrial attachment in their organisations. This strategy, however, did not produce any positive results; none of the questionnaires were filled in.

I later mailed 100 questionnaires to 50 handpicked companies around the country, in and outside my resident city, Bulawayo, from a list given by the Industrial Liaison Office. In Bulawayo and the surrounding areas, I hand-delivered questionnaires, in many cases requesting respondents to respond while I waited. Only a few agreed to this request, promising to look at the questionnaires later.

For some key companies in the main cities other than Bulawayo which attached groups of more than one student in their different departments, I took extra questionnaires with me when I went around on my visits to universities and hand-delivered questionnaires to workplaces I could access in the limited time at my disposal.

3.5.1.1.6 The Quality of Questionnaires

The questionnaire used in this study was constructed during and for this particular study. As stated before, such an instrument has never been put to the test and its potency

and weaknesses were not known. However, some measures were taken during the construction to ensure quality. The instrument is not significantly different, except in specific content, from similar ones that have been developed and used elsewhere.

- *Validity*

The format and structure (face validity) of the questionnaire used in this study were developed using samples provided by the university and by referring to the literature as well. In terms of content, the three versions of the questionnaire went through iterative processes of drafting and revision before being released for administration to ensure compliance with accepted norms and standards. Part of the revision was to address the language and the intended meanings of statements and questions. In the process of instrument construction, I sought and made use of advice from experienced and knowledgeable people such as my supervisor and the statisticians from the Department of Statistics, all this on top of the lectures, research support sessions, meetings and seminars that I attended as a postgraduate student working towards producing an acceptable research product. At the stage of verifying whether all the questionnaire items would be analysable using computer programs, we held a joint discussion with my supervisor and the statisticians reviewing each item to ascertain its inclusion in the questionnaire in the light of the research questions and sub-questions as well as the objectives of the research study.

The pilot testing that I carried out was partly an attempt to assess whether a small sample of respondents would interpret the questions in the intended manner, and that it was giving the results I desired, thus consolidating its validity. If the pilot questionnaire had produced unexpected results, it would have had to be revised.

- *Reliability*

Validity is a function of reliability; in other words, an instrument is valid only if it is already reliable, but not the other way round. Reliability is about consistency in giving the same results if an instrument were to be administered many times, theoretically to the same respondents, assuming one administration does not affect responses in the next. In practice with human beings, it is not possible to administer an instrument to the same group repeatedly without experiencing maturation or other accretion effects. In this study, the consistency or replicability of the questionnaire as a quantitative data

collection tool was enhanced in large measure by the same validity checks discussed above. It was not feasible in the available time to subject the questionnaire in this study to the documented reliability checks such as the test-retest, equivalent-form and split-half approaches (Goddard & Melville, 1996:46). However, the fairly rigorous measures taken as well as the different people involved in drafting and redesigning it are a good reason for my confidence in the questionnaire reliability.

3.5.1.1.3 Objectivity

The objectivity criterion for quality in an instrument such as a questionnaire is often partly addressed by reliability. Objectivity may be viewed as consistency of meaning, to various people or to the same person at different times, allowing the instrument to be uninfluenced by whoever is using it or is being subjected to it, their personal beliefs and feelings. I am confident that my questionnaire could be administered by anyone as competent as myself, and that it could be administered on any respondents comparative to those who participated in my study. This was partly made use of in the pilot testing.

3.5.1.2 Interviews

Alongside observation, discussion, record reviews and others, interviews are the most common data collection techniques in qualitative research studies. The rationale, principles and the types of interview for different types of research methodology are widely documented in the literature both peripherally and in depth (for example Gillham, 2000; Rubin & Rubin, 2005; Dawson, 2009; Silverman, 2006; Flick, 2006). I explain below those procedures that I went through in the use of interview as one of the data collection techniques in my mixed methods study. To the extent that interviews focus on the few selected questions or topics under discussion, they provide depth and detail which constitute the 'thick description' rooted in the interviewees' first-hand experiences that make up the material that researchers gather and synthesise (Rubin & Rubin, 2005).

I have taken an interest in what Rubin and Rubin (2005) call 'responsive interviewing', which is what they term an approach to depth interviewing research. They have this to say about it:

> The responsive interviewing model relies heavily on the interpretive constructionist philosophy, mixed with a bit of critical theory and then shaped by the practical needs of

> doing interviews. The model emphasises that the interviewer and interviewee are both human beings, not recording machines, and that they form a relationship during the interview that generates ethical obligations for the interviewer. In the responsive interviewing model the goal of the research is to generate depth of understanding, rather than breadth (Rubin & Rubin, 2005:30).

This was the cornerstone of my approach to the interviews: that it encouraged the respondent to discuss freely issues based on the trust that was allowed to build up between us. It was apparent that with responsive interviewing, the design of the research remained flexible throughout the project, regarding the timing, the structuring and the administration of the interviews. The flexibility of the research referred to also includes the needs for interview follow-ups, redesigning instruments, et cetera. Dawson (2009) says that for qualitative data the researcher may analyse as the research progresses, continually refining and reorganising in the light of the emerging results.

3.5.1.2.1 Constructing the interview schedules

Like the questionnaires, my interview schedules (or interview protocols) for the various targeted interviewee categories were designed to contribute to the answering of the key research question and sub-questions.

The interview questions were developed and then incorporated into a one-page report template or summary form which would be used for each interview. The top part of the template was designed to record information about the interviewee, namely the name, place where interviewed, date and time of interview, the interviewer and information on the location of the voice-recordings. This would assist with any follow-ups on the data providers.

The interview schedules for the various categories of respondents contained between five and nine basic open-ended questions serving as the guideline for the semi-structured interviews requiring open-ended responses. According to Max Bergman (2008), open-ended questions reflect the interviewee's conceptions while closed-ended questions reflect those of the interviewer. In the actual interview, the questions were asked not necessarily word for word as given in the interview schedule, and they were posed to different respondents not necessarily in the same sequence. This was due to the responses provided by the respondents that sometimes necessitated that a later scheduled question be brought forward to link quickly with a point or points raised by

the respondent in response to an earlier question. Discussions with the interviewees prior to the main interview would have some effect on the recorded interview.

The last question posed to all the respondents was a request to add their own information on anything within the research topic, whether discussed earlier or not. Semi-structured interviews allowed respondents the freedom to expand and provide open-ended responses to the depth that they wished and allowed me to probe interviewees further or seek explanations where I thought necessary. Through expanded and open-ended responses, interviewees would reveal the depth of their knowledge or opinions about the things they were talking about. These 'thick descriptions' would then provide me with the opportunity for analysis of espoused opinions and perceptions around the topic and the research questions.

Semi-structured interviews are a very important form of interview in a case study. In their simplicity, they allow for rich data, with tremendous flexibility whose 'naturalness' rests on a clear structure, carefully developed and practised (Gillham, 2000:65).

- *Interview schedule for NUST management staff*

The interview schedule (Appendix VIII) for this category of respondents was primarily meant for the category including the director of Technopark, the director of Research and Innovation Office, the deans of faculties, and chairpersons of departments. The chairpersons, whose functions overlap very closely with those of lecturers or practitioners, were included in this category this time because they form the foundation of university administration and most of them have been in the university a long time. In the questions I asked them I was interested in how they bring in issues of quality in academic practices on their own without my asking them that directly. After initially administering the schedule and noticing from the early respondents that some areas such as research were not being addressed in depth, and that most respondents were not adequately bringing up the comparison between traditional degree programmes and the current NUST model, the interview schedule was modified for the Director of Research and Innovation.

The interview questions 1 to 3 required the respondents to recount the trends and challenges they had so far experienced and perceived with the industrial attachment exercise in their respective capacities in the university. They were to address this in comparison with other universities locally or internationally. In this I would expect the administrators to reveal their understanding on one angle of how the exercise contributes to university missions and objectives. This was expected to answer in full or in part research sub-question (a)(i) which reads: *To what extent has the NUST brand of industry-based learning been jointly perceived as significant in enhancing quality academic practices in university teaching and learning by participating students, lecturers and industry supervisors?*

Questions 3 to 5 were also expected to address research sub-question 1.3 which reads: *How is the proposed and developed model for university-industry engagement conceived by lectures as a contributor to sustainable transformative learning and mutual benefit to both partners?*

Questions 6 and 7 sought to obtain views of administrators on the relevance of the graduates from the NUST industry-based learning background, as well as the views of respondents on the involvement of small and medium-scale enterprises (SMEs), thus addressing research sub-question (b)(ii): *What contributions are perceived to be attributable to industry-based learning in knowledge growth and holistic economic development of the country?*

The modified version of the interview schedule (for the Director of Research and Innovation) addressed specifically sub-questions (a)(ii) which reads: *How do the participants' views on the potential for, and the achievement of, research-driven learning and learning-focused research and development (R&D) in the current industry-based learning format indicate concern for an effective university service?* and (b)(i) which reads: *How does the perceived value added by industry-based learning indicate an upturn on the traditional and prevailing modes of university teaching and learning, as well as on the subsequent performance of graduates in the workplace?*

The final question or request in the interview schedule was the open-ended offer for the respondents to add any other points or ideas they wanted. This allowed for views which

would answer any of the research sub-questions and also to gauge the respondents' passions and strengths of their views on the research topic.

The question on the proposed model, which would answer sub-question 1.3, was inadvertently left out of the interview schedule for administrators. However, the question was posed to some of the respondents.

- *Interview schedule for NUST lecturers*

There were overlaps between the questions for this category and the one for administrators described above. For instance, questions 1 to 5 on the lecturer interview schedule (Appendix IX) sought to address research sub-question (a)(i) which reads: *To what extent has the NUST brand of industry-based learning been jointly perceived as significant in enhancing quality academic practices in university teaching and learning by participating students, lecturers and industry supervisors?* Answers to questions 1 to 5 related to the nature and quality of student learning and were meant to reinforce corresponding quantitative data obtained through the questionnaires.

Question 6 required respondents to expound on the benefits that local and participating industry were obtaining from the industry-based learning, and this sought to find out how the issue of research was being brought out, thus answering research question (a)(ii): *How do the participants' views on the potential for and the achievement of research-driven learning and learning-focused research and development (R&D) in the current industry-based learning format indicate concern for an effective university service?*

Question 7 and 8 were similar to those posed to administrators on the relevance of graduates to developing Zimbabwe's needs and particularly how the industry-based learning affected SMEs as part of the country's economic development vehicles alongside bigger companies.

Question 9 addressed the proposed three-tier model, i.e. research sub-question (a)(iii): *How is the proposed and developed model for university-industry engagement conceived by lecturers as a contributor to sustainable transformative learning and mutual benefit to both partners?*

- *Interview schedule for industry staff*

The interview schedule for industry supervisors (Appendix X) contained six questions as well as an open question where respondents could add any points they wanted. Questions 1 to 4 were meant to answer the research sub-question 1.1: *To what extent has the NUST brand of industry-based learning been jointly perceived as significant in enhancing quality academic practices in university teaching and learning by participating students, lecturers and industry supervisors?*

Additionally, question 4 would also partly address the research aspect in sub-question 1.2: *How do the participants' views on the potential for and the achievement of research-driven learning and learning-focused research and development (R&D) in the current industry-based learning format indicate concern for an effective university service?*
Question 5 would address sub-question (b)(ii): *What contributions are perceived to be attributable to industry-based learning in knowledge growth and holistic economic development of the country?*

- *Interview schedule for other universities*

The interview schedule for sister universities (Appendix XI) in Zimbabwe that had adopted the same full-year integrated industry-based learning model was designed to provide backup to the ideas and information supplied by the participants at NUST.

Interview question 1 was meant specifically to address research sub-question (c)(i): *What motivations have popularised the NUST brand of industry-based learning among sister universities and why?*

Questions 2 to 4 were designed to provide answers mainly to research sub-question 3.2: *What quality academic practices are expressed by participating universities and how do they signify goal-directed and needs-based university education?*

Question 5 addressed sub-question 3.3: *How is integrated industry-based learning perceived to respond to local needs of Zimbabwean society?*

3.5.1.3 Reliability and validity of interview instruments

Self-constructed data collection instruments have the disadvantage that they have not been used before and their quality and effectiveness are not known beyond the measures taken in their development to ensure such quality and effectiveness. A rigorous process in the creation of such instruments will often produce instruments with a certain measure of respectability, in particular reliability and validity.

- *Reliability*

The ability of the research instrument, in this case the interview schedule, to give the same result consistently is called its reliability (Goddard & Melville, 1996). This happens with an appropriate sample chosen from an appropriate population. Determining reliability requires repeated trials of the draft instruments to produce the final draft instrument that is to be used for the intended purpose in the research. In my research I used the first interview to put the instrument to the test and to apply and assess my own competence of interviewing. I changed a few aspects after my first interview, and I continued refining my instruments and my techniques following each interview.

The fact that I conducted all the interviews myself aided in the attainment of some measure of reliability in that I could explain a question when a respondent needed such explanation. My continued participation in the whole research assisted me to carry forward the learning from my experiences from one interviewee to another. For instance, if an earlier interviewee misunderstood or misinterpreted one of the questions, I would make sure that I worded the same question differently, hopefully more clearly, with later interviewees. This would ensure that my interviewees interpreted the question in the way I wanted them to, that is in keeping with my research questions and the objectives of my research study.

In content and thematic analysis of interview transcripts in general, the requirement for reliability is that the themes or issues analysed are sufficiently precise to enable other research analysts to arrive at the same results when examining the same material (Silverman, 2006). I did not engage other researchers with my interview schedules prior to administering them but I am convinced that the efforts I put in their development and the measures to maximise respondents' comprehension of the questions posed

contributed to the trustworthiness of the interview schedule as a data collection instrument.

The very fact that I recorded all the interviews electronically, painstakingly transcribed the recordings myself, and that I provide long extracts of data in my report of findings in the next chapter, satisfies the requirement for low-inference descriptors (Silverman, 2006). Low-inference descriptors, according to Silverman, provide concrete evidence of what the respondents say, rather than the researcher's reconstructions of the general sense of what was said, 'which would allow researchers' personal perspectives to influence the reporting'.

- *Validity*

As with reliability, in normal research practice, an elaborate iterative process of testing whether the final instrument correctly achieves or measures what it is intended would be necessary. The most applicable type of validity to my interview schedules would be *content validity*. The language and the terminology used in the interview were carefully selected and checked with my supervisor.

In general the practical administration of the interviews was carefully planned for beforehand, and the interviews were conducted by mutual arrangement and agreement to be located in the respondents' familiar environment as recommended in the literature. Since interviews are predominantly aimed at a few carefully selected respondents, it was appropriate for me to check the content of the interview schedules scrupulously before administering them because there was not enough time available for a full validation process.

In considering criteria for validity in qualitative research, Silverman (2006), alludes to the researcher's influence (or bias) on the setting, values of the researcher, the truth status of a respondent's account, as well as triangulation and respondent validation. My impact on the settings in which I conducted interviews with colleague staff members at the university would be essentially that of equal partners, and this would be enhanced by the understanding university academics have for research and researchers in general. In industry, where I was not part of the organisation and almost always a stranger, the assumption was that my relationship with respondents was unfolding as our interaction

took shape, before and during the main interviews. Those respondents I had communicated with by telephone or face-to-face during the preparations for the interviews would be expected to show less 'halo' effect. And the duration and tenor of the opening discussion just prior to each interview would be important in influencing the settings. Similarly my values as the researcher would affect the interview if I let them shape my discourses and allowed my preferences to dominate the interview. I tried to be neutral and not allow my personal views on side issues such as politics and the economic situation to be heard or deduced through the interviews.

On the truth status of the respondents, I have no reason to doubt the accounts given by any of my respondents, many of whom I met for the very first time and made interview arrangements only minutes before the interview, while with others I had communicated about the interview much longer in advance. However I could not rule out the possibility that I could have been listening to answers portraying ideal situations rather than elucidation of actual events and situations experienced. An example would be a lecturer who described how students should be orientated before going out on industrial attachment, instead of describing what he/she and others had actually done. In general though the validity of my interview instruments and the actual interviewing process were, in my view, moderately preserved by being free from extreme influences from either myself or my respondents.

3.5.1.4 Conducting the Interviews

My initial task was to organise interviews with selected university administrators and lecturers at NUST with the aim of running them concurrently with interviews of industry supervisors in my home city. This was in an attempt to obtain data from across the various target respondents in the first few encounters so that I could use issues raised to sharpen my subsequent approach to asking questions and guiding the overall discussions with later interviewees. I personally conducted all the interviews.

Among the NUST management staff, the Director of the Technology Park (Technopark) and the Director of Research and Innovation Office (RIO) were purposively selected as respondents, and of the five deans of faculties, two deans were ultimately conveniently selected to take part on the basis of their willingness and availability during the period

in which the interviews were conducted. The difficulty of using purely random or purposive sampling arose when a targeted respondent was continually busy usually with management and administrative tasks or was away on leave or on official university business. Appointments were also arranged with available and willing chairpersons of departments, as was done with purposively selected senior lecturers. Among the lecturers purposive sampling was done once more, and when a selected member agreed to the interview, an appointment was made. To gain access and obtain permission to interview willing industry supervisors, I made telephone calls, sometimes followed by email messages, through the Human Resources Offices of selected organisations participating in the industrial attachment exercise that would then assist me in making appointments with the appropriate respondents at times convenient to both of us.

The interviews, which at certain times took place concurrently with the administration of questionnaires, were conducted over an extended period of nine months. My first interview was with one of the university managers and it took place in July 2010. This introductory interview helped me to get warmed up to the whole exercise and allowed me to make adjustments where necessary. Following an unanticipated break of about four months, further interviews with the rest of the respondents resumed in mid-November to mid-December and proceeded into February and March of the following year.

In each interview encounter, I had a preliminary discussion with the interviewee in which I introduced the topic and gave a brief outline of the general information that I would be requiring, setting the stage for an open exchange. The interviewees did not have the exact questions that I intended to ask beforehand. This was done in order to reduce the possibility of respondents providing prepared answers, but encouraging spontaneous opinions and accounts coming from their internalised knowledge. This, however, has the disadvantage that the respondents might leave out things they might have forgotten. This happened a few times when a point forgotten was later on visited after the conclusion of the interview.

Although intended to last around 20 minutes, the actual interviews lasted between 15 and 38 minutes, with some respondents giving brief answers while others provided wide and elaborate descriptions of the ideas they had to offer. Guided by the interview

schedule, I would attempt to pose questions in the given sequence with few interjections, except where there was a clear need to probe or guide the interviewee.

With the permission of the interviewees, all interviews were recorded using a digital voice recorder, as well as an audio cassette recorder for backup. A few notes were written down. After each interview I would play back a few lines of the interview to confirm the recording and to confirm approval from the respondent. At the end of all the interviews the voice recordings were transcribed into text through word processing for concrete storage, closer scrutiny and discourse analysis. I personally did all the transcriptions, which took me a whole month, so that I could visualise and recreate the interview encounters in my mind as I did the transcriptions.

3.5.2 Development of the three-tier model of university-industry collaboration

I was inspired by Ebong (2004) to think about various levels in which associations could occur between universities and their industry partners in a developing country. Contexts and situations in which universities exist are very diverse. Ebong (2004: 558) writes: “The universities in Nigeria have maintained contact with industry at two levels: the informal and the formal levels.” He goes on to outline the characteristics of each level and the history behind it. I set to thinking that it was possible to view universities as being aligned to their countries’ economic development and thriving on the synergy achieved between them and the level of industrialisation in the country. In other words, universities in less industrialised countries with predominantly agricultural economies would set their programmes to suit that scenario. My assumption was that through the many possible avenues of formalised university-industry collaboration, each university would select a group of activities that most suited its mission and capabilities. Through this, it was therefore possible for new universities to grow in tandem with the levels of their collaborations with industry, starting from the lower level and progressing higher up.

I initially drew up a list of possible activities of engagement which I had obtained from reading the various literature sources. No single source would provide all the components or ideas that I eventually had to put together to characterise the stages and activities within stages of the model. I also drew insightful examples from common

practices drawn from my observation and experience in the conduct of workplace-based learning in my institution and others. The model as it stands, assists me to conceptualise and organise the various industry-based learning activities in some form of hierarchy. It would assist to determine from the interviews with university staff and industry supervisors what issues they raised which connected with and corroborated the model. However, because it is still rudimentary and is yet an unrefined and untested inclusion in this study, it serves as a useful link for further investigation in future research endeavours.

For the implementation of the model, the activities had to be discussed and agreed upon between the university and industry participants. In preparation for my interviews, I would discuss the model and ask the respondent to study it before I would ask them questions on it during the actual recorded interview.

Below is a description of the activities and outputs suggested at each of the levels of the three-tier model.

3.5.2.1 Level 1 - Basic Student Industrial Experience

This is the level of the least engagement between the university and industry and it is meant basically for students' learning and preparation for joining the workplace on completion of their studies. The students get attached to their discipline-related workplace, either chosen by them or they may have been placed by the university. The students are expected to perform specified duties that fit into the curriculum requirements of their degree programme. Because students in a specific degree programme or discipline (say applied chemistry) get attached individually at different companies, they gain individualised work experience, albeit with the possibility that several of them may perform similar tasks and thus acquire similar knowledge. Students will be assessed through performance observation and periodic interviews by both university and industry supervisors, and through oral and written reports, the assumption being that each student produces a uniquely different written report from his/her colleagues. The attachment should also help students to initiate their final year project that must address a problem or issue encountered at the place of attachment. By

and large, the experiences and the learning of individual students remain distinct from those of colleagues.

3.5.2.2 Level 2 – Improved industrial experience and research

At this level several improvements are made on level 1. One is that all students get attached deliberately to both LSEs and SMEs, with a formula being worked out on the proportions of the periods spent in each sector. Another improvement is the inclusion of lecturers on short-term attachments (or sabbatical leave) to the same industries (both LSEs and SMEs) that their students go to, for say one month once every three years for each lecturer. This is meant to address the training needs of the people who do the training, and will help lecturers to be able to speak collectively the same language as their students and industry partners, to update their own industrial knowledge, to revive their work-related skills, and to maximise opportunities for applied industry-relevant research and consultancy, individual or collaborative. Choy and Haukka (....) pledge that:

> Industrial attachment is seen as an effective professional development activity for TVET [technical and vocational education and training] practitioners to maintain the currency of their vocational knowledge and expertise, including their knowledge of technologies and practices commonly used in contemporary workplaces .... This on-going development is necessary because the role of TVET practitioners is constantly changing. (p. 1368)

Staff would be encouraged to engage in collaborative multi-disciplinary, multi-departmental or multi-faculty research with colleagues and industry partners. At this level too, students are attached preferably in small groups of three to five in one industry, and assigned to work on the design of a prescribed project, such as renovating the production department of a plastics manufacturing company or division of a company. The actual task may not necessarily be undertaken, but students get to experience conceptualisation and documentation of their design ideas in real life settings. The collaborative engagement of these groups of students would enhance their tackling of issues relating to different disciplines such as finance, information technology, communication(s), design, construction, management, machinery, et cetera. The relationship between the university and industry at this level would be such that it would be possible for all students at the university (other than those on industrial attachment) to engage in fieldwork or short visits where learning sessions are offered in industry settings by industry personnel in real life working environments.

3.5.2.3 Level 3 - University-Industry Research and Academic Development

This final level signifies the highest form of mutual and collaborative engagement between the university and industry. The improvement on the previous level includes the requirement that industry will trust and engage the university as a major partner in its growth and development through inviting the university regularly and integrating it in identifying challenges and opportunities, and in finding solutions to mutually identified problems. The disadvantage here is that most companies, in particular large-scale and multinational foreign aligned ones, would perhaps not feel comfortable bringing 'outsiders' into their territory for fear of letting out confidential material that would eventually reach their competitors. For student learning this level would advocate increased implementation of the problem-based learning model during the whole degree programme, which necessitates learning of concepts around real problems encountered in workplaces. Lecturers and industry staff would be expected to engage in more collaborative research and development activities mutually conceived and resourced. This collaboration would be aiming at capitalising on the academic's wide theoretic approach to complement the industrialist's practical and focused outlook. Table 3.5 shows a summary of the different activities and components of the proposed model.

The above proposed model was shown primarily to the lecturers and some of the chairpersons of departments and discussed briefly at the introduction just before the start of the interviews. A question would then be asked during the interview on what the respondent thought about the model.

Table 3.5 Activities in the industry-based learning model

Level	Attachment	Activities	Location	Assessment	Research Projects
1	• Student only	• General specified	• LSE	• Supervision • Written/oral reports	• Student final year
2	• Student and lecturer	• Staff consultancy	• SME and LSE	• Direct supervision • Reports	• Group • Multidisciplinary
3	• Student and lecturer	• Problem-based learning	• SME and LSE	• Supervision • Contribution to industry	• Mutually beneficial to university and to industry

3.6 Data Analysis

In keeping with the nature of the concurrent embedded mixed methods study, the qualitative and the quantitative data were analysed separately but essentially concurrently in that it was not important which data type should be analysed first. But since the qualitative portion of the study was of greater priority than the quantitative, the discussion below starts with the former.

In this typical concurrent or parallel/simultaneous mixed methods design in which I collected both qualitative and quantitative data at essentially the same time, data analysis was done after all the data had been collected as proposed by Onwuegbuzie & Teddlie (2003). Analysis of data in mixed methods may be viewed as the use of quantitative and qualitative analytical techniques from which interpretations are made, and such analysis may be design-independent (Onwuegbuzie & Teddlie, 2003). In other words, quantitative data can be subjected to both quantitative and qualitative data analysis techniques, and so can qualitative data. Dawson (2009) writes about the qualitative data analysis continuum, in which there are highly qualitative, reflective types of analysis at one end, and on the other types of analysis that treat the qualitative data in quantitative ways by coding and counting data. In my questionnaires the open-ended portions of items, for instance, were subjected to both quantitative and qualitative data analysis, in a bid to get more out of the same data.

3.6.1 Qualitative data analysis

The interview transcripts, generated from 'oral narratives of personal experience' by respondents (Lewis-Beck, Bryman & Liao, 2004) allowed for textual analysis with some hindsight of some of the contexts in which the interviews took place since I was the interviewer, remembering and mentally recreating at least some of the dynamics of the interviews.

I used content analysis, also referred to as narrative analysis by Lewis-Beck et al. (2004) in relation to the questions and ideas I discussed with respondents, and relating to the research sub-questions from which they were derived. I read through the transcripts one by one in each group of interviewees, often several times, highlighting what I considered to be the substantive statements made by the interviewees based on

Gillham's (2000) ideas. Then I categorised these statements and coded them according to both my expected themes and emerging themes.

Thematic analysis, according to Dawson (2009), is inductive, allowing themes to emerge from the data and not being imposed by the researcher, with data collection and analysis taking place often simultaneously. According to Lewis-Beck et al. (2004) thematic analysis is only the first and most basic of four types of *narrative analysis*, and its emphasis is on the content of a text, 'what' is said more than 'how' it is said. Language is important in thematic analysis because it is a 'direct and unambiguous route to meaning', a resource rather than a topic of investigation in the research.

> The thematic approach is useful for theorising across a number of cases - finding common thematic elements across research participants and the events they report. … Because interest lies in the content of speech, analysts interpret what is said by focusing on the meaning that any competent user of the language would find in a story. … The contexts of an utterance - in the interviews in wider institutional and cultural discourses - are not usually studied. Readers must assume that when many narratives are grouped into a similar thematic category, everyone in the group means the same thing by what he or she says (Lewis-Beck et al., 2004:706).

Item 37 on the questionnaires was the very open-ended request: *In this space feel free to write any additions, concerns or explanations to some of your answers to the previous questions.* In analysing this item I sought to collect all the themes, whether already included in my list of expected or new and emerging ones brought in by respondents. I categorised all the substantive statements and then cross-checked with my list of expected themes using a content analysis grid (Appendix XV). This was my thematic analysis, in which I did both the *count* analysis and the *meaning* analysis. Thematic analysis helps to identify commonly expressed themes by respondents, whether expected or emerging.

3.6.2 Quantitative data analysis

Both descriptive and inferential measures were used in the analysis of the closed-ended questionnaire items. I coded all the responses to the questionnaire as provided for in the design. The same statistician and consultant at STATOMET in the Department of Statistics who had helped in the questionnaire design worked with me in the analysis of questionnaire data. Data from all the three groups of questionnaires (student, lecturer, and industry supervisor) were captured into the computer. A series of meetings to

discuss the data outputs and the meanings and to decide on further action were held between my supervisor, the statisticians and me.

3.6.2.1 Descriptive data

The computer program SAS was used to generate summaries for all the variables in all sections of the questionnaire, e.g. absolute frequencies, percentage frequencies, cumulative absolute and percentage frequencies, means, medians, ranges and standard deviations. The summaries were done for the whole samples, and also for sub-samples such as by factor, faculty, age, gender, previous work experience, and others depending on the class of respondents. After the first round of printouts of raw data and summaries, there arose the need in a few cases to readjust the coding with respect to open-ended items to cater for additional response categories that had not been anticipated during the design stage.

3.6.2.2 Inferential data

The students' version of the questionnaire was the only one qualifying for a factor analysis because the number of respondents (363) was more than 20 times greater than the number of items (19) requiring the factor analysis. Thus, after all the data had been captured, a confirmatory factor analysis using the BMDP4M computer software program was carried out on items 7 to 25 that used the Likert scale format of response. A confirmatory factor analysis tries to confirm the factors expected from the responses since the factors were created during questionnaire design.

A comparison of factor means for sub-groupings by faculty, age, gender, et cetera. was generated. The Chi-square test was used with each of the categorical (yes/no) items (number 26 to 36, omitting 32 and 33) in the three categories of respondents.

3.7 Justification for the Research Approach

The decision to settle for the mixed methods approach for my study partly arose from the realisation that mixed methods provide for complementarity between quantitative and qualitative data. They aim to attain holism as described by Copley in Du Toit (2008), that is, the conception that the combination of methods achieves more than the sum of the different methods treated separately. For a case study, this is desirable because a single case may very often not be typical of all other cases.

In general in the literature there is a question often raised: Should we trust mixed methods? Describing the divide between QL and QN methods as based on highly questionable premises, on positivist versus constructivist paradigms rather than processes, Bergman (2008:19) recommends that "mixed methods research will need more elaborate explanations with regard to its methods and purposes, as well as how and for what purposes the results from the different methods are being combined. Thus, mixed methods research cannot claim to bridge the unbridgeable gap between positivism and constructivism. Furthermore, it does not automatically provide better answers to research questions in principle, and it is unlikely to replace well-designed mono method research designs (Bergman, 2008).

Bryman (2008) expresses his increasing uneasiness in recent years 'about the current wave of enthusiasm for mixed methods research'. His uneasiness comes from the fact that in his own experience and analysis, mixed methods research is often insufficiently justified in published journal particles and in review articles preparing for publication, as well as in research grant applications.

Explaining what he terms 'research for understanding one's own situation and problems', Suwanwela (2008: 132) notes that one of the greatest mistakes in the past was to import solutions for local problems. Research that starts out from a local practical problem is immediately relevant and usable, and the nature of the research questions is determined more by the questions than by a consideration of whether to use qualitative or quantitative methods.

3.7.1 The quality of research methods

The traditional criteria of determining the rigour of research methods and judging the quality of scientifically sound research are given as validity (internal and external), reliability and objectivity. These are particularly applicable to quantitative research but parallel versions have been provided for qualitative research in the past few decades. The notable contribution in this effort has been by Lincoln and Guba (1985); and their arguments are discussed below in broader contexts with inputs from more recent

literature. Lincoln and Guba (1985) actually prefer the term *trustworthiness* to rigour in dealing with qualitative studies, while Butin (2010) speaks of *trustworthiness* and *authenticity*.

3.7.1.1 Credibility and Internal Validity

The truth value of a research effort is determined in different ways by researchers and consumers of research. Lincoln and Guba (1985) suggest that findings must be approved (or approvable) by the constructors of the multiple realities being studied, a process called 'member-checking'. Silverman (2006:292) refers to 'respondent validation' where tentative findings are taken back to the people studied to see whether they conform to their own 'experience', and then refined in the light of the respondents' reactions. In my case this has not been fully possible beyond follow-up interviews on the data provided by some respondents.

As a member of the institution in which the case study is centred, I believe I satisfy the requirements of prolonged engagement and persistent observation (Lincoln & Guba, 1985). My use of mixed methods and multiple methods, interviews and questionnaires (open- and closed-ended) also satisfies the method triangulation strategy to increase the credibility of my research. Particularly the triangulation of data sources within my university and from respondents from outside the university helped me to produce a more complete, and perhaps credible picture taken from various angles.

Other strategies such as peer debriefing, negative case analysis (or deviant case analysis) were also mildly used in this study. For instance, I held free discussions with some of my interview respondents both before and after the interview sessions discussing aspects related to the research. This had the desired effect of relaxing the atmosphere between me and the respondents, and increasing the much-needed mutual trust and assurance of the authenticity to the exercise.

3.7.1.2 Transferability and External Validity

The question of whether the findings of a research project can be applied elsewhere answers to the criteria of generalisability in traditional quantitative research. In qualitative research, especially case studies, the more relevant concepts, according to Lincoln and Guba (1985) and other authors are transferability, portability and emulability. This shifts the onus for usability of research findings to 'the person seeking

to make an application elsewhere' (Lincoln & Guba, 1985), and requires empirical evidence about contextual similarity between the case studied and the case elsewhere which wishes to emulate the findings. I am convinced that my rich descriptions of findings provide enough data and grounds on which similarity judgements can be made by similar and like-minded universities.

3.7.1.3 Dependability and Reliability

The stability, consistency and replicability criteria used in quantitative research are satisfied by how dependable the methods and the outcomes in qualitative research are, and these seem to rely on the credibility described above. The stability of an interview schedule, for instance, is judged by whether it produces the same results in both natural and contrived settings (Lincoln & Guba, 1985). My use of both questionnaire open-ended items and interviews is an indication of overlapping methods, a form of triangulation. My developing and adjusting the interview schedule and techniques as the research progressed is an indication of 'stepwise replication', where the data gathering process was improving as I was progressing with the data collection. Since this is a supervised research effort, my supervisor acted as my 'inquiry auditor', but I am inviting my readers to join in and be my auditors on my processes and the product.

3.7.1.4 Confirmability and Objectivity

Qualitative and interpretive research does not claim to be totally neutral or free from all bias from the researcher. Indeed the researcher is part of the ensuing narrative, and rather than pretending to come into the situation with no biases at all, researchers have to declare the influences of their own prior experiences and cultural lenses (Rubin & Rubin, 2005:31). However, qualitative researchers still need to assure their audiences of trustworthiness in their processes and the resultant products. I trust that my evaluators will indeed focus on the quality of the data that I present more than on any of my characteristics as a person or researcher. My personal involvement in the research puts me in a position that I was responsible and answerable for my actions and claims. Audit trails (diaries, notes and recordings) assisted me in confirming some of the work I did and in supporting my claims to knowledge generated in this report.

3.7.2 The quality of mixed methods

If the processes of data collection and analysis are of acceptable quality and are trustworthy, the chances are that the results obtained will also be of high quality as well.

As seen in the discussions above, the criteria for judging qualitative research are traditionally different from those of judging quantitative research. In a mixed methods case study such as this one, the assumption is that there are two avenues possible for ascribing quality to the overall research. The first is to apply qualitative criteria to the qualitative portions of the study separately, and the quantitative criteria to the quantitative portions. The second is to find hybrid criteria that seek to assess both criteria simultaneously. One issue is the emergence of a language of research, a bilingual language. Creswell and Garrett (2008) recognise the emergence of a bilingual language of research, a language that is neither quantitative nor qualitative.

Onwuegbuzie and Teddlie (2003) prefer to ascribe rigour in mixed methods research in terms of representation and legitimation. In representation, that is the ability to extract adequate information from the underlying data, five purposes of mixed methods evaluations are fulfilled, namely *triangulation*, *complementarity*, *development*, *initiation* and *expansion*. In legitimation, that is the validity of data interpretation, Onwuegbuzie and Teddlie (2003) allude to five types of validity seeking 'legitimacy', which, they say, incorporate validity, credibility, trustworthiness, dependability, confirmability and transferability of research findings. These are *descriptive* validity, *interpretive* validity, *theoretical* validity, *evaluative* validity and *generalisability* (internal and external).

Creswell and Clark (2007) recommend the use of the terms *validity* and *inference quality* to address issues of quality in mixed methods. They define validity within a mixed methods study context as the ability of the researcher to draw meaningful and accurate conclusions from all the data in the study. This means that both qualitative and quantitative portions of the data need to be integrated first before the analysis is done. I am in favour of this approach for my study, since the two portions overlap in seeking out the same data. However, inference quality is defined as the accuracy with which researchers draw inductive and deductive conclusions from a study.

Punch (2009:121) poses the question whether researchers would want to generalise from a particular case study. He says, "… whether a case should even to seek to generalise, and claim to be representative, depends on the context and purposes of the particular project". Quoting Denzin, Punch (2009) says that generalisation should not necessarily be the objective of all research projects, whether case studies or not. An

instrumental case study does not have generalisability as its objective, since the case studied is often unique and atypical, requiring a deeper understanding of its peculiarity. Yin (2003) says case studies, like single experiments, are generalisable to theoretical propositions (analytic generalisation) and not to populations or universes (statistical generalisation). This implies that another university planning to adopt processes and findings depicted in a particular case study may adopt only selected theoretical aspects rather than the whole picture.

A case study may, however, produce generalisable findings explains Punch (2009). This happens when the study 'conceptualises', that is, it studies some phenomenon in depth so that "the researcher develops one or more new concepts to explain some aspect of what has been studied". For example, in this study, if the objective is to bring to the open the operations and intricacies of industry-based learning, many like-minded universities would like to emulate the case. In explaining how the problem of generalisation is approached by different earlier writers, who suggested different kinds of generalisation such as analytic generalisation, retrospective generalisation, assertion, propositional generalisation, intrinsic case study, illuminative evaluation, evaluative case study and qualitative generalisation, Bassey (1999:35) refuses to offer a summarised single view, arguing that to draw such comparisons is a dangerous game.

While Onwuegbuzie and Teddlie (2003) suggest otherwise, McNiff and Whitehead (2006) recognise a significant difference between validity and legitimacy, and they explain it thus:

> Validity refers to establishing the truth value of a claim, its authenticity or its trustworthiness. This is a matter of rigorous methodological procedure. Legitimacy refers to getting the account accepted in the public domain, by getting people to listen to you and take your work seriously, in the hope that they may be open to learning from it or trying out something similar for themselves. Establishing legitimacy is a matter of power and politics, because people may or may not want to listen, in spite of your having demonstrated the validity of your work (p. 157).

The point made above is that legitimacy does not rest in the author's work or research competence but with stakeholders, particularly those wielding power, ranging from a supervisor through institution authorities, up to the journal editor. It is important for me therefore to keep updating these key stakeholders on the issues emerging throughout the process of my research, while maintaining control and exercising mature independence

of them. McNiff and Whitehead (2006) advise that both validity and legitimacy involve getting the agreement of others that what I have to say should be believed and incorporated into public thinking, adding the following:

> While you have some control over validation processes, by showing the internal logic and methodological rigour of your claim, you have less control over legitimation processes, because you are presenting your claim within the socio-political context of other people's interests, including their personal and professional ambitions. This can be tricky, because those people may or may not agree that your work is valuable depending on how it suits their purposes (p. 166).

One final consideration of the rationale and potency of assessing any research study is that there very often are endemic problems in judging research quality. Cooper (2010) mentions as some of these the predispositions of the judge or judges, the judges' disagreement about what constitutes research quality, and the differences among quality scales.

3.8 Challenges and Practical Constraints

In carrying out this study, as is expected, there were some unexpected happenings and outcomes that impeded the processes intended and experienced in the study. I have already alluded to the prevailing country's economic problems, which accounted for most of the challenges that were experienced.

At the time of data collection, the telecommunications system in the country was operating in a reduced capacity and the effect was felt by all sectors of the country's economy. Telephone communications were often problematic, especially inter-city trunk calls that were crucial for arranging appointments with respondents. From the experience I had with participating companies in my home city, it was virtually impossible to secure an appointment in one attempt, partly because the targeted supervisors were not always in the offices. The postal system was very unreliable, slow and sometimes completely dysfunctional in some areas of the country. I had to post questionnaires twice to some places, but still got discouraging feedback. The modern methods of communication using information and communication technologies were no better. Internet connectivity and electrical power supplies were very unreliable at the time the field work for this study was conducted.

A profound effect on the research was financial constraints. A careful budgeting plan was adopted for the limited funds allocated by my university under the Research Board facility, but I still had to use my own resources to see the research get carried out. The requirements of the Research Board assume a straightforward situation in which research visits are undertaken smoothly and as per plan. In practice, however, I had to visit some places more than once, make telephone and cellular phone calls repeatedly, sometimes ultimately giving up with no positive results forthcoming. I intended interviewing more respondents in industry from places all round the country but my budget allowed me only one week out of my station to cover universities and industry visits. The result was that I could not wait when appointments required me to extend my stay away from home.

Within the university under study the general availability and motivation of participants for an academic exercise appeared reduced from what I had been used to in the previous normal years. Even when a person would have agreed to an interview appointment, some did not treat this seriously and were not available at the agreed time. Personal and family problems were sometimes given by members who failed to honour appointments. Also, it appeared that scheduled programmes, timetables and calendars often were difficult to adhere to both in the short and long term. Some administrators genuinely failed to honour appointments because emergency meetings or other unanticipated commitments had come up in their diaries.

In a similar vein, industry supervisors and managerial staff were often very busy people. I could sense the difference between academics and industrialists where the latter could not commit themselves to an exercise such as answering a questionnaire that would not produce tangible results for them. Academics did make promises although they too failed in the main to honour them.

3.9 Ethical Issues

Research that deals with people as subjects of inquiry is laden with issues of fairness, propriety and effects. The consideration of ethical issues affecting participants in this research study was done during the development of the research proposal as is the norm at the University of Pretoria. The application for ethical clearance was made before commencement of data collection, and subsequent procedures were carried out to

maximise adherence to ethical means and thoughts. Various aspects of ethical practice are considered below.

3.9.1 Trust and respect of participants

Throughout my interaction with the respondents, I went out of my way to show them all the respect I believed they deserved by considering their situations and agreeing to make arrangements that suited them ahead of my own desires and plans. The participants were all adults above the age of majority who happened also to be well educated, and thus trusted to make informed decisions about their participation. Most of all, they were aware of their rights and what sort of treatment they were entitled to. While any research effort may conjure up effects ranging from raising participants' expectations through feelings of being exploited, deceived to causing anxiety, I did my best to present myself generally unobtrusively and in a modest but business-like manner. I did make out that some of the respondents associated this type of research with rewards such as funding or some privilege on my part even if I was researching on a topic (industrial attachment) that touched many people in the university. This was partly because of the university's science and technology focus, where social research plays a smaller role compared to laboratory and experimental investigations dealing with non-human subjects and materials. Another explanation could be the constrained economic situation in which people expected any contribution of their precious time and effort to be rewarded somehow. For my part, this study was an effort to engage all as cooperating partners professionally thinking and reflecting on our practices. I also was conscious of the requirement that I needed to be respected and trusted by all my informants in order for them to be truthful in their responses to my questions and requests for information.

3.9.2 Access

I have pointed out in my description of the data collection processes above that I sought appropriate prior permission to gain access to all the respondents that I required to engage in my study through face-to-face, telephone, email and written communication. This permission was sought, where necessary, from the 'gatekeepers' of organisations, as well as from the individual respondents. Fortunately, all organisations I engaged with were 'closed' or 'private' settings, allowing me 'overt' access based on informing subjects and getting their agreement often through gatekeepers (Silverman, 2006). In

negotiating entry into organisations, I was guided by their tendency to concentrate more on building trust in the relationship between them and me or my organisation rather than on merely providing me with information as Flick (2006) suggests. With regard to universities, some were more open than others. The responses to my request to go into the institutions and carry out the study ranged from outright refusal (See Appendix XIIIb) through conditional and delayed acceptance to lukewarm acceptance (see Appendix XIIIc).

3.9.3 Informed consent

All the respondents were by virtue of their age and level of education competent to decide on whether the research was harmful to them or not to determine their participation. I made all efforts to explain the objectives of my research to all the respondents and I informed all of them of the voluntary condition to participate and the option to withdraw at any point once they were in the process. The language of communication was English, a second or third language for most respondents, but it being the country's official language, I was satisfied with all respondents' competence and confidence in what they were saying, and in how they interpreted what I said to them.

3.9.4 Anonymity

The questionnaires offered full anonymity in that the respondents did not write their names. On the other end interviews were conducted face-to-face with the respondents, and during the voice recordings I intentionally made full identification of who was providing the data. The report on findings from the interviews in the next chapter relies heavily on respondents' views presented in direct quotations. The people responding are thinly disguised since they can be identified by their positions and by the content of their answers. But for most of them it was difficult to conceal their professional identities and it is possible some readers will be able to identify the individuals referred to. Since all of them are adults I anticipate that not much harm is awaiting them. Anonymity of the respondents in the report was protected by using codes (Appendix XIV).

3.9.5 Confidentiality

This study can be characterised as a low sensitivity one with little intrusiveness into personal and organisational details of everyday life or personal occupation. By and large, the information I sought from all the respondents was not intended to include confidential matters that would inadvertently affect other people within or outside the study. If any potentially confidential information arose in the interviews, I would use my discretion and perhaps follow up on the affected respondent to check if he/she wanted his/her responses published as part of the results; otherwise any sensitive information such as gossip would be left out of the report.

3.9.6 Safety and consequences of participation

Issues of physical safety did not arise in this study because respondents were not subjected to any manipulation, change of environment or unfamiliar practical activity. They were all approached and engaged in their day-to-day working or study locations. Just as there were no envisaged material benefits accruing to respondents as a consequence of their participation, there were also no physical risks intended either. There were, however, conceptual benefits expected for all participants in that their awareness of the industry-based learning activities would be enhanced when they were called up to give analytic views on the subject.

3.10 Conclusion

Research practice hinges on underpinning theory and philosophy. This has been the subject of discussion in the opening sections of this chapter. The conceptions of the research and the terminologies used are important to understand before any attempt to categorise the research. The constructivist, interpretivist paradigm and framework have informed the design of fieldwork processes that were aimed at generating desired knowledge in this study. The research questions and the study objectives have necessitated the use of mixed methods in an enhanced case study that employed questionnaires and interviews for data collection.

The processes and procedures carried out in this research study describe a case study utilising the concurrent embedded design of mixed methods research. It is observed that mixed methods best answer research questions that seek to delve into both quantifiable information and in-depth personalised constructions of reality and truth. However,

mixed methods of inquiry have their own limitations and problematic nuances that are voiced by staunch adherents of either qualitative or qualitative research paradigms, and discussed elsewhere in this chapter.

The appropriate fieldwork processes have been described in considerable depth, starting from the conception and leading to the development, validation, administration and analysis of the data collection instruments. Some justification for the choice of methods, instruments, and information sources is provided alongside descriptions of these in the text. In addition, some of the observed strengths and weaknesses of the procedures undertaken have been brought out in the hope that the reader may understand the attempts at acceptable scientific research practice.

In putting the perceived quality of this study under spotlight, this chapter has attempted to justify the design, content and administration procedures used in the light of recommendations in the literature. The contested conceptions used for identifying criteria for judging mixed methods as compared to judging purely qualitative or quantitative designs are presented to provide the reader with glimpses of conceptual gaps encountered in the literature. This chapter has also touched on the researcher regarding potential and real bias. How does one know whether the respondents are telling the truth in the information they give? I have tried to show how the threats to validity in data collection were neutralised, in the selection of participants, in interactions with them, and in follow-up interviews. The ethical concerns in this study have been minimised by the fact that all respondents were adults or young adults who could be trusted to understand the impact of the research on them and make informed decisions about their involvement. Threats to quality in data analysis are addressed in the next chapter following a presentation and analysis of the findings. Also the contexts in which some of the results were obtained are analysed. This should clear the way for interpretation and the resolution of the research questions.

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	**Management**			
	Director Technopark	1	1	1
	Industrial Liaison Officer	1	1	-
	Director R&I Office	1	1	1
	Deans of Faculties	5	2	1
	Practitioners			
	Department Chairpersons	30	5	7
	Lecturers	140	5	2
Industry	**Industry Supervisors**	300	5	2
Other Universities	**Manager/Practitioner/Coordinator**	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
TOTAL			**25**	**24**

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 form 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)

A. Faculty of Industrial Technology

Normal degree programme format	1st year	2nd year	3rd year	4th year	
Degree with industrial attachment	1st year	2nd year	3rd year	4th year	5th year

B. Other Faculties

Normal degree programme format	1st year	2nd year	3rd year	
Degree with industrial attachment	1st year	2nd year	3rd year	4th 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 enrols 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 'trailblasing 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 4th 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 4th year with all those courses that are of certain intensity, and they are doing their 4th 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 (#OULD05).

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)).

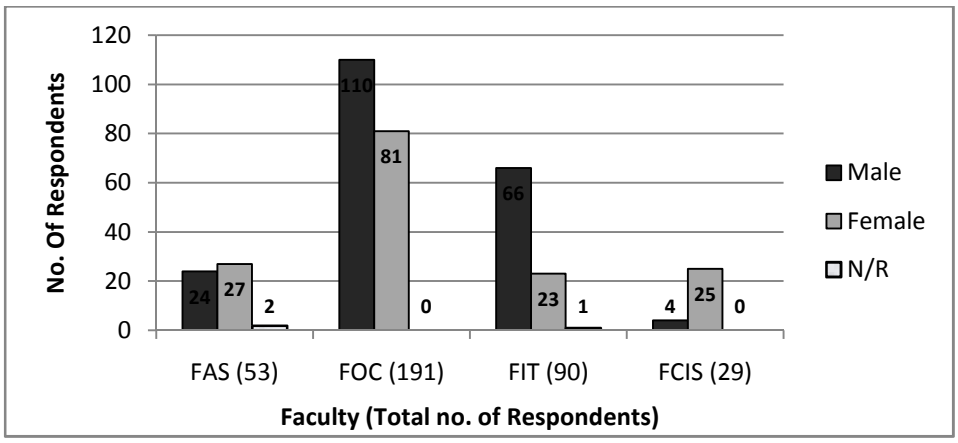


Fig. 4.1 Student Respondents according to faculty and gender (n=363)

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.

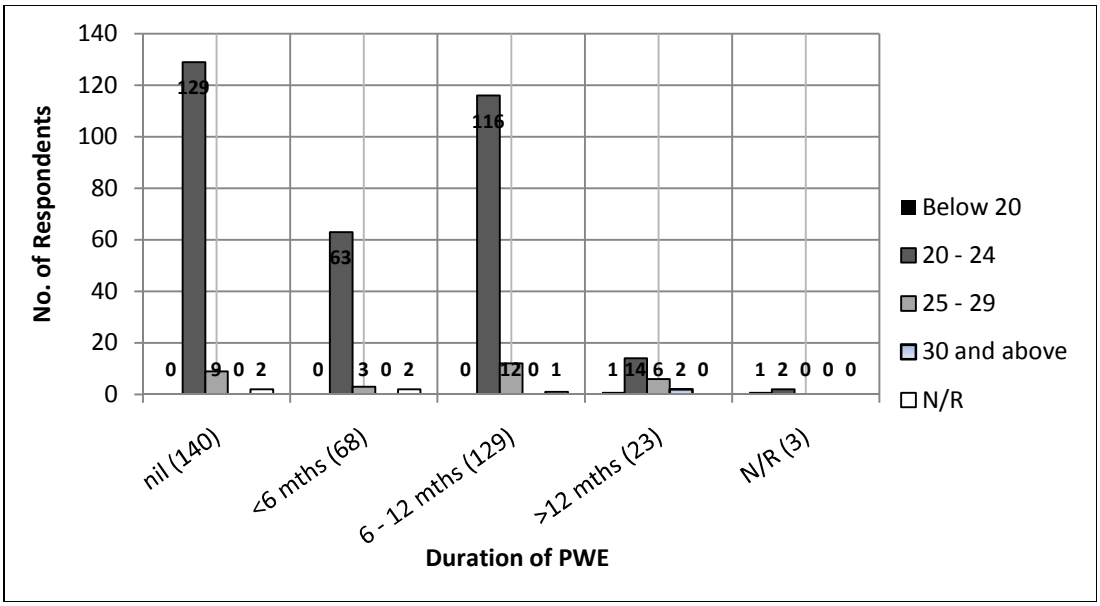


Fig. 4.2 Student respondents according to age and duration of previous work experience (n=363)

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).

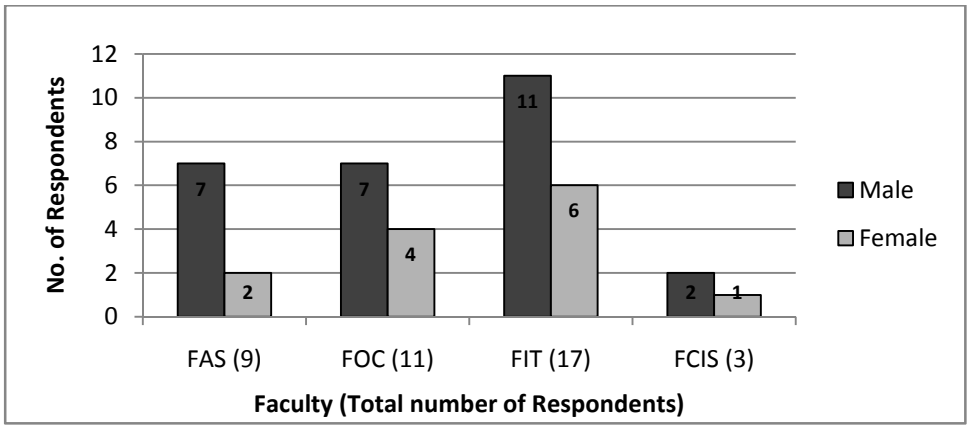


Fig. 4.3 Lecturer respondents according to faculty and gender (n=40)

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.

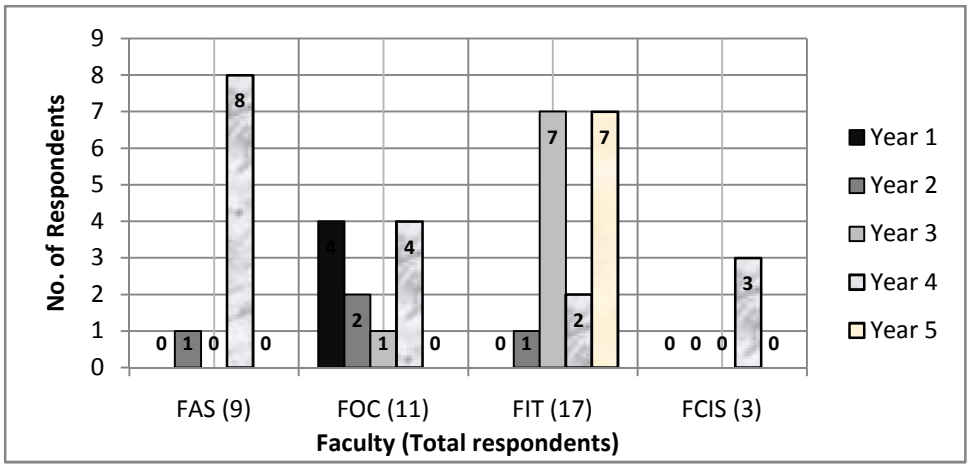


Fig. 4.4 Lecturer respondents according to faculty and highest year level taught (n=40)

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).

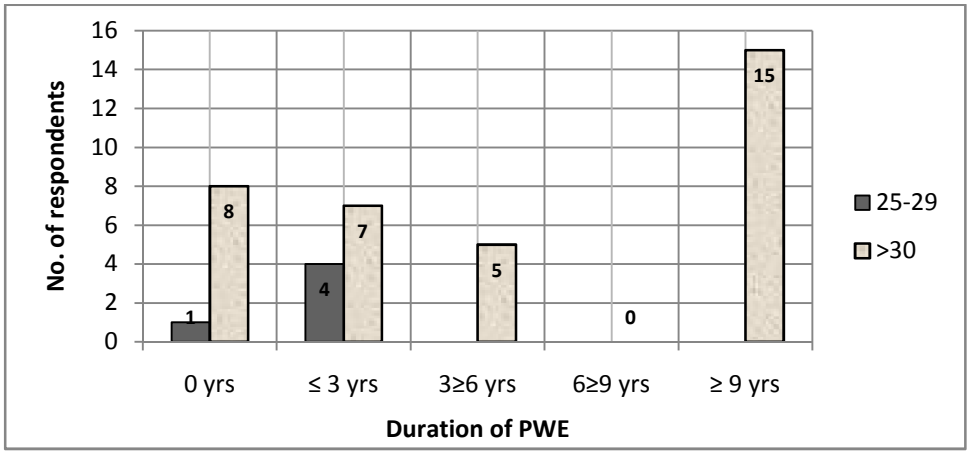


Fig. 4.5 Lecturer respondents according to age and duration of PWE (n=40)

- *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.

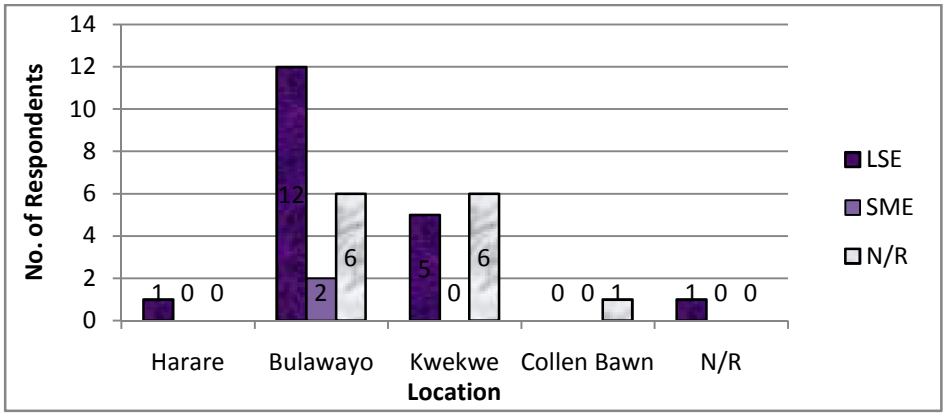


Fig. 4.6 Industry respondents according to location and company size (n=34)

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.

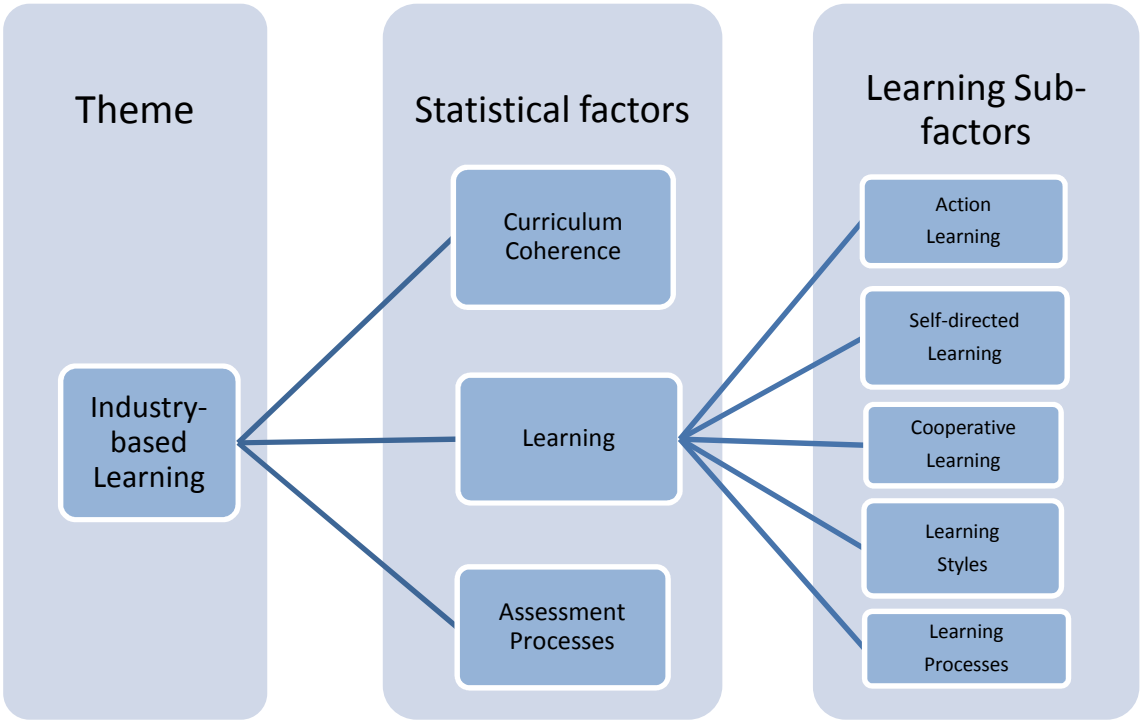


Figure 4.7 Relationship between the research theme, statistical factors and sub-factors

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 (χ^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.

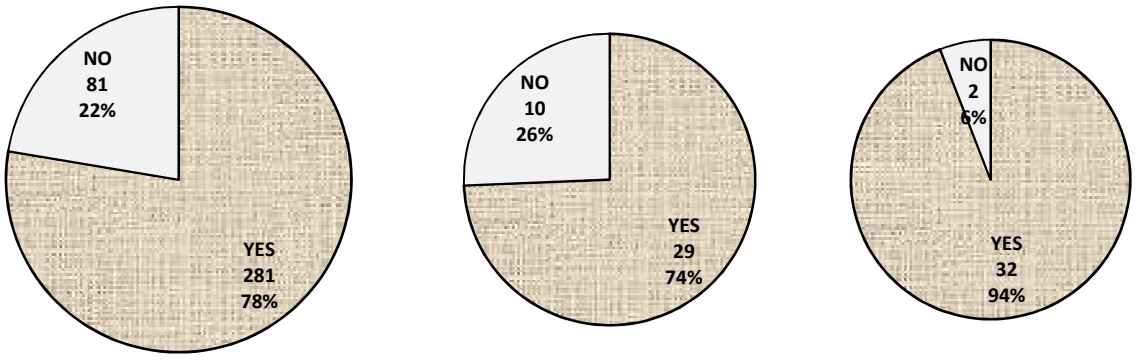


Figure 4.8 Comparative opinions on contribution to student learning and self-development
(Inter-Group variations not statistically significant: χ^2=5.493; probability =0.642)

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 χ^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 χ^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 χ^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 χ^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 χ^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 χ^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 χ^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).

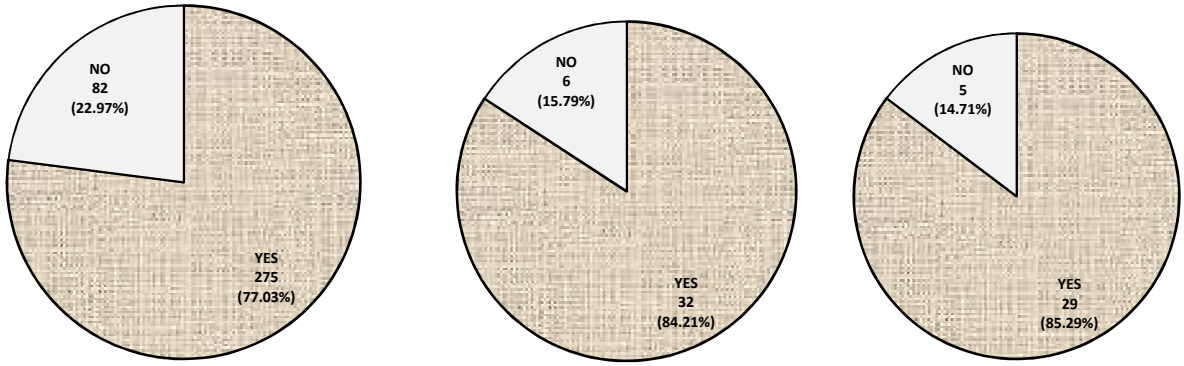


Fig. 4.9 Comparative opinions on engagement with SMEs (Item 35)
(Inter-Group variations not significant: χ^2=2.1; probability =0.3499)

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 (χ^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 χ^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.

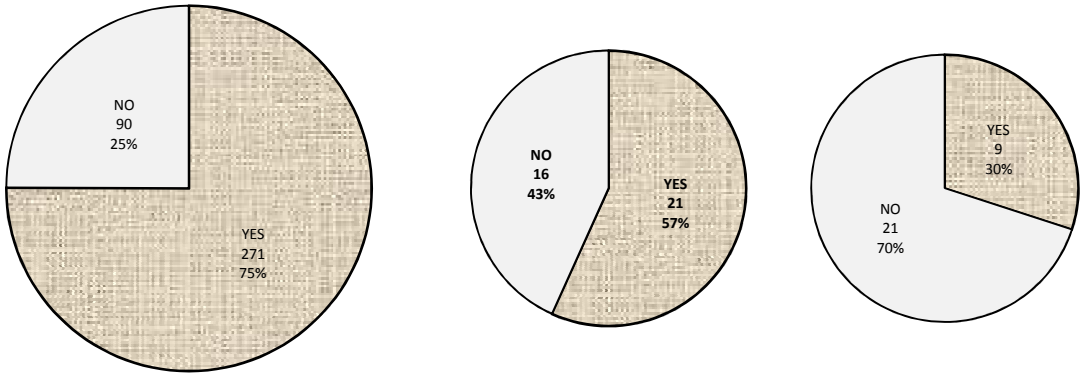


Fig. 4.10 Comparative opinions on whether the current IA programme needs change
(Inter-group variations statistically significant): χ^2=30.5347; probability =<0.0001)

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).

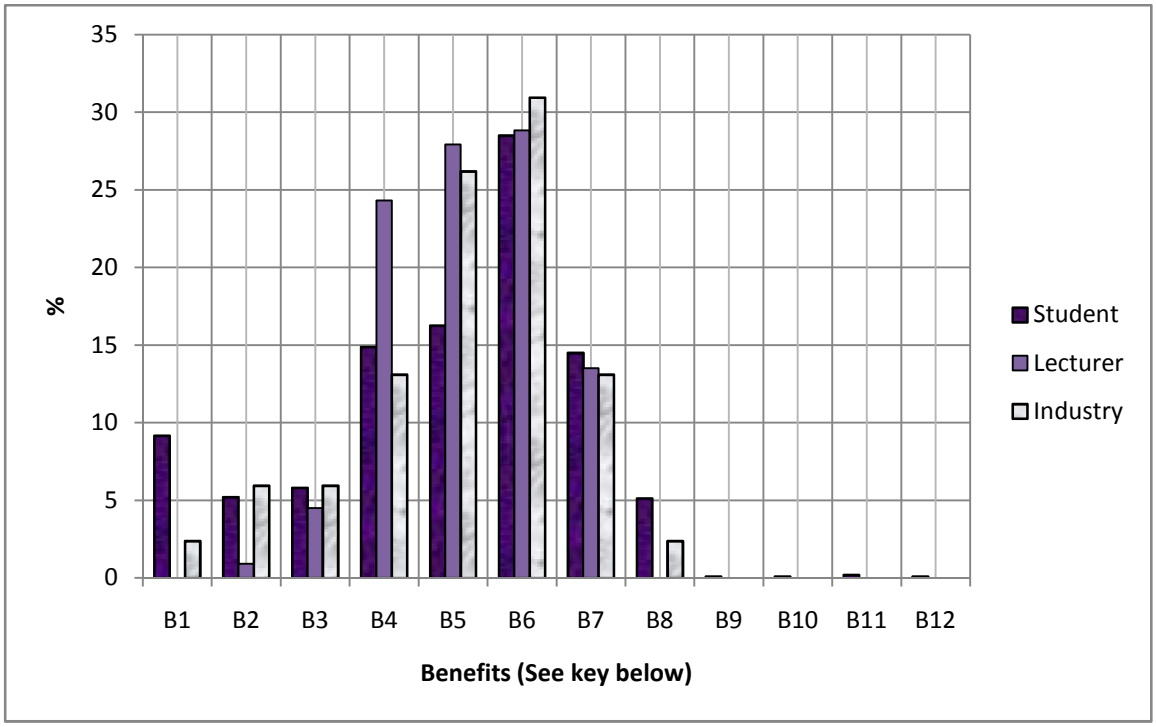
4.4.4.4 Benefits to students

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 knew 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

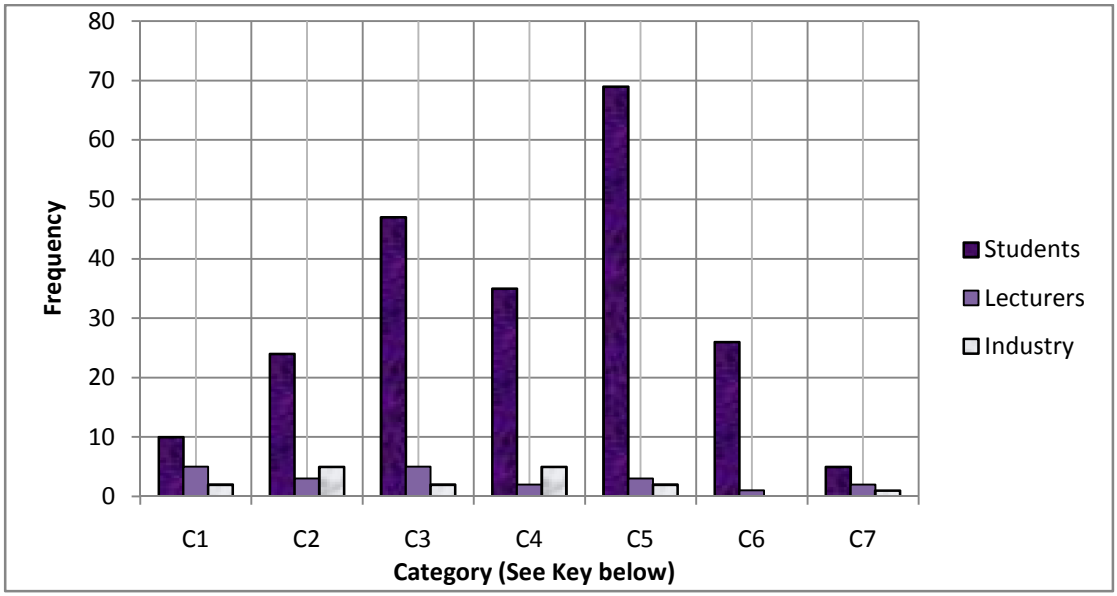
Item 33 in the students' questionnaire asked the students the category and location of the organisation they had been attached to. The majority (70.14%) had been attached in large-scale urban companies, followed by 17.97% in urban small and medium-scale organisations. Other categories of student attachment 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 attachees 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.

CHAPTER 5: INTERPRETATIONS AND REFLECTIONS

5.1 Introduction

This chapter is designed to put into broader context the findings of this study and to provide insight into the perceived wider implications of the data that has been presented in the previous chapter and in the foundational information in earlier chapters. The chapter is also expected to crystallise issues that may have appeared unrelated in the presentation of data and findings, where such issues have been found to converge or align. In particular, this chapter is presented in themes that integrate the triangulated qualitative and quantitative data from the thematic content categories obtained from interview data (Appendix XV) and the data from the matched questionnaires as presented in the previous chapter. It is the chapter in which the voice of the researcher begins to heighten to fuse with that of the respondents hitherto given more prominence. The integration of themes is shown in Table 5.1 below, and is necessary to help the researcher to reach conclusions informed by data and to make authentic recommendations.

Table 5.1 Integration of themes from Qualitative and Quantitative Data

THEMES (in this chapter)	QUALITATIVE DATA Interviews Thematic Content – App XV Open-ended questionnaire items	QUANTITATIVE DATA (Closed-ended questionnaire items)
Perceptions of quality and best practices	1.Quality issues in academic practices 5. Relevance of programmes and graduates 7. Assessment and supervision 9. The model 13. Student preparation and placement	Factor 1 curriculum coherence Factor 2 Learning Factor 3 Student assessment
Learning and knowledge development	3. Teaching & learning improvement, value-addition, curriculum integration	Factor 2 Learning
Research-enhanced Practices	2. Research and learning 14. Innovation, creativity, entrepreneurship	
Community Engagement and Development	4.Holistic engagement & SMEs 6. Comparison of IA format and competition 8. Mutual conception of IA & communication	
Transformation	12 Transformation, life enrichment	
Goal-directed Action and Critical Thinking	2. Research and learning 11. Challenges	
Building a Legacy: The Future Beckons	10. Benefits 15. Other (miscellaneous) Open comments	

It has been hinted elsewhere in this report that Zimbabwean higher education has expanded phenomenally in the past two decades, and in this expansion, higher education institutions have adopted ways of serving the needs of the local and global communities

as enshrined in relevant proclamations of the nation's visions and developmental plans. One of the ways adopted by universities to transact the business of empowering the growing number of the select cohort of young people to participate in the development of their country is the unanimous use of industry-based learning as a strategy to contextualise university teaching and learning through engagement in workplaces. The trends of events have prompted the research question in this study: *How does integrated industry-based learning enhance quality academic practices and relevance to national needs of Zimbabwe?* In the sections below I attempt to augment and synthesise the undercurrents intimated in the previous chapters with critical and reflective interpretations of key issues raised, beginning with the cross-cutting focus of this research study on quality.

5.2 Perceptions of Quality and Best Practices

When earlier I noted that all universities had a potential for quality and excellence within their own mission and goals as Bouge & Hall (2003) suggest, which could be demonstrated through various indicators, little did I visualise quality and excellence as basically personal and individualised constructs that are shared among like-minded people to varying degrees of success. Many of the respondents displayed quite disparate conceptions of what quality educational practice is in the application of industry-based learning at university level. There were those who were happy to describe the quality of what they were aspiring for, rather than the quality of what they were actually doing or achieving at a particular moment in time. The temptation to dwell on 'what ought to happen' rather than 'what is happening' manifested itself in statements such as, 'Contract research is a big possibility, but … as you are aware, lecturers are overloaded with teaching … the benefits … would be very large … [but] unfortunately it hasn't happened' (#NM02) rather than 'We carried out such and such a research with industry at such and such a time or place'. This drew me back and reminded me of the widely acknowledged gap between theory and practice, for I believe that the best manifestation of quality is in the reality, rather than the idea about that reality. Quality, in my view, has to do with the completeness of missions and goals, relevance and the quest for accountability and transparency, issues that I discuss in greater detail below.

5.2.1 Quality academic practice and holistic human development

It is encouraging that although some respondents acknowledged the insufficiency of their own endeavours and their specific situations regarding the practice of industry-based learning, there was appreciation of quality when all systems, plans and actions alike, were taken holistically and contextually. Indications of a gradual decline in adherence to established quality procedures by lecturers including inadequate preparation of students, uncoordinated placements, poor supervision and assessment, and poor liaison with industry featured prominently in the findings. An awareness of the weaknesses of a system is a promise that these weaknesses may be addressed when normality returns in the broader socio-economic outlook of the country. Suffice to say that there have always existed challenges for the university community, administrators, lecturers and support staff, to pull efforts together, whether there existed economic problems or not.

Furthermore, meta-analysis of participants' views indicates a good number of them displaying 'practical reasoning' directed toward action, i.e. figuring out what to do as contrasted with just figuring out how the facts stand (Mezirow, 2009), an important ingredient for action learning. Take the example of the student who observed that, 'Learning experience … 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). This shows consciousness of a holistic orientation to teaching and learning requiring students, university administrators and lecturers to be prepared to work on their own holistic awareness, creating learning environments conducive to whole person learning (Taylor: 2009:10). Lecturers in this study appeared to understand diverse contexts in which they performed and were expected to perform, events that eclipsed their performance, and the educational reality as historically enacted by these events. This is true of the hermeneutic approach to education according to Danner (2002).

5.2.2 Quality as relevance

One pertinent issue in quality discourses is that of relevance. In this study, relevance pertains to plans, activities, programmes and their outcomes. University-industry partnerships by their nature affect the participants (internal relevance) and the wider society (external relevance). Universities in developing countries are icons of both

utility and exclusiveness often linked with alien knowledge generation and management. They regrettably often fall short of applying this and other knowledge to transform their environments towards latent and espoused standards. I view industry-based learning as an opportunity to orient students to solving problems intelligibly in their own backyard, viewing them as challenging and worthy of their attention. Problems of under-development haunt Zimbabwe, a country whose universities effortlessly produce internationally acclaimed scholars and graduates annually while solutions to rampant under-development just over the fence continue to be loaded on charitable and often foreign benevolence.

Relevance of industry-based learning would be a measure of how successfully in the short, medium and long term the country moved towards expanding and diversifying industry and the whole national economy. It would be a measure of the ability to create employment, entrepreneurial and investment opportunities and safeguard livelihoods of the very communities from which both the university and the industry draw their clients, the students and the employees respectively. So when a respondent observes, '… [Our graduates] are still the most preferred by employers both in industry and commerce because of [our] brand', and 'Our graduates are already running … all the major companies in this country …' (#NM01), he is speaking proudly of the relevance and visibility of university graduates in the economically productive sectors of the country. A relevant university programme would also contribute to the expansion and dissemination of technical and 'technopreneurial' knowledge, increasing the efficiency of identifying developmental opportunities. It would also increase career knowledge in schools, and be significantly involved in efforts of sustaining the vibrancy of the nation's technical and vocational education (TVE) system which, in recent times, has been observed to be 'collapsing', leading to the country producing 'educated' personnel who 'lack the experience and technical knowhow required by industry … who are intellectually sharp but are not ready to enter the industrial world' (*Sunday News*, 20 March 2011). This idea is raised by Mazawi (2007) who cites the marginality of vocational programmes and the emerging dominance of academic curricula and semi-academic programmes in colleges and universities of technology offering 'employment-directed training' in Arab countries.

The readiness of graduates to enter the industrial world is a function of their prior learning and experiences, and I presume it is also a consequence of the nature and the rigour of their preparation towards that entrance. The respondents in this study have indicated variously that, although acceptable, some of the processes undertaken in the exercise of the industry-based learning programme under study have been lacking in professionalism and effectiveness. Particular reference is made to student supervision and assessment practices, where comments from students were obtained such as, '… [Lecturers] did not visit me where I was and [I] do not know how they got my supervisor's mark' (Student #0323). Little wonder then that one lecturer would go as far as to propose a written examination for assessing this totally field-based learning experience, an admission that due procedures are flawed, and a teaser for pedagogy.

5.2.3 Quality academic practice in respect to accountability and transparency

University education in developing countries is still largely considered a luxury as governments have been compelled to spend more of their meagre resources on the lower levels of education. In general, higher education systems in developing countries are under great strain and are chronically underfunded although they face escalating demand (International Bank for Reconstruction and Development/World Bank, 2000:10). With depleted resources it is difficult for institutions to venture freely in search of best practices, and to uphold their autonomy. It is easier to share strategies and to rely on watchdog bodies such as the Zimbabwe Council for Higher Education (ZIMCHE) for 'prescriptions' of standards and their subsequent monitoring down the line. As one respondent put it, similar institutions 'need to come together and craft some [common] framework of doing this thing [industry-based learning]' (#OUMC03). The role of industry and government in determining best practices is crucial so that there are no blind spots, and there is less of living 'secret lives' as one respondent (#NL08) noted.

The broad concept of service learning in its various versions is accepted and practised in a number of countries worldwide, and particularly in developed countries it is adapted for all levels of education; primary, secondary and tertiary. In Africa the ideals of Julius Nyerere are documented. His policy on education for self-reliance and his philosophical perspective that 'education places a very personal responsibility upon the educated to ensure the well-being of other community members', are an example of a holistic education that seeks to improve humanity (Hatcher & Erasmus, 2008:53). When one of

the respondents expressed that, 'I would even have wanted high school students to go for attachment' (#OULE08), he was expressing a wish perhaps considered remote in Zimbabwe but one that is commonplace, for example, in the United States of America. And further, those respondents who have pondered about the ideal duration and format of industry-based learning for the university student in Zimbabwe may take a cue from some South Africa academics who are reported to have strengthened their resolve to 'use service learning pedagogy and continuously adapt it to reflect and accommodate uniquely South African contexts and realities (Hatcher & Erasmus, 2008:50). In short, then, the discourse on quality is a very prolonged one. It is as good as the learning itself.

5.3 Learning and Knowledge Development

This study underscores the importance of integrating formalised university classroom learning with informal learning in the real workplaces, both sites meant to provide the learner with a pre-determined repertoire of knowledge and skills to begin a career in similar workplaces. The idea is that learning for life is not confined to one locality and learning equips the learner for change. Perhaps the following statements explain this: 'Learning is all around us', and 'Learning must be equal to or greater than the rate of change' (Teare & Prestoungrange, 2004). These are some of the proclamations attributed to Reg Revans, the brain behind the Revans University of Action Learning created in 2000 in Scotland. Revans is also reported to have identified with wise sayings by other greats, such as, 'That which we learn to do, we learn by doing' by Aristotle. What drives learning in an individual or a group or a community is often not what is known, but the unknown. A society with many real challenges is pushed to learn, because challenges create action and action builds knowledge. Knowledge eventually becomes differentially distributed among society's members as the bulk of learning gets entrusted to certain members of the society that have the capacity to adopt and apply it. Knowledge-driven practice characterises the society that has chosen a progressive path of social development. Knowledge is discovered by innovators, acquired and developed by experts and then bequeathed to all others (the learners and subsequent users) by professionals and professionally developed practitioners.

5.3.1 Learning and work

University learning seems to be the pinnacle of learning and it is not universally available to the majority of people in any society. Those who possess university education hold a premium as knowledge has long outdone physical capital as the measure of wealth in the modern global economy (International Bank for Reconstruction and Development/World Bank, 2000:9). What the university students learn, and how they learn to satisfy their natural quest for learning becomes a concern for society and its watchdog institutions. A choice to put through students in service learning programmes speaks of the goals of a society seeking to integrate a character of service in learning, work and life. University education in developing African countries may seek to interrogate issues of theory and epistemology such as constructivism, to evaluate the relevance of Western knowledge and education, to find space and legitimacy for indigenous knowledge and to justify the African cause. The underlying purpose in all cases, however, is to secure the survival of African societies through eradicating hunger, disease, poverty and ignorance among many other realities that portray the stark inadequacies of Africa compared to other nations.

A common notion is that young children spend most of their time in school learning as well as playing, and doing little work, while adults spend most of theirs between work and leisure, with less formal learning. There is an element of truth in this. In asking the question, 'Can work and learning really co-exist?' (Teare & Prestoungrange, 2004:52), Reg Revans evokes in certain minds the inter-connectedness of people and their lifestyles in a variety of real life, unassuming situations; people such as workers, customers, learners, visitors, children, et cetera. One of the respondents in this study noted that as young impressionable students go out in society, they become better, responsible citizens, and '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' (#IND01). The point of the university as a learning community has been raised earlier, and it emphasises the co-existence of work and learning in a subtle way. The learning community, for its part, is a dynamic grouping of co-existing people with overlapping goals and aspirations, who share a substantial amount of public knowledge.

5.3.2 Theory and Practice

Industry-based learning brings into the fore the familiar arguments between theory and practice in knowledge acquisition as well as in academic discourses in general. The theory-practical gap worries educators at all levels of the education system, causing practitioners to ponder over arguments such as 'how to teach is the teacher's choice, how to learn is the student's choice' (Perkins, 2006:45). The implication is that teachers can prescribe ways of teaching they think will make students learn best, giving little thought to whether students actually do learn best in those ways.

The findings of this study indicate that the university students' choices of how to learn depended somewhat on their perception of three factors. The first was curriculum coherence, in which the students perceived continuity and connection between learning experiences carried out in different sites, university campus and industry workplace for example. The second factor was the learning experience itself, in which students judged the conveniences and challenges of doing what they had to do to be said to have learnt, whether through theory or practice. And the third factor was concerned with assessment processes, in which the students questioned the mechanisms of transforming the worth and completeness of their learning experiences into some license to enter the world of work.

Was there a difference in learning effectiveness when the students were in industry compared to when they were on campus? This point was not directly investigated in the study but the perceptions expressed by respondents show that basically there were two different but overlapping learning regimes experienced at the two sites. On campus, students were provided with a culture of strong intellectual advancement accompanied by comparatively less social and professional training. In industry, the same students got strong professional advancement and comparatively less social and intellectual training. The act of exposing students to professionals in industry, who would be their colleagues and bosses a few years later, was like putting role models in front of them to act and practice what the lecturers taught them in theory in campus classes. This confirms that if we want students to act in certain ways, it helps for us and other models to act in that same way (Wolsterstorff, 2002:123).

Was there a difference when students sat in class and absorbed information dished out by a lecturer or read from a text compared to when they went out and engaged in physical work? Moving between learning through theory and through practice assists those struggling students to whom knowledge and skill acquisition is ordinarily an intellectual burden. To assist such students, Perkins (2006) proposes the use of 'pragmatic constructivism', a practice of luring students into learning in ways deeper than those to which they might be disposed, in order to tackle 'troublesome knowledge', such as university curricula.

Can theory be useful without practice? The logical observation from the industry-based learning experience and impact is that the two are sides of the same coin. Campus learning alone for the average student apparently becomes insufficient to equip a lifelong professional with requisite skills to survive the challenges of the workplace in a changing economic environment. Similarly industry-based learning alone would deprive the ultimate worker of the intellectual endowment needed to survive the troublesome and challenging workplace. Advising that theory and practice be recognised separately for their roles in holistic learning, Giroux (2001:21) notes that 'Theory and practice represent a particular alliance, not a unity in which one dissolves into the other'. In essence, we should celebrate the pedagogies that integrate physical real life experiences with contrived intellectual enhancement. As a result, theory and practice, while interconnected at the point of experience, should also be regarded as representing distinct and analytical moments that do not collapse into each other (Giroux, 2001:99). This to me means that the theory-practice gap must remain, because it is a healthy and useful gap, but bridges are required to minimise the gap.

5.3.3 Higher learning and creativity

Does industry-based learning appear to stimulate, promote or enhance creativity and innovativeness in students and their lecturers? This might be a good question for a separate research study. Some of the respondents were optimistic. According to one, industry-based learning promotes the skill of 'trail blazing the path of problem-solving' (#NM01), and in general students, lecturers and industry supervisors agreed that students had and used the opportunity to contribute new ideas to improve their organisations of attachment. Creativity and innovativeness are inborn human traits that

are facilitated by learning and experience, and industry-based learning affords huge opportunities for both. Coupled with transformative learning, service learning inspires people to explore, inquire and analyse (Pompa, 2005:191), thus nurturing creativity and innovativeness.

In a Finnish study on university student reflections on their off-campus work practice, Valo (2000:173) concluded that students in his study did not differ much from the highly educated persons already in working life. He reports that 'Professionals in industrial societies tend to emphasise autonomy and disposition as well as interesting and demanding work-tasks, while people who have not attended higher education put stronger emphasis on income, status, job security and reduced workload'.

5.3.3 Experiential learning

Whether contrived or fortuitous, the encounter between the student in the decisive stage of his/her life with the workplace brings hope of a future approached with confidence. Industrial attachment reduces the anxiety and uncertainty which occurs when someone experiences something for the first time, such as the factory. For NUST graduates, the factory has already become something familiar to them. They have acclimatised to factory life, and 'It's a place they know' (# NM02). Moreover, in the current state of affairs, the IA compensates for the brain drain affecting the availability of qualified and experienced lecturers. By interacting with industry supervisors and being exposed to industrial processes, the student is making up for instances when at university he has to while away time, being lectured by constrained lecturers or less experienced and qualified teaching assistants. Industrial attachment is like a familiarisation or preparatory trip to a place one is interested to spend time at. When students return to campus for their final year to report, reflect, and review their experiences, they are using different lenses to view the efficacy of their learning and the knowledge they construct and share with colleagues, peers and superiors.

5.3.4 Fit-for-purpose strategy

One respondent reminded us that NUST, as the second national university in the country, was allowed to adopt IA programmes so as to produce graduates that meet the needs of industry, leaving the University of Zimbabwe to retain its emphasis on basic science or basic research (#NM03). The path that the newer Zimbabwe universities have

taken, of collectively adopting one model of instruction in the name of industrial attachment, signals a realisation of the country's industrialisation dream. Zimbabwe industry basically requires a hands-on workforce and management rather than a basic research orientated leadership because industry and business are largely a foreign investment, deriving advanced knowledge, research and systems from parent companies in developed countries. With the recent formation of the Zimbabwe Council for Higher Education (ZIMCHE) and consolidation of relations between the council, the Ministry of Higher and Tertiary Education and the universities themselves, it is hoped that consensus will be reached on how all the universities, new and old, will streamline their visions and missions in view of both autonomy and service to the nation.

Meanwhile it is important how individuals and structures within the universities view their own practice, so that they can inform or evaluate decisions made by regulatory bodies on their behalf. Have they, for instance, internalised the key policies and programmes undertaken in their institution? Do they articulate their experiences well? Do different practitioners agree and share sentiments, within and between universities? The perception of participants of existing quality practices associated with workplace-based learning programmes underscores their trust in effective university-industry partnerships. Continuous interrogation and review will enhance quality management at universities by finding out and articulating what should be developed according to Bowden and Marton (1998), presumably consistently effective, locally relevant and responsive graduates.

5.4 Research-enhanced Practices

Possessing the skills of investigation, exploration, inquiry, problem-identification, problem-definition, and problem-solving, among others, confers the possessor with numerous capabilities with which to engage meaningfully and intelligently his/her mysterious environment, seeking truth and evidence to back that truth. In higher education academic practitioners respect evidence-based practice (Taber, 2007) and action research promotes collection of evidence on the immediate experiences of practitioners to understand and effect change in professional practice. Quality practices attract the attention of peers and invite supporters and competitors, while change improves the same quality practices to maintain competitive advantage and relevance.

Action research thus is anchored in its relevance to the situation and the participants and contributes to long-term societal development.

5.4.1 Academic research

Research always carries many ethical connotations, whether it is applied or purely academic research. It can be a volatile intellectual activity that needs to be purposeful, situational and user-specific; it may claim to be useful to society but is also subject to misuse, even abuse because only a few people can fully comprehend it particularly when it is still unfolding. Thus it is imperative to spell out local and imported agendas for research, their possible effects and outcomes thereof.

I am interested in the cyclic aura of research-driven learning and learning-focused research within the broader realm of holistic learning. Although, to many an educator, it is easier and perhaps more desirable to become a lecturer than to be a researcher, university lecturers are courteously but cautiously invited to become both, for good reason. Theirs is a vocation of influence and power that safeguards the heritage of a nation in terms of unifying the people, the material world at their disposal, and knowledge. The respondents in this study were generally sceptical about their own research capabilities, let alone their engagement, expressing the wish to do more than they were doing at the time. They would say, '… research is a big possibility, but … lecturers are overloaded with teaching to move in that direction' (#NM02). If local research is not undertaken, what drives the teaching and the knowledge that is shared with students? Is this a legitimation of alien agendas and imported values brewed from researches carried out far afield? And if great amounts and many years of teaching and learning experiences are allowed to pass by without being subjected to systematic investigation, manipulation, analysis, synthesis and evaluation, is this not a waste of opportunity for growth?

5.4.2 Need for Action Research

A young modern university that specialises in science and technology, and commercial and community development disciplines needs to consider broadening its research portfolio to embrace more than the traditional positivist and quantitative regimes of inquiry. Action research involves evaluation of practitioners' on-going practices and experiences, and tends to stimulate participants to introspect, wondering: What drives

our actions? What are we not doing right? Who is the researcher? What is the motive? The research-literate university community can intelligibly analyse and critique research processes that affect them. Thus the whole research becomes a personalised and sensitive exercise where ethical considerations take high priority. The complementarity among regimes of research effort increases usable knowledge, producing a knowledge-intensive society. The reported recent arrival of the Emerging Global Model (EGM) university concept, a sub-set of 'research universities', has brought universities 'characterised by an intensity of research that far exceeds past experience, as well as world-wide competition for students, faculty, staff, and funding' (Mohrman, Ma & Baker, 2007). EGM universities are also said to brook faculty that become members of 'team-orientated, cross-disciplinary, and international partnerships, with research directed more often than before toward real-world problems' (Mohrman, Ma & Baker, 2007:147).

5.5 Community engagement and development for quality enhancement

Respondents in this study have hinted at the importance of three realities pertinent to engagement that enhance social cohesion, the three C's, namely community, context, and cooperation. The importance of belonging was implied in a number of responses given. On establishing working relationships between the university and its hosting neighbourhood, Heyneman, Kraince, Lesko and Bastedo (2007:71) say the following:

> Building social cohesion requires a commitment to forging linkages with the wider community. A university that is engaged in the community demonstrates to the public that everyone can benefit from higher education and that the university cares about the health of its surrounding community. Ultimately, this helps facilitate integration and goodwill between "town and gown".

Communities are the bedrock of engagement in social development and they hold sway in the ultimate determination of destinies for their members. The communities have a cultural, social, economic and historical background that defines the context in which operations of an institution such as a university are immersed.

A developing university in a developing country seeking world-class status is engulfed in the milieu of communities, organisations and other universities in various stages of development both locally and abroad. These exert push and pull forces that keep the university in a buoyant position (See Figure. 5.1), sometimes maintaining a momentary state of dynamic equilibrium when the aims of the dominant stakeholders are satisfied.

Underdeveloped or impoverished communities and organisations in the neighbourhood of a university aspiring for world-class status tend to exert *pull-down* forces exemplified by instances of disputes, theft, vandalism, and a cultural gap. But the university can turn these forces around into *pull-up* forces if it engages the communities and works to improve them through active participation, resources sharing and knowledge-seeding. Conversely, vibrant, knowledge-seeking and self-motivated communities may present *push-up* forces to a university that enthusiastically takes up their challenges through research and innovation. And still, the university may unwittingly inflict *push-down* forces on its neighbouring communities by marginalising locals, denying them employment, contracts and tenders, and imposing undue restrictions on local student recruitments.

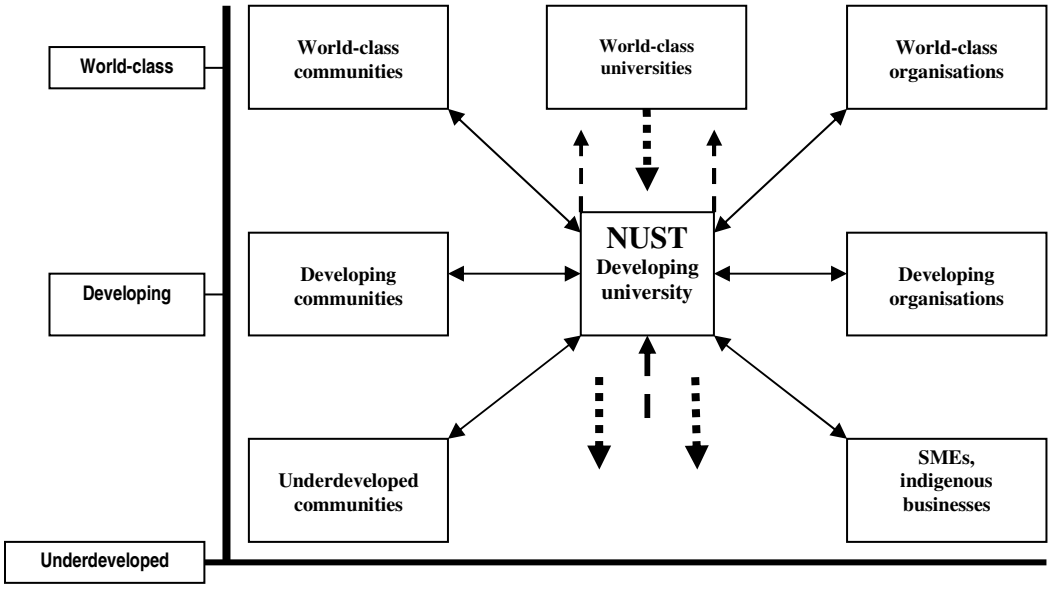


Figure 5.1 NUST and world-class status: push and pull forces at work

The scenario described above can occur to a lesser or greater extent between the university and its world-class associates above it. When a university uplifts its neighbouring communities, it increases its own chances of ascendency, because in so doing it will not fail to be noticed by its peers and other significant opinion holders. Community engagement is a manifestation of social cohesion which is facilitated in a university by a proactive leadership that, according to Heyneman et al. (2007:64), explains and defends the role of higher education, and promotes public debate on sensitive issues and engagement with international scholarly communities. Such a

leadership works with faculty to develop curricula that reflect social problems, employs empirical research on social issues, attracts students and faculty who are broadly representative of the wider population, establishes linkages with the wider community, fosters academic freedom, institutional autonomy, publicly available standards of student and faculty conduct, a transparent process of adjudication for misconduct, and attract multiple sources of finance aside from government and fixed donors.

The characteristics of lecturers within an institution are said to be important in decision-making processes and in influencing change in the communities. Vessuri (2008:119) notes that scientists generally have difficulty communicating across plural perspectives, conditioned as they are by a specialised and rather dogmatic scientific orientation. However, artists and humanities specialists tend to trivialise technical depth and complexity in preference to opinions and relationships. In this light a project carried out in a community may be viewed in terms of its social impact rather than its technical feasibility. Vessuri notes further that in weaker countries with inadequate capacities and basic infrastructure, higher education, science and technology have not significantly reduced social and economic disparities but rather increased social and economic differentials between the knowledgeable and the ignorant within communities.

The success of achieving all of the above rests on the approachability and marketability of the university. Throughout its history the university has been seen to have woven a closely-knit network of relationships with other institutions and groups in society, creating the so-called 'university-surroundings relationship', but it has also been noted that the university 'has interests and objectives that are not common with organisations such as the government, industry, NGOs, communities and, in general, the sector outside the institution' (Parra-Sandoval, Carmona and Gonzalez, 2010:62).

5.6 Transformation

Indications of personal and behavioural transformation were brought up by respondents in this study. Coming back from attachment, students were seen by their lecturers as having improved in a number of observable and desirable ways, including their command of language. 'They come back very fluent in English, thinking in English. They come back … much more [global-minded] … it's very fair to say they are all terribly motivated as a result of that industrial attachment' (#NL12). And since language

is an aspect of culture, there is an implication of transformation on the broader aspect of culture of participants deriving from the participation.

5.6.1 Cultural transformation

Mills and Gale (2010:75) allude to the phenomenon of the 'cultural capital' as the behaviours, competencies, values, knowledges and attitudes of students that get shaped and then transmitted through generations, and whose accumulation requires an investment of resources, mainly time. One of the respondents argued that,

> They [students] are raised in your own African tradition. They are not expected to come up with ideas. They are not expected to talk to [old] adults. They are not expected to invent things ... But after they've been with us … they come back … they are thinking of solutions now, ideas and solutions in [ways] that they never were before (#NL12).

5.6.2 Social transformation

Closely linked to cultural transformation is social transformation that addresses relationships, livelihoods, power perceptions and practices, incorporating leadership development in social spaces and workplaces. Some of these are shaped by the technological advances that have replaced much of the traditional forms of work with machines and automation. The rapid transition from pre-industrial to industrial society requires the active development of people to take part in the new form of life for survival, principally dominated by paid work. In the Southern African context, people development is thought of around the positioning of 'ubuntu', a cherished version of humanism, and a philosophy of teamwork and collaboration that has the power to reshape our workplaces, our relationships and our personal lives (Lundin & Nelson, 2010).

5.6.3 Industrial transformation

Can we speak of an industrial transformation? Would this be a modern version of the industrial revolution? Countries such as Zimbabwe are unlikely to experience an industrial revolution of the same magnitude and significance as the historical European experience of the eighteenth century. However, an industrial transformation may be the vehicle to lift Zimbabwe up from the predicament of being an industrially or economically marginalised country. Students and lecturers stand to become the agents of that transformation rather than the reproduction of retrogressive whole or part cultures of yesteryear.

Industry-based learning assists African students (and their lecturers) with the ability to merge two sub-cultures, both relatively alien to their mainstream culture, and very little-known by the generations before them. These are the university sub-culture (the preparatory culture), and the industry sub-culture (the destination culture). Through these they hope to steer their country via small revolutions of knowledge leading to progressive awareness of industry in the world of technology, mechanisation, mass production and consumerism, all in a bid to survive and compete with well-endowed counterparts. And if the industry-based learning model selected by universities in Zimbabwe is a national vision (stated or implied), or indeed one of the small revolutions for combating the unavailability and inadequacies of equipment, laboratories, workshops and other resources on campuses, as observed by some respondents, it remains to be seen if this type of learning will yield results enviable to other counterparts in Africa and the rest of the developing world in the near or remote future. However, it is interesting that Parra-Sandoval et al. (2010:33) report the following:

> Our theoretical and methodological journey led us to the conviction that the search for one universal model for Latin America (and the South of the planet) was a useless effort, because the complexity and celerity with which the higher education systems in these regions configure and reconfigure, following concepts and orientations that may even be contradictory, impede realising the dream of an ideal model worthy of being reproduced.

Be that as it may, the industry-based learning pedagogy in itself is set to educate emerging third world societies to move slowly towards industrial awareness. This is captured in the respondents' comments,

> … [Students] actually help our society to be more enlightened about what is happening within our industry, because these are the ambassadors who will go back home and say, 'Such and such an industry is operating like this', and the nation knows which industry to support, which industry has got problems, without really having to know about the shares, how they operate at the exchange, in the stock exchange' (#NL09).

A final quip on transformation is from Reg Revans who is quoted saying, 'Those unable to change themselves cannot change what goes on around them' (Teare & Prestongrange, 2004:39). It might be prudent for Zimbabwean university graduates to explore their own change capabilities and agendas. Issues of mass unemployment and misemployment, human resource wastage, brain drain and unequal wealth distribution have the potential of being addressed through the deliberate experimentation with small and medium scale enterprises (SMEs) as suggested often in the literature and in public debates. With proper planning, management of available resources, education and professional development can produce change in individuals and in what goes on

around them. The best laid plans are those aligned to well-formulated goals and purposes for action, a point we now turn to in the next section.

5.7 Goal-directed Action and Critical Thinking

The relationship between the university and its surrounding communities, discussed above, and the pressure exercised by market conditions derived from the globalisation process, challenge the university to delineate its space carefully and determine its road map in a jungle. The demand for the university to integrate itself actively in the sustainable development process in underdeveloped countries generates a set of internal and external factors that subject the institution to tensions characteristic of the epochal change experienced by humanity (Parra-Sandoval et al., 2010:15). To enjoy long periods of relevance and acceptability, an institution has to have a mechanism of goal-direction sustained by critical thinking.

5.7.1 Setting and nurturing goals

One of the goals the university and its internal players have to determine is the type of institution it wants to be known as among the many versions that have existed and others that have emerged through the ages. There have been calls for research universities, entrepreneurial universities, innovation universities, developmental universities, socialist universities, including emerging global model universities (Mohrman, Ma & Baker, 2007). The underlying factor among all types is whether they prioritise knowledge production, knowledge reproduction or recycling.

The noble dream of establishing the first national university of science and technology in the country which, in its teaching would ‘combine sound theoretical training with a strong applied orientation’ (Williams, 1989) has had a ripple effect on the national thinking and conscience regarding the general direction of university education in the country. Following up on this initiative, the Science and Technology Policy has been proclaimed, with its objective to ‘promote national scientific and technological self-reliance’ (Republic of Zimbabwe, 2004). Further evidence of goal-directed action in the university sector has been seen in the resuscitation of the National Manpower Advisory Council (NAMACO), composed of industry, commerce and the public sector, and which advises government on the country’s training needs and relevant training

programmes, to ensure that curricula in institutions are 'aligned to the needs of industry' (Zimbabwe, 2008).

One of the respondents noted that NUST had chosen a path of incorporating industrial attachment which; after a few years of its implementation, '… it seems obvious that it's more popular, at least in case of Zimbabwe's needs, where other universities … have begun to implement [it] as part of their degree programmes' (#NM03). The popularity of the industry-based learning programme, presumably derived from observed and proven successes, gives hope that the goals set in the beginning have achieved practical credence.

5.7.2 Critical theory and critical thinking

A comparison is given that, like the fish that has trouble understanding the very sea surrounding it, we have trouble identifying the influence of our culture on our own behaviours and ideas because we are so immersed in it and are part of it, "… until an experience with a different culture shows us that things might be other than the way we've always known them to be (Hinchey, 2010:13). Being critical is central to paradigm change, and an organisation that creates an environment for frank critical inputs is the better. Critical theory offers us an alternative perspective to use in analysing our own experiences, as the fish would get an entirely new perspective of the sea if it were able to consider it from the beach. The usefulness of critical theory in our practice is that 'it helps open our minds to possibilities we once found unimaginable' (Hinchey, 2010:13).

One respondent engaged in critical thinking when analysing the role and treatment of industrial attachment students compared to apprentices in industry. He complained that the government and industry do not consider university students on attachment to be of more benefit or to be equally important as the apprentices. He adds,

> In most companies the apprentices have better privileges, remuneration and are treated as people who have been permanently employed. Isn't there something that can be done so that the government and industry can see the value in the [university] student even before completion of their degrees? (#0281).

Using the usual paradigm that university students must be treated in the same manner or better, this student did not appreciate the different foci of two separately conceived programmes. However, he raised a question that is critical of the top policy that

determines vocational education and experiential learning. In essence the student could be asking whether the two methods of developing qualified personnel are significantly different since their graduates pass through the same place and experience. In the end one ponders whether the comparison will not continue into the rest of the working life of the graduates.

5.7.3 Acting decisively

Competitiveness is a virtue for any organisation seeking visibility and world-class status. Goal-directed action works for the good if it is accompanied by decisive action in guarding jealously programmes of innovation such as industry-based learning, which respondents are happy to describe as 'a brilliant invention, [which] gives students practice in the real world, [where] they contribute to the company by being honest, sober, smart, hard-working and motivated' (#NL12). Guarding a valued innovation requires committing resources and mobilising partners towards a common cause. Competitive and competing universities taking up industry-based learning within the country afford opportunities for sharing of experiences and knowledge development. Banking on past successes may be retrogressive. Observations such as, '… insofar as Zimbabwe is concerned in particular, NUST is quite ahead … It is a leader in that area [of industrial attachment]' (#NM01) are very encouraging but they need to be supported by appropriate action.

The overwhelming approval accorded to the industrial attachment programme by the respondent means that it must be given the chance to continue and take its place among initiatives to develop human resources to the full. However, many cautions and reservations have been expressed that need to be addressed. Areas that the respondents repeatedly cautioned about as needing decisive action include proper orientation of students prior to going out, effectiveness and authenticity of supervision and assessment, frequency, duration and timing of visits, relevance of experience to degree programme, development of research, et cetera. Specific concerns have been raised about what appears to be very simple aspects that could be solved at department level such as, 'I feel the assessment forms are now outdated. They need to be reviewed in relation to new technology and environmental changes' (Lecturer #1021).

The support of partners is suggested by the student respondent who said, 'Industry should also support NUST by donating [laboratory and workshop] equipment so that the university does not only provide theoretical education but also practical education (#0314). Another student did not have the knowledge about how the university interacted with industry, pointing out that,

> NUST should be well represented in all [national] forums like the Tripartite Negotiating Forum (TNF) and also there should be an Industrial Liaison office for IA, unlike the present situation where students look for work themselves' (#0281).

The effort to make students fully knowledgeable about their industrial experience may just be a matter of one or two relevant authorities making a critical decision. Decisions made today shape the future, and good practices sustained provide a legacy for future generations.

5.8 Building a Legacy: The Future Beckons

Universities in developing countries debate the need for expanding their scientific, technological and innovative potential and the urgency of taking care of conditions that prolong inequality and poverty (Parra-Sandoval, 2010). This perhaps serves as their moral purpose. For a university of science and technology, the challenge is great of annually producing highly acclaimed graduates who fail to make an impact to change the industrial capacity and outlook of their country, but can easily walk to any other country and get employed. Walking the paces of industrial attachment promises to leave a feeling of concern for, and an attachment to, the deprived communities in at least some of the graduates, who will want to learn more about local problems and feel they have a responsibility to leave a mark on the landscape for the benefit of those still to come.

5.8.1 Learning for life

The importance of learning and its contribution to knowledge development has been discussed in section 5.3 above. An additional aspect of concern here relates to learning for change and learning in order to leave a legacy of the importance of learning to others. It also speaks about learning from change and changing from learning. 'The only way to cope with a changing world is to keep learning' (Dixon, 1998 in Teare & Prestoungrange, 2004:40). Industry and commerce are still a new culture or sub-culture to the majority of African learners, and moving successfully to embrace that culture

demands a change of paradigm right from childhood through formal schooling into adulthood. The role of the lecturer is to practise what Newell (2010) calls culturally responsive teaching which uses cultural knowledge, prior experiences and performance styles of students to make learning more appropriate and effective to them.

5.8.2 Passing the baton

An interesting and encouraging revelation by one Faculty of Commerce lecturer was that,

> Most of [our graduates] are trying by all means to set up some technical colleges in the rural areas, to be able to train the less privileged so that they can at least go up in the same field one day' (#NL09).

The truth and authenticity of this claim would need some verifying through accepted protocols, but it is a thought that describes the idea of academic philanthropy.

5.9 Conclusion

This chapter has brought together into one perspective many wide-ranging and all-encompassing issues pertaining to the objectives, the research questions, the methodology and the presented findings of the study. A few aspects in the findings that had not been given due analysis and interpretation in the previous chapter have been raised here. A predominantly qualitative study has the potential to produce in-depth questions and ideas that qualify the significance of results and findings. This chapter has been an attempt to synthesise the views of various participants with the author's reflections and interpretations. The blending and/or discordant voices of the author on one hand, and of the respondents on the other, with the hidden backing of the literature, add to the excitement of the discourse on the topic under discussion.

On the spotlight in this whole study is the perception of quality practice and outcomes by those directly engaged in the use of industry-based learning as a pedagogic approach, that is students, lecturers and university management staff, the so-called insiders. To assist them has been the inclusion of the perceptions of strategic partners, industry supervisors, the so-called inside-outsiders, and competitors and collaborators from other universities, the outsiders in this case. The synergised perceptions of quality thus mobilised are anticipated to be invincible to the lay sceptic as a first step towards aspiring for expert and world-class articulation of quality.

One difficult preoccupation is to think and act holistically. Stages and activities in life are easily described in piecemeal manner, and judgements derived from such descriptions often fail to produce sustainable outcomes. The discussion on holistic human development reminds practitioners of creating historical and contextual links between plans, actions and evaluations of these in order to realise big goals. The admission that participants are individuals with personalised, temporary and limited contributions to big phenomena is a step towards holistic wisdom. Part of the pursuit of holistic wisdom is the admission that quality can hardly be divorced from relevance. Industry-based learning gets perceived as a qualitative undertaking by those who can vouch for its short, medium and long term relevance. Enthusiastic industry-based learning promoters and practitioners have a duty to be truly accountable and transparent particularly towards their local communities and their country.

Discussing learning and knowledge development in this chapter is relevant to maximise intellectual capital development as a priority in modern institutions of higher learning. Knowledge built from the mix between classroom learning and work is considered more superior to other knowledge, and we should strive to have work and learning co-exist. This would be our contribution to defining the best-fitting interpretation of the theory-practice divide which would address our peculiar social concerns and answer our specific personal questions. No doubt the practice of academic research and the adoption of action research stand to enhance outcomes as experienced in leading countries and institutions that employ these. Community engagement is an energy consuming process in which the university experiences push and pull forces that put to the test its determination to stay in the race for world-class status.

The desired outcome of quality undertakings in developmental setups is transformation, whose direction in the context of industry-based learning intervention discussed in this study could be cultural, social or industrial. The primacy of critical thinking and goal-directed action ensures the building of a lasting legacy of societal improvement, the undisputed quest for humanity. In the next and final chapter the key stages of the overall research study are summarised, conclusions are drawn and recommendations for future action are made in the light of new and prior knowledge.

CHAPTER 6: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

The conception of this study was a culmination of personal experience and progressive reflection on my own practice and those of colleagues, as well as shared views in various interactive forums. In its development and undertaking the study has revealed a number of outcomes or avenues that conceptualise its impact on the consumer of the study. It is illuminative in that it attempts to highlight both the predominant utterances and the undertones of a shared activity by the very participants in their own voices. It is also an explorative undertaking, traversing new conceptual terrains by raising issues that arise out of simplistic questions posed in a variety of dimensions for any interested persons to decide what they need to do. After all, quality practice results mainly from introspection. The usefulness of this study is that it informs the university under case study as well as other similar universities, particularly those that participated in providing information for the study. In this closing chapter I put all the pieces together, draw conclusions and lay on the table my own insight into the way forward. I start by summarising the conceptions, procedures and the findings of the study presented in the previous chapters.

6.2 Summary of the research process

The study was conceived to address the key question: *How does industry-based learning enhance quality academic practices and relevance to national needs of Zimbabwe?* This question was posed in the backdrop of a pioneering pedagogy adopted by the National University of Science and Technology (NUST) at its inception almost two decades ago in which the university dedicated a full year to deploying students into discipline-related workplaces as an integral part of their degree studies. This industry-based learning pedagogy, termed 'industrial attachment' by the founding university, exists in some universities in other countries of the world as described in the literature, albeit in different formats. Because the pedagogy is central to all the university's degree programmes, it has an impact on the academic practices such as curriculum development, teaching and assessment. And because it takes place outside the university's physical confines in autonomous workplaces, the question of its relevance out there and ultimately to the nation arises. These two aspects are linked together by the prerequisite for quality. For the sake of the discourse the key question was divided into sub-questions that seek specific information from different respondents pertaining to different themes. The

rationale for asking the question and sub-questions was when, a few years down the road, other new universities coming onto the scene began adopting the very same pedagogy

The theoretical framework, informed by the literature, situates industry-based learning in the realm of learning and teaching theory, learning experience, community development, university-community partnerships, the university mission and research for practice. The bulk of the supporting literature underscores the gains made in using tested theory to enrich teaching and learning experiences in outward-looking universities that had their surrounding communities in mind when designing their programmes.

The research design and methods of obtaining data that addressed the research question are the concurrent embedded design of the mixed methods approach in which both qualitative and quantitative data was collected and analysed simultaneously. The method of case study was applied because central issues raised were concerned with one institution from which most of the data was collected. The population consisted of management and lecturing staff at the university, supervisory staff in industry and selected management and lecturing staff from other universities. The data collection techniques were interviews and questionnaires. The response rates from samples were not overwhelming but were encouraging and sufficient to deduce trustworthy findings. Qualitative data from interviews and from open-ended questions in the questionnaires was analysed using thematic content analysis, while quantitative questionnaire data was analysed statistically using computer software and by enlisting the assistance of university-appointed statisticians.

The findings, their analysis and their interpretations are discussed in the section below in relation to the research questions and sub-questions. It is prudent to point out that the findings of this study shape and consolidate what I have learned from my own professional experience as a teacher and lecturer, what I have learned from reading the literature, and from engaging in scholarly discourse with other academic authorities. In particular, the study has pointed to the importance of a match between theory and practice in learning in higher education, and that this enhances the quality of the learning. Part of my learning has resulted in my constructing patterns and relationships between theoretical and practical learning approaches as presented later in Figure 6.1.

6.3 Reflections on Research Questions and Findings

This section reflects on whether the research and its findings answer the stated questions and sub-questions, and to what extent, pointing out what may be missing or lacking. The title of this thesis and the key research question bear two key terms: quality in academic practices, and integrated workplace-based learning. Both will be unpacked in the discussion that follows.

6.3.1 The nature and quality of academic practices

The question addressing this major theme was: *What understandings do participating students, lecturers and industry supervisors wield on the nature and quality of academic practices realised through industry-based learning at NUST?* In various verbal depictions of their internalised understanding of the notion of quality, the three categories of respondents had the expected view of excellence couched in terms such as 'correct procedures', 'high standards', 'scores', 'matching theory with practice', 'learning for real life', et cetera. For the more adult lecturers and university management staff, there was much description of quality as something out there, rather than a personal attribute first and foremost. Respondents could realise and visualise quality in processes and outcomes.

There was also much confidence among many that quality was attained and attainable in the practices that took place in the conduct of industry-based learning. For instance, the belief that quality graduates were produced was aired persistently and confidently by respondents, some supporting it with claims that some graduates easily got employed anywhere in the world, while others got places in foreign universities to further their studies. Whether the mentioned successes were not affected by other factors such as past history, country comparisons, et cetera. was not probed further. Yet one could argue that such certainty had to be supported by empirical evidence. Bouge and Hall's (2003:9) idea that 'Quality is conformance to mission specification and goal achievement – within publicly accepted standards of accountability and integrity' was barely alluded to in the descriptions of staff respondents. Also missing was the perception of quality from a personal experience point of view. On their part, students were more conservative about their perception of quality. For instance, among many revelations they viewed the industry-based learning experiences less useful in preparing for their final year project than their lecturers did, and they were very clear that student

welfare was not handled qualitatively enough for their comfort. In a nutshell, lecturers and industry supervisors viewed the NUST brand of industry-based learning as significant in enhancing quality academic practices in university teaching and learning, while the students thought less so. The limited opinions on and the admission of reduced activity in research by lecturers reduced the strength of opinions on research-driven learning and learning-focused research and development (R&D) driven by the current industry-based learning format as an effective university service.

6.3.2 The pedagogy and its perceived relevance

The research question put forward was: *How do the views of participants inform analysis of the local relevance and impact of value-added university education on national socio-economic development?* Universities and industry have various platforms of their partnership and collaboration in action, such as the formal and informal levels of relationships alluded to earlier by Ebong (2004). But none, in my view, is as persistent and penetrating as a full-year industrial attachment arrangement year on year, with the student in the middle between the university and the organisation, perhaps asking questions such as, 'Who is the stronger boss?' The industry-based learning pedagogy appears to be onerous on both the university and the organisation on one hand, yet also beneficial on the other, because the student has to meet requirements of both at the same time. What keeps the relationship going is perhaps the perception of mutual relevance that promises chances for both stability and creativity.

It has been repeatedly stated in the earlier chapters that industry-based learning should be relevant to the participants, particularly the students. Their immediate personal needs are cognitive, social, psychological and emotional. On a wider scale feature contribution and cooperation in the affairs of others, coupled with concerns for the future such as anticipations, ambitions, development. On a national level graduates should be able to participate in fixing their economic and industrial potential by engaging in all levels of the economy rather than leaving it to others, much like the shoe trader who does not wear the shoes he sells to others.

6.3.3 Shared conceptions and visions

The question posed is: *How do sentiments shared between NUST and other Zimbabwean universities engaged in industry-based learning indicate their awareness of quality*

practices and the importance of a needs-based and responsive higher education? In the findings and their analysis I explained in some depth the views of universities other the case that is being studied, and it was apparent that there were huge areas of overlap in conceptualisations of practice and aspirations.

One area of consensus among universities is the value added to learning and curriculum development processes and to teaching and learning that flows from industry-based learning. In practice it is difficult to reach a goal if one does not have one. Goal-setting informed by the mission of the university and considering the relevance of any action taken are seen as a virtue. Assimilation into the culture of industrialisation is encouraged, and although the one year period was viewed as convenient and effective, a lifelong learning approach would be more effective.

6.4 Summary of issues emerging from findings

The discussion linking research questions and findings in section 6.3 above has touched on some of the key wisdoms emerging from the study as a whole. It is useful to bring out a summary of these wisdoms in relation to other perceived breakthroughs that inform the academic community about quality concerns in workplace-based learning in higher education institutions. By and large, the findings of this study confirm much of the expressed notions of quality in higher education portrayed in the literature and in practice, such as that industry-based learning in itself is not faulty, but that the people and the methods of applying it may be faulty. Furthermore, some pertinent refinements to the traditionally held definitions of quality indicators emerge, and the task of the university is to access such refinements and select for application appropriately.

6.4.1 Quality is relative but unmistakable

The conception that quality is both a personalised and a publicly shared and contested phenomenon provides explanations for its importance in the development agenda. At the individual level, educational management, practitioners, learners and industry staff, keen to develop their personal professional strongholds, may display and even insist on adhering to narrow views of quality based on limited experiences and specific geographical or situational environments. This, however, does not erase or diminish the value and import of quality when it manifests itself as either a deliberate effort or an accidental encounter in educational undertakings. It would be unconceivable to write-off

the value to learning achieved through industry-based learning without proffering a credible alternative, especially for developing country universities and other related higher education institutions (HEIs). Thus when a quality enhancing process is publicly conceived and deployed, both sceptics and advocates are seen to twitch. The public contestations of quality fuel both competition and collaboration because development-oriented minds converge around quality.

6.4.2 Industry-based learning has the ingredients for quality practice

Within the operational policies, programmes and academic regulations of every HEI lie its projections and insights into tackling challenges to its mission and vision. The task of producing relevant and responsive human power for a country with developmental challenges calls for universities to search for genuine opportunities to accomplish much from very little. The findings in the study that graduates with industry-based learning experience have competitive advantage over their counterparts without, and are accepted for work engagements anywhere around the world, speaks well of a practice that promotes satisfaction in its participants, a sign of the presence of quality constructivist learning.

6.4.3 Institutional approaches determine adherence to a quality culture

When individuals and organisations discover the value and excitement of sustainably associating with quality, it is not easy to let go. In essence, practice of quality becomes an addictive occupation because those dealing with it enjoy some elevated status which is not easily accessible to all and sundry. This is because the practice of quality is not an easy layman task. It requires substantial effort, time, commitment and resources. For an institution to subscribe to the quality movement, its approaches to academic practice must embrace the concepts of relevance, responsiveness and flexibility discussed earlier. As such, aspects such as preparation of students before going out to workplaces, and induction of new lecturers before they are assigned to assess students should be addressed at department, faculty and institutional levels. The uniformity of documents used in the whole exercise is important.

6.4.4 The university-industry relationship

The model of university-community engagement (HEQC, 2006) discussed in section 2.3 acknowledged the place of service-learning among the key contributions of partnerships to holistic learning and teaching. This study has found cracks in the relationships of some of the players in the discharge of the service learning function by the university under study. The most significant of these cracks exist between university staff and industry staff. Students in particular, as the middle persons in the matrix, expressed their discomfort with the knowledge and operational distance between their supposed mentors on opposite ends of the university-industry partnership. This does not auger well for high-level quality practice. Furthermore, the paucity of collaboration in the area of research and development projects and joint inquiry into practice undermines the quest for knowledge that should inform all partners for ease of fulfilling needs and expectations of learning organisations. Instead, petty tensions are tolerated and avoidable crises painstakingly managed at great cost to people and the organisations in the partnership.

So, while the university-industry relationship was seen to work sufficiently smoothly in terms of administration and continuity from year to year and from one student group to another, the quality of participant interactions needed a second look. It was, for instance, not sound quality thinking to doubt the abilities of industry supervisors to assess students objectively in the workplaces, and do nothing about it from year to year. The negative socio-economic climate prevailing at the time could stand to blame for lack of resources to institute correctional measures, but commitment to correction needed to be strongly voiced. In the final analysis, the university-industry relationship requires much support since without it the industry-based learning cannot work successfully.

6.5 Implications of the study

Recognition of the key issues emerging from the findings of the study assists participants to take into consideration the implications for future planning and practice, policy direction and possibilities extension of research to inform institutional operations and to create appropriate knowledge to drive those operations.

6.5.1 Policy and practice

The relative nature of perception of quality invites university management to consider increasing professional development programmes and strategies that would bring students, university staff, and industry partners to increase knowledge sharing among them and to debate and negotiate the desirable notions of quality in the industry-based learning pedagogy. The lack of adequate communication between university academic staff and industry-based supervisors suggests a need for publications and discussion forums at convenient stages of the process. Monitoring mechanisms and ways of assessing the perception gaps would pre-empt disputes between participants and promote dialogue instead. Such monitoring instruments could be in the form of checklists for students before departure for industrial attachment, or for junior academic staff before embarking on supervision visits to industry. Others could be pre-departure briefings and post-assessment meetings.

The published rules and regulations for student engagement in industry are the key guide the students from year to year, and insights gained on both policy and practice should be added periodically in the revisions of documents such as the university yearbook. This would reduce recurrence of problems such as placement of students in workplaces which do not satisfy either the professional or social expectations of both students and the institution.

If quality awareness is to be standardised among various participants and within accepted limits, there would be need to keep track of agreed and stipulated approaches to the practice of industry-based learning. This refers to institutional approaches such as the pre-industrial attachment procedures, the timing and frequency of assessment visits and the determination of grades from various components of student assessment of industry-based learning. Sharing of notes among universities that use the pedagogy of industry-based learning was suggested by respondents in the study and appears to be one way of obtaining information for self-regulation and improvement in this regard. The implications to a university for a standardised procedure may be the strengthening of systems and the employment of appropriately qualified and knowledgeable people in positions that deal with industry-based learning. This also goes for the university-industry relationship, which would be enhanced by employing personnel with high

people skills as well as discipline-specific knowledge to help them deal with public relations issues.

6.5.2 Research

If, as found in the study, quality is relative and dynamic, research has a role to play in the discovery and systematic deployment of those practices and ideas that signify that characteristic of quality. The practice of branding and re-branding that corporate organisations use as a survival strategy and a competing tool must be adopted by universities. Staying with one product for over ten years without altering any of its attributes does not augur well for a learning organisation. A research and development culture built into university administration ensures that the institution is a site of continuous inquiry and analysis, where satisfaction surveys, revision of documents, and brainstorming of ideas, for instance, are common practice. Small research assignments undertaken often and persistently build bigger research ideas in enterprising environments. Although such efforts may require deployment of resources, such as finance, it is highly possible that well-coordinated efforts also earn benefits that would off-set the dreaded costs of carrying out research.

Opportunities for extension of research outside this study include the exploration of mixed methods as a way of investigating social phenomena in a dominantly science and technology environment. The methodology used in this study may arouse questions among practitioners hitherto only familiar with the traditional divide between qualitative and quantitative methods. Further the appreciation of the methodology might lead to its further development and improvement since the university is a site of creativity and innovation. When sharing findings of this study and other related studies within the university in public forums, this invites interest among other universities who may want to adopt the findings and recommendations, or adapt them to suit their own situations. This is the noble goal of intellectual engagement.

6.6 Conclusions and recommendations

Equipped with an understanding of the issues that emerge fro this study and their implications on practitioners in reference to policy, practice and research, it is possible to propose some way forward as a way of recognising the learning realised from such an

exercise. In this section I present the key conclusions among many others, and then provide recommendations for future action and for future research.

6.6.1 Conclusion I

In the current exercise of industry-based learning the value added to student learning, curriculum coherence and the relevance of the pedagogy, among others, have been perceived as an indication of quality practices that have been carried over from the initial inauguration of the programme when there was still much enthusiasm and great expectations.

Recommendations for future action:

i. Revitalise those areas that are doing well and publicise or popularise good practice.
ii. Incorporation of workplace-based learning in staff development programmes such as:
    - Induction courses
    - Continuing enrichment in-house courses (for lecturers and industry supervisors)
    - The Postgraduate Diploma in Higher Education (PGDHE) as a core course for NUST lecturers and elective course for other participants (See Appendix XXI for an abridged course outline)
iii. Increase student awareness and participation in basic decision-making – set up student committees and appoint student representatives for voicing student concerns and reporting purposes.
iv. Strengthen the office of the Industrial Liaison Officer with all necessary support to interact with academic staff.

Recommendation for further research

i. Lecturers could engage in a variety of research activities on issues of their choice such as the analysis of workplaces, student expectations and actual experiences, views of industry staff and contributions possible between the partners.

6.6.2 Conclusion II

One of the greatest concerns especially among the students is the area of preparation and placement of students in workplaces, which affects student welfare and makes it difficult

for students to view their other experiences in an unbiased manner. Students question the grades they get in the final assessment as they compare their efforts to attain better, the misfortunes of landing in a particular company and not the other, and other fortuitous determinants to their performance.

Recommendations for future action

i. Adopt the concept of continuous improvement. This is an area that may not be solved completely at once because placement depends on the state of the industry and on the availability of places. Only when the number of possible places far exceeds the number of students seeking placement can there be some benchmarking on which organisations offer valuable and comparable experience.
ii. On preparation ensure a compulsory and comprehensive pre-departure programme for all students, incorporating various players and participants who would explain their expectations to students.
iii. Establish multi-level bilateral communication between the university and workplaces to share information and practices. Management and practitioner teams could tackle different aspects of the engagement between the partners.

Recommendations for further research

i. The university should consider conducting research into student welfare issues, including satisfaction surveys at various stages of the industrial attachment process on placement, induction, treatment by various industry staff, university lecturer communication and supervision.
ii. Institute built-in data collection strategies on all placements capturing the type and size of companies, variety of experiences and strengths and weaknesses of the company.

6.6.3 Conclusion III

The overall process of supervision and assessment of students has been rated as the lowest in terms of quality procedures. It requires standardisation and streamlining to integrate online or telephonic interviews between lecturers and students to capture performance on a continuous basis. The contentious issue of lecturer visits, their frequency, duration and timing is a persistent challenge that seeks answers beyond the academic sphere of influence. Also, attendant to this, the level and nature of

communication between academic and industrial supervisors was not conducive to a healthy partnership.

Recommendations for future action

i. Develop faculty-wide or cross-faculty assessment instruments that capture experiences and the student's contribution or pro-activeness over time.
ii. Academics should involve industry supervisors in the interpretation of assessment instruments and keys.

Recommendations for further research

i. Obtain and document examples of best practice in supervision and assessment as described and done by other universities the world over, providing information for local debates and discourses.
ii. Carry out studies on the effects and acceptance of various assessment formats for students.
iii. Carry out studies on academic and industrial routes of communication, including interaction between lecturers and industry supervisors.

6.6.4 Conclusion IV

There is an overall general approval from all participant quarters for industry-based learning to continue to be implemented by universities even though there are various views on how well NUST is doing at the moment, effecting self-evaluation and self-appraisal especially among lecturers.

Recommendations for future action:

i. Decide on a model or example to guide the choice of compatible activities (See example of the developed Model in Appendix XII).
ii. Explore a two-tier attachment model in which all students spend part of their attachment in small and medium-scale enterprises (SMEs) and the other part in large scale enterprises. They should spend at least 30% of their attachment period in each of the two environments.

Recommendations for further research

i. Explore empowerment projects suitable for SMEs and liaise with technical and vocational education and training (TVET) providers on a streamlined community development strategy to facilitate the increase of relevant knowledge to end-users.
ii. Conduct faculty or discipline-specific research on suitable models of engagement with various sizes of enterprise.
iii. The university should intensify scholarly efforts to protect its intellectual property, and systematically develop all potentially innovative ideas to the end.

6.7 The Learning Journey: End or Beginning?

Taking a pause in this research endeavour and looking back I recall the long and lonesome journey that has dominated my coming this far. Research is indeed a lonely path that separates one from other people who are generally not bothered and unaware of one's obsession with it. Even those few engaged in it are pursuing their own themes and not many will specifically walk the same path of understanding and inquisitiveness so that one can share deeper meanings with them. I am encouraged though that, as Jansen, Herman and Pillay (2004:100) say, my research learning journey, though filled with obstacles, reversals and breakdowns, has nevertheless progressed to this decisive stage. The reassuring reward for me is the personalised transformation that I feel I have undergone, from a novice to a more confident and inspired researcher. The research learning experience, coupled with my prior classroom teaching history, has advanced my path towards the scholarship of discovery in pedagogic research and managing research, as well as towards the scholarship of application (Stefani, 2006:114), taking me steps ahead in my linking of research to theory and practice.

By engaging the subject of my research study, namely quality through industry-based learning, my grasp of pertinent issues has increased. One particular example is my conception of the hierarchy of learning strategies for acquiring competence or skills for work, which I have created and developed in Figure 6.1. The model is a personally constructed depiction (synthesised from various learnings and with insightful extension derived from experience and from reading the literature) of my emerging understandings and thoughts stirred up by the responses of participants in this study. It is an untested creation which it is my wish to qualify and modify through future research.

The model describes a sequence of learning experiences possible for all types of learners. Starting from the basic theoretical lecture in a classroom setup, normally for short duration and simple tasks, the hierarchy moves up through the depicted stages to workplace learning which is designed for prolonged learning of complex sets of related cognitive, psychomotor and attitudinal capabilities.

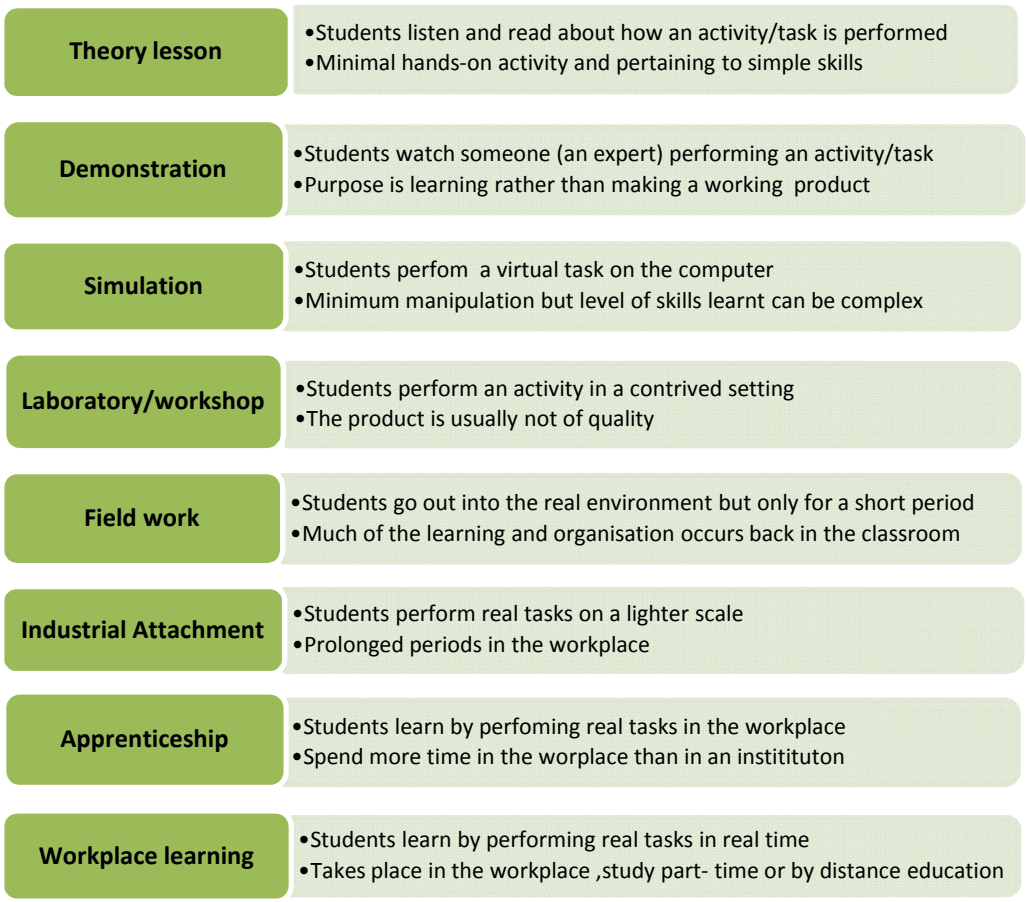


Figure 6.1 Learning for competence

The research effort might be the end of a journey but to me it is also the beginning of a new focus on my academic career. My new resolve is to endeavour to incorporate more research in my practices and increase knowledge of universal application relating to my work and in my interaction with others.

6.8 Conclusion

Through situated inquiry of appropriate learning and assessment practices as seen through the eyes of the participants, this study has sought and accomplished support for the university to consolidate its unique competitive advantage, the industry-based learning

pedagogy. The study interrogated the efficacy of selected quality indicators in the domains of curriculum coherence, learning and assessment processes, among others in an attempt to link learning with real world application. The findings are positive that industry-based learning is an effective strategy and its application at the university under study is achieving reasonable success, with some crucial adjustments that were needed as highlighted in relevant discussions throughout the study report. Analysis and interpretation of all claims have led to the conclusions and recommendations put forward earlier in this chapter, chief among them being the realisation of quality opportunities to grow and learn from them. Further discussions and deliberations with the gatekeepers and stakeholders of the industrial attachment programme may shed light on how many of the recommendations can and need to be addressed, in the short, medium or long term. Similarly, further research is necessary to scientifically get to the bottom of what seems to be either going well or not in a practice that has so much potential and appeal to participating communities and individuals.

This study has hopefully opened debate on the importance of reflecting continuously on quality assurance in university education in general, and in industry-based learning activities at the National University of Science and Technology in Zimbabwe specifically. The study recognises learning as a celebrated occupation for individuals and organisations, and prods proponents of learning in higher education institutions to broaden the scope of strategies to achieve relevance and utility in their communities of practice.

Communities struggle to provide fulfilling lives for their citizens. A liberating and empowering education helps us to make good decisions, contribute to public life and live as responsible citizens of a caring world. Our colleges and universities are encouraged to try to provide learning that has direct and tangible consequences in the context of living communities. According to Ramaley (2005:180) ‘individual aspirations and personal goals can be most productively advanced when research and education are inspired by *both* a thirst for knowledge and a desire for practical outcomes. This should be the defining feature of all kinds of post-secondary institutions, whatever their mission’.

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APPENDICES

APPENDIX I – Activity plan

TASK/ACTIVITY	Task No		Year 1 2008				Year 2 2009				Year 3 2010				Year 4 2011				Year 5 2012				Year 6 2013			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
LITERATURE SEARCH	**1.0**	**P**																								
		A																								
RESEARCH PROPOSAL	**2.0**	**P**																								
		A																								
Draft proposal	2.1	**P**																								
		A																								
Proposal development/Literature review	2.2	**P**																								
		A																								
Proposal defence	2.3	**P**																								
		A																								
ETHICAL CLEARANCE	**3.0**	**P**																								
		A																								
INSTRUMENT DEVELOPMENT	**4.0**	**P**																								
		A																								
DATA COLLECTION	**5.0**	**P**																								
		A																								
DATA ANALYSIS	**6.0**	**P**																								
		A																								
REPORT WRITING	**7.0**	**P**																								
		A																								
Preliminary chapters	7.1	**P**																								
		A																								
Methodology/Procedures chapter	7.2	**P**																								
		A																								
Results and findings	7.3	**P**																								
		A																								
Produce 1st thesis draft	7.4	**P**																								
		A																								
SUBMISSION & CORRECTIONS	**8.0**	**P**																								
		A																								
Language editing	8.1	**P**																								
		A																								
Write journal paper	8.2	**P**																								
		A																								
Final thesis submission (unbound)	8.3	**P**																								
		A																								
Corrections and amendments	8.4	**P**																								
		A																								
Submit final bound copies	8.5	**P**																								
		A																								

Key: P = Planned; A = Actual

APPENDIX II – Consent letter for lecturers

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

P O Box AC 939, Ascot, Bulawayo, Zimbabwe
Cnr. Gwanda Road/Cecil Avenue

Tel. 281086, 289438, 289265, 298456, 289435
Fax 286803, 285933

DEPARTMENT OF TECHNICAL TEACHER EDUCATION

Date: ...../...../.....

To: .....
.....

INVITATION TO PARTICIPATE IN A RESEARCH STUDY

Dear Colleague

I am a research candidate in the Faculty of Education at the University of Pretoria. I am in the process of carrying out a study on the effects of industry-based learning on academic practices under the tentative title: **Enhancing Quality Academic Practice through Inclusive Industry-based Learning.**

You have been identified as one who can provide useful information for the success of this study. This letter serves to request your participation in which recordings and transcriptions will be made. The specific details of your participation will be communicated to you verbally in due course. All information that you provide will be handled confidentially and used only for the purposes of the study and for the advancement of quality practices in university education. Original recordings and transcripts will be safely kept at the University of Pretoria as is the norm. In the final thesis publication, all specific names of persons and places will be converted to codes. Your participation in the study will be voluntary, and you may later withdraw if you so decide without being disadvantaged in any way.

If you should require more information regarding this request, please feel free to contact me using the contact details below. I appreciate your thoughtful consideration, and I look forward to working with you in the near future.

Thank you in anticipation.

Signature : …….
N. Phuthi : Research Coordinator

Signature : ……...
Dr P H Du Toit : Research Promoter
(University of Pretoria)

My Contact Details:
Telephone: 289265 Ext 2336
Cellular phone: 011917503
Office No.: SD27 Commerce Bldg

APPENDIX III – Consent letter for organisations and institutions

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

P O Box AC 939, Ascot, Bulawayo, Zimbabwe Tel. 281086, 289438, 289265, 298456, 289435
Cnr. Gwanda Road/Cecil Avenue Fax 286803, 285933

DEPARTMENT OF TECHNICAL TEACHER EDUCATION

Date: ...../...../.....

To: .....
.....
……
……

APPLICATION FOR PERMISSION TO COLLECT DATA FOR A RESEARCH STUDY

Dear ……

I am a research candidate in the Faculty of Education at the University of Pretoria. I am in the process of carrying out a study on the effects of industrial attachment (also called industry-based learning) on academic practices and student learning under the tentative title: **Enhancing Quality Academic Practice through Inclusive Industry-Based Learning.**

Your organisation has been identified as one that can provide useful information for the success of this study. This letter serves to request your participation in which recordings and transcriptions will be made. The specific details of your participation will be communicated to you verbally in due course. All information that you provide will be handled confidentially and used only for the purposes of the study and for the advancement of quality practices in university education. Original recordings and transcripts will be safely kept at the University of Pretoria as is the norm. In the final thesis publication, all specific names of persons and places will be converted to codes. Your participation in the study will be voluntary, and you may later withdraw if you so decide without being disadvantaged in any way.

If you should require more information regarding this request, please feel free to contact me using the contact details below. I appreciate your thoughtful consideration, and I look forward to working with you in the near future.

Thank you in anticipation.

Signature : …….
N. Phuthi : Research Coordinator

APPENDIX IV – Indemnity letter for institutions and organisations

Company Letterhead

Date: …….

To Whom It May Concern

Herewith my consent that all documentation that I compile, written and verbal feedback that I give, or any other means of generating ideas regarding the study: *Enhancing Quality Academic Practice through Inclusive Industry-Based Learning,* can be used by the researcher, Mr N. Phuthi, as data for the purpose of feedback and research of the industry-based learning programme with a view to improving university educational practice.

My understanding is that any data/feedback will be reported anonymously when made public.

Name: ……..

Signature: …….

Company Stamp

APPENDIX V – Student cover letter and questionnaire

LETTERHEAD

Date: ...../...../.....

Dear Participant

STUDENT QUESTIONNAIRE ON INDUSTRY-BASED LEARNING

The attached questionnaire is part of the process of obtaining data on experiences and opinions towards better understanding of industry-based learning, in our case referred to as Industrial Attachment (IA). Like many enterprising universities world-wide, our university is keen to realise the gains in systematically integrating classroom learning with the real world of work so as to prepare graduates for the challenges of the changing global environment.

You are requested to respond to all the items as explained in this questionnaire. The information you provide will be regarded as confidential and will be used for research purposes only.

Thank you for agreeing to be a participant in this research. Please return the completed questionnaire to the Research Coordinator by …….

.....

Mr N. Phuthi
Research Coordinator
Department of Technical Teacher Education
National University of Science and Technology

……
Dr P H Du Toit
Supervisor
Faculty of Education
University of Pretoria

LETTERHEAD

DATE: ...../...../.....

QUESTIONNAIRE – STUDENT VERSION

	FOR OFFICE USE
RESPONDENT NUMBER	V0 [ ][ ][ ][ ]

SECTION A – Background information

Put an X in the numbered box corresponding to the response of your choice, as in this example.

Undergraduate	X
Postgraduate	2

1 Your Faculty

Applied Sciences	1
Built Environment	2
Commerce	3
Industrial Technology	4
Library & Information Science	5
Medicine	6

V1 [ ]

2 Year of study

First year	1
Second year	2
Third year	3
Fourth year	4
Fifth year	5

V2 [ ]

3 Gender

Male	1
Female	2

V3 [ ]

4 Age

Below 20	1
20 – 24	2
25 – 29	3
30 and above	4

V4 [ ]

5 Previous work experience (Were you ever employed, or attached to a workplace, prior to enrolling for your current degree programme?)

Yes	1
No	2

V5 [ ]

6 Duration of previous work experience
(If YES in no. 5, how long, in total, were you engaged?)

Less than 6 months	1
6 months to one year	2
More than one year	3

V6 [ ]

SECTION B - Experiences and opinions of Industrial Attachment (IA)

For items 7 - 25 put an X in the box corresponding with your preferred response. Any further explanations may be written at the end in item number 37.

Key to responses: **1** = not at all **2** = slightly **3** = moderately **4** = greatly

Indicate your views on your recent Industrial Attachment (IA) experience.

			FOR OFFICE USE
7	My earlier university courses and other learning experiences prepared me for IA.	1 2 3 4	V7
8	My IA experience consolidated the courses I had studied earlier.	1 2 3 4	V8
9	The IA experience has improved my study skills.	1 2 3 4	V9
10	The IA experience has improved my deeper understanding of subject content knowledge.	1 2 3 4	V10
11	The IA experience has improved my practical skills and workmanship.	1 2 3 4	V11
12	The IA experience has helped me to be more creative and innovative in terms of problem-solving.	1 2 3 4	V12
13	The IA experience has empowered me to develop control of my own learning.	1 2 3 4	V13
14	The IA experience has improved my capability to work in a team.	1 2 3 4	V14
15	The IA experience has enhanced my sensitivity and responsiveness to problems in my environment.	1 2 3 4	V15
16	My IA has improved my organisational and administrative skills.	1 2 3 4	V16
17	My IA has improved my social, emotional and people skills.	1 2 3 4	V17
18	My IA has improved my imaginative, conceptual and strategic thinking skills.	1 2 3 4	V18
19	My IA experience has prepared me for the realities of the world of work.	1 2 3 4	V19
20	My IA experience has encouraged me to respect and uphold the dignity of practical work whether skilled, semi-skilled or unskilled.	1 2 3 4	V20
21	My IA experience has improved my ability to work closely with different kinds of people.	1 2 3 4	V21
22	My IA experience has improved my time management and the systematic planning of my studies.	1 2 3 4	V22
23	I was satisfied with the supervision and assessment by the industry-based supervisor.	1 2 3 4	V23
24	I was satisfied with the supervision and assessment by the university-based supervisor.	1 2 3 4	V24
25	The overall process of assessment of my IA experience was adequate and appropriate for me.	1 2 3 4	V25

FOR OFFICE USE

For numbers 26 – 31, put an X on your chosen option, either YES or NO.

26	My IA organisation provided me with opportunities for continuous learning and self-development.	YES	NO	V26
27	I identified and contributed new ideas to improve the organisation.	YES	NO	V27
28	Compared to my colleagues and classmates, I think my IA experience was excellent.	YES	NO	V28
29	In class, my lecturers encourage the use of information and experiences gained from IA.	YES	NO	V29
30	My IA experiences have contributed to progress regarding my final year project.	YES	NO	V30
31	Industrial attachment is a vital learning component of my degree studies.	YES	NO	V31

For the following items, put an X in the numbered box corresponding to your chosen response or fill in the spaces provided where applicable.

32 From the list below, select and rank the top **THREE** items that you benefited from your IA experience. (Rank 1 as the most important benefit).

V32.1 ☐
V32.2 ☐
V32.3 ☐

		Rank
1	Remuneration	
2	Material benefits and other working conditions	
3	The organisation's reputation	
4	Intellectual challenges	
5	Application of prior knowledge	
6	Learning new knowledge and skills	
7	Prospects for future employment	
8	Offering a service	
	Other (Specify)	

33 To which category of organisation were you attached?

V33 ☐

Large-scale urban	1
Large-scale rural	2
SME urban	3
SME Peri-urban	4
SME Rural	5
Other (specify)	

34 In your opinion, do small- and medium-scale enterprises (SMEs) need MORE support from your university for their sustainability and growth than large-scale enterprises (LSEs)?

Yes	1
No	2

V34 ☐

Substantiate your answer .....
.....
.....
.....

	FOR OFFICE USE

35 In your opinion, should NUST include SMEs in the IA program at all?

Yes	1
No	2

V35 ☐

Substantiate your answer ……
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……
……

36 Does the current IA program need changes or improvements?

Yes	1
No	2

V36 ☐

If YES, suggest what changes/improvements you would like to see implemented.

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37 In the space below, feel free to write any additions, concerns or explanations to some of your answers to the previous questions.

V37 ☐

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V38 ☐

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V39 ☐

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V40 ☐

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V41 ☐

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Thank you for completing this questionnaire. Your contribution is greatly appreciated.

APPENDIX VI – Lecturer cover letter and questionnaire

LETTERHEAD

Date: ...../...../.....

Dear Colleague

QUESTIONNAIRE ON INDUSTRY-BASED LEARNING – ACADEMIC STAFF

The attached questionnaire is part of the process of obtaining data on experiences and opinions towards promoting quality practices and processes in our university using industry-based learning (also referred to as Industrial Attachment). Like many enterprising universities world-wide, our university is keen to realise the gains in systematically integrating classroom learning with the real world of work so as to prepare graduates for the challenges of the changing global environment.

You are requested to respond to all the items as explained in this questionnaire. The information you provide will be regarded as confidential and will be used for research purposes only.

Thank you for agreeing to be a participant in this research. Please return the completed questionnaire to the Research Coordinator by …….

.....

Mr N. Phuthi
Research Coordinator
Department of Technical Teacher Education
National University of Science and Technology

……
Dr P H Du Toit
Supervisor
Faculty of Education
University of Pretoria

LETTERHEAD

DATE: ...../...../.....

QUESTIONNAIRE – LECTURER VERSION

	FOR OFFICE USE
RESPONDENT NUMBER	V0 ☐☐☐☐

SECTION A – Background information

Put an X in the numbered box corresponding to the response of your choice, as in this example.

Undergraduate	X
Postgraduate	2

1 Your Faculty

Applied Sciences	1
Built Environment	2
Commerce	3
Industrial Technology	4
Library & Information Science	5
Medicine	6

V1 ☐

2 Levels of students you teach

First year	1
Second year	2
Third year	3
Fourth year	4
Fifth year	5

V2 ☐

3 Your Gender

Male	1
Female	2

V3 ☐

4 Your Age

Below 20	1
20 – 24	2
25 – 29	3
30 and above	4

V4 ☐

5 Previous non-educational working experience
(Have you worked anywhere other than in educational institutions before?)

Yes	1
No	2

V5 ☐

6 Duration of previous working experience
(If YES in no. 5, how long, in total, were you engaged?)

0 - under 3 years	1
3 – under 6 years	2
6 – under 9 years	3
9 years and above	4

V6 ☐

SECTION B - Experiences and opinions of Industrial Attachment (IA)

For items 7 - 25, put an X in the box corresponding with your preferred response. Any further explanations can be written at the end in item number 37.

FOR OFFICE USE

Key to responses: **1** = not at all **2** = slightly **3** = moderately **4** = greatly

Indicate your current views on Industrial Attachment (IA) experience.

7	I present my pre-IA courses and other learning experiences with a view to preparing students for IA.	1 2 3 4	V7
8	Students' IA experiences have consolidated the pre-IA courses.	1 2 3 4	V8
9	The IA experience improves students' study skills.	1 2 3 4	V9
10	The IA experience improves students' deeper understanding of subject content knowledge.	1 2 3 4	V10
11	The IA experience improves students' practical skills and workmanship.	1 2 3 4	V11
12	The IA experience encourages students to be more creative and innovative in problem-solving.	1 2 3 4	V12
13	The IA experience empowers students to develop control of their own learning.	1 2 3 4	V13
14	The IA experience improves students' capability to work in a team.	1 2 3 4	V14
15	The IA experience enhances students' sensitivity and responsiveness to problems in their environment.	1 2 3 4	V15
16	The IA improves students' organisational and administrative skills.	1 2 3 4	V16
17	The IA improves students' social, emotional and people skills.	1 2 3 4	V17
18	The IA improves students' imaginative, conceptual and strategic thinking skills.	1 2 3 4	V18
19	The IA experience prepares students for the realities of the world of work.	1 2 3 4	V19
20	The IA experience promotes in students the respect for and dignity of all categories of work, be it skilled, semi-skilled or unskilled.	1 2 3 4	V20
21	The IA experience improves students' ability to work closely with different kinds of people.	1 2 3 4	V21
22	The IA experience improves students' time management and systematic planning of their studies.	1 2 3 4	V22
23	The supervision and assessment of students by the industry-based supervisor has been professional and effective.	1 2 3 4	V23
24	The supervision and assessment of students by the university-based supervisor has been professional and effective.	1 2 3 4	V24
25	In my view, the overall process of assessment of students' IA experience was adequate and appropriate.	1 2 3 4	V25

For items 26 – 31, put an X on your chosen option, either YES or NO.

				FOR OFFICE USE
26	Most IA organisations provide opportunities for students' continuous learning and self-development.	YES	NO	V26
27	Students often identified and contributed new ideas to improve the organisation.	YES	NO	V27
28	The majority of IA organisations provide desirable experiences for our students.	YES	NO	V28
29	In class, I encourage the use of information and experiences gained by students from IA.	YES	NO	V29
30	Students' IA experiences contribute to progress on their final year project.	YES	NO	V30
31	Industrial attachment is a vital learning component of our degree programme.	YES	NO	V31

For the following items, put an X in the numbered box corresponding to your chosen response or fill in the spaces provided where applicable.

32 From the list below, select and rank the top **THREE** items that you desire your students to benefit from their IA experience. (Rank 1 as the most important).

		Rank	
1	Remuneration		V32.1
2	Material benefits and other working conditions		V32.2
3	Sharing in the organisation's reputation		V32.3
4	Intellectual challenges		
5	Application of prior knowledge		
6	Learning new knowledge and skills		
7	Prospects for future employment		
8	Offering a service		
	Other (Specify)		

33 Indicate the percentage of your students attached in different categories of organisations.

Category of Organisation	**% attached**		
Large-scale urban			V33.1
Large-scale rural			V33.2
SME urban			V33.3
SME Peri-urban			V33.4
SME Rural			V33.5
Other (specify) …….....			V33.6
			V33.7
			V33.8

	FOR OFFICE USE

34 In your view, do small- and medium-scale enterprises (SMEs) need MORE support from the university for their sustainability and growth than large-scale enterprises (LSEs)? V34 ☐

Yes	1
No	2

Substantiate your answer ……
……

35 In your opinion, should NUST include SMEs in the IA program at all? V35 ☐

Yes	1
No	2

Substantiate your answer ……
……
……
……

36 Does the current IA programme need changes or improvements? V36 ☐

Yes	1
No	2

If YES, suggest what changes/improvements you would like to see implemented.
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37 In the space below, feel free to write any additions, concerns or explanations to some of your answers to the previous questions.
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V37 ☐
V38 ☐
V39 ☐
V40 ☐
V41 ☐

Thank you for completing this questionnaire. Your contribution is greatly appreciated

APPENDIX VII – Industry cover letter and questionnaire

LETTERHEAD

Date: ...../...../.....

Dear Participant

QUESTIONNAIRE ON INDUSTRY-BASED LEARNING – INDUSTRY PERSONNEL

The attached questionnaire is part of the process of obtaining data on experiences and opinions towards better understanding of industry-based learning (also referred to as Industrial Attachment). Like many enterprising universities world-wide, our university is keen to realise the gains in systematically integrating classroom learning with the real world of work to prepare graduates for the challenges of the changing global environment.

You are requested to respond to all the items as explained in this questionnaire. The information you provide will be regarded as confidential and will be used for research purposes only.

Thank you for agreeing to be a participant in this research. Please return the completed questionnaire to the Research Coordinator by …….

.....

Mr N. Phuthi
Research Coordinator
Department of Technical Teacher Education
National University of Science and Technology

……
Dr P H Du Toit
Supervisor
Faculty of Education
University of Pretoria

LETTERHEAD

DATE: ...../...../.....

QUESTIONNAIRE – INDUSTRY VERSION

FOR OFFICE USE

RESPONDENT NUMBER V0 [ ][ ][ ][ ]

SECTION A – Background information

Put an X in the numbered box corresponding to the response of your choice, as in this example.

Undergraduate	X
Postgraduate	2

1 Location

Harare	1
Bulawayo	2
Gweru	3
Mutare	4
Kwekwe	5
Other (specify) ……	

V1 [ ]

2 Sector

Private	1
Public	2

V2 [ ]

3 Organisation Size

LSE	1
SME	2
Other (specify) ……. ……..	

V3 [ ]

4 Type of business

Manufacturing	1
Mining	2
Retail	3
Service	4
Parastatal	5
Other (specify) ……. ……..	

V4 [ ]

5 Source of student industrial attachees

Universities only	1
Universities and colleges	2

V5 [ ]

6 Preferred duration of attachments

Less than 6 months	1
6 months to under one year	2
One year	3
More than one year	4

V6 [ ]

SECTION B - Experiences and opinions of Industrial Attachment (IA)

For items 7 - 25, put an X in the box corresponding to your preferred response. Any further explanations can be written at the end in item number 37.

FOR OFFICE USE

Key to responses: **1** = not at all **2** = slightly **3** = moderately **4** = greatly

Indicate your views on recent Industrial Attachment (IA) experiences for NUST students.

7	Students have generally come well-prepared for IA.	1 2 3 4	V7
8	The IA experience aims to consolidate the courses already studied by the students at university.	1 2 3 4	V8
9	The IA experience aims to improve students' personal study skills.	1 2 3 4	V9
10	The IA experience aims to improve students' deeper understanding of subject content knowledge.	1 2 3 4	V10
11	The IA experience improves students' practical skills and workmanship.	1 2 3 4	V11
12	The IA experience encourages students to be more creative and innovative in problem-solving.	1 2 3 4	V12
13	The IA experience aims to empower students to develop control of their own learning.	1 2 3 4	V13
14	The IA experience improves students' capability to work in a team.	1 2 3 4	V14
15	The IA experience enhances students' sensitivity and responsiveness to problems in their environment.	1 2 3 4	V15
16	The IA has improved students' organisational and administrative skills.	1 2 3 4	V16
17	The IA has improved the students' social, emotional and people skills.	1 2 3 4	V17
18	The IA has improved the students' imaginative, conceptual and strategic thinking skills.	1 2 3 4	V18
19	The IA experience prepares students for the realities of the world of work.	1 2 3 4	V19
20	The IA experience promotes in students the respect for, and dignity of, all categories of work, be it skilled, semi-skilled or unskilled.	1 2 3 4	V20
21	The IA experience has improved students' ability to work closely with different kinds of people.	1 2 3 4	V21
22	The IA experience aims to improve students' time management and systematic planning skills.	1 2 3 4	V22
23	The supervision and assessment of students by the industry-based supervisor was professional and effective.	1 2 3 4	V23
24	The supervision and assessment of students by the university-based supervisor was professional and effective.	1 2 3 4	V24
25	The overall process of student assessment of IA experience was adequate and appropriate.	1 2 3 4	V25

FOR OFFICE USE

For no. 26 – 31 put an X on your chosen option, either YES or NO.

26	My organisation provides students opportunities for continuous learning and self-development.	YES	NO	V26
27	Students are free to identify and contribute new ideas to improve the organisation.	YES	NO	V27
28	Compared to other organisations, I think my organisation provides excellent IA experience.	YES	NO	V28
29	In class lecturers should encourage the students' use of information and experiences gained from IA.	YES	NO	V29
30	IA experiences should contribute to progress on students' final year projects.	YES	NO	V30
31	Industrial attachment is a vital learning component of students' degree studies.	YES	NO	V31

For the following items, put an X in the numbered box corresponding to your chosen response and fill in the spaces provided where applicable.

32 From the list below, select and rank the top **THREE** benefits you desire to offer students during their IA experience in your organisation. (Rank 1 as the most important). V32.1 V32.2 V32.3

		Rank
1	Remuneration	
2	Material benefits and other working conditions	
3	Sharing in the organisation's reputation	
4	Intellectual challenges	
5	Application of prior knowledge	
6	Learning new knowledge and skills	
7	Prospects for future employment	
8	Offering a service	
	Other (Specify)	

33 Which category of organisation do you do most business with? V33

Large-scale urban	1
Large-scale rural	2
SME urban	3
SME Peri-urban	4
SME Rural	5
Other (specify)	

34 In your view, do small- and medium-scale enterprises (SMEs) need MORE support from the university for their sustainability and growth than large-scale enterprises (LSEs)? V34

Yes	1
No	2

Substantiate your answer .....
.....

	FOR OFFICE USE

35 In your opinion, should NUST include SMEs in the IA program at all?

Yes	1
No	2

V35 ☐

Substantiate your answer ……
……
……
……

36 Does the current IA programme need changes or improvements?

Yes	1
No	2

V36 ☐

If YES, suggest what changes/improvements you would like to see implemented.

……
……
……
……
……

37 In the space below, feel free to write any additions, concerns or explanations to some of your answers to the previous questions.

V37 ☐

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V38 ☐

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V39 ☐

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V40 ☐

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V41 ☐

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Thank you for completing this questionnaire. Your contribution is greatly appreciated.

APPENDIX VIII Interview schedule for university administrators

INTERVIEW REPORT

Interviewee		
Place		
Date		
Time		
Interviewer		

ENHANCING QUALITY ACADEMIC PRACTICE THROUGH INCLUSIVE INDUSTRY- BASED LEARNING

Interview Schedule
NUST ADMINISTRATORS

1. What have been the most notable trends and challenges on the NUST industrial attachment exercise over the past few years? (For making comparisons with local and international partners and competitors).
2. What are the benefits (short-term, medium-term or long-term) of the IA to the university, to the lecturing staff and to the students? (To include effects on student learning, creativity and innovativeness)
3. What are the benefits to industry?
4. What are the short-term, medium-term or long-term benefits to wider society and the country?
5. Are the graduates coming from a programme with IA suitable for a developing country such as Zimbabwe?
6. What are your views on IA in small- and medium-scale enterprises (SMEs) and large scale enterprises (LSEs) in new companies and well-established ones?
7. Comment on the proposed three-tier model provided.
8. Any other points.

APPENDIX IX – Interview schedule for NUST lecturers

INTERVIEW REPORT

Interviewee		
Place		
Date		
Time		
Interviewer		

ENHANCING QUALITY ACADEMIC PRACTICE THROUGH INCLUSIVE INDUSTRY- BASED LEARNING

Interview Schedule
NUST LECTURERS

1. How is the quality of teaching and learning influenced by industrial attachment (IA)?
2. How is student learning improved?
3. How does IA improve student creativity and innovativeness?
4. How has IA contributed to student constructivist and self-regulated learning?
5. What learning styles are promoted by IA?
6. How is local industry benefiting from IA?
7. How is the type of graduate suited for a developing country's challenges?
8. What are your views on IA in small- and medium-scale enterprises (SMEs) and large scale enterprises (LSEs) in new companies and well-established ones?
9. Study the model supplied and comment on the level for NUST engagement.
10. Any other points.

APPENDIX X – Interview schedule for industry

INTERVIEW REPORT

Interviewee		
Place		
Date		
Time		
Interviewer		

ENHANCING QUALITY ACADEMIC PRACTICE THROUGH INCLUSIVE INDUSTRY- BASED LEARNING

INDUSTRY SUPERVISORS
Interview guide

1. Impressions on student quality versus company expectations.
2. Comparisons to national/international/global partners and competitors
3. What areas can the students improve in?
4. How do the university, staff, student, industry and society benefit?
5. Views on learning opportunities from IA in SMEs and LSEs, new companies and well-established ones.
6. Current and future challenges.
7. Any other points.

APPENDIX XI – Interview schedule for other universities

INTERVIEW REPORT

Interviewee		
Place		
Date		
Time		
Interviewer		

ENHANCING QUALITY ACADEMIC PRACTICE THROUGH INCLUSIVE INDUSTRY- BASED LEARNING

OTHER UNIVERSITIES
Interview guide

1. The guiding rationale for industry-based learning.
2. The format of industry-based learning or service learning in your university.
3. Benefits of the partnership for the university and for industry to teaching, learning, research and community service.
4. The value addition.
5. What are major challenges for producing loyal and locally-relevant graduates?
6. Any other points.

APPENDIX XII – The model

Levels of University-Industry Collaboration

LEVEL 3
University-Industry Research and Academic Development

- Lecturer and student attachment in both SME and LSE.
- Research/development areas negotiated between university and industry.
- Students gain work experience plus specified project.
- Focus on academic, industry and student development.
- Student assessment includes research outcomes.
- The problem-based learning (PBL) model.

LEVEL 2
Improved industrial experience and research

- Lecturer and student attachment (sabbatical) in both SME and LSE.
- Student gain work experience plus prescribed project.
- Some learning sessions offered in industry settings.
- Groups of students work on one industry (or group of industries).
- Staff multi-disciplinary/multi-departmental/multi-faculty research.

LEVEL 1
Basic Student industrial experience

- Student attachment on specified duties in industry.
- Students gain individualised work experience.
- Students assessed through observed performance, periodic interviews, oral and written reports.
- Students expected to initiate their final year projects.

APPENDIX XIII – Permission letters

National University of Science and Technology

P.O. Box AC 939 Ascot . Bulawayo, Zimbabwe
Cnr Gwanda Road/Cecil Avenue

Telephone: 263-9-282842/288413/39/58
Fax 263-9-286803

REGISTRAR

FM/sm

2 June 2009

Dr Pieter H. Du Toit
The Promotor/Supervisor
Department of Humanities Education
Faculty of Education
University of Pretoria
SOUTH AFRICA

Dear Dr Du Toit

RE: RESEARCH FOR THE DOCTOR OF PHILOSOPHY: PERMISSION LETTER FOR MR NDUDUZO PHUTI

Mr Phuti who is registered as a Doctor of Philosophy student with the University of Pretoria has approached this University, requesting for permission to carry out his research at the National University of Science & Technology, for his PhD studies.

I am pleased to confirm that Mr Phuti has the permission to conduct research at this University on the topic: "Enhancing Quality Academic Practice Through Inclusive Industry-Based Learning". We wish him well in his Research.

Yours sincerely

F MHLANGA (MR)

Registrar
Mrs. M. Bidi
P O Box 1235
MASVINGO
Tel: 039-252100
Fax: 039-252100

Off Old Great Zimbabwe Road
MASVINGO
E mail mbidi@gzu.ac.zw

GREAT ZIMBABWE UNIVERSITY

4 May, 2011

Mr N. Phuthi
National University of Science and Technology
P.O. Box AC939
Ascot,
BULAWAYO

Dear M. Phuthi

RE: APPLICATION TO CARRY OUT RESEARCH AT GREAT ZIMBABWE UNIVERSITY

Please be advised that your application in respect of the above has been approved by the Vice-Chancellor. You may now go ahead to contact the members of staff you intended to interview.

Yours sincerely

M. Bidi, Mrs
REGISTRAR

cc- Vice-Chancellor
- File

P O Box MP 167
Mount Pleasant
Harare, Zimbabwe

Telegram: UNIVERSITY
Telephone: 303211 Ext 11105
303284
Fax (263) 308941
Telex: 26580 UNIVZ W
E-mail:officeoftheregistrar@admin.uz.ac.zw

From the Registrar
Sergeant Chevo

UNIVERSITY OF ZIMBABWE

30 March 2011

Mr N. Phuthi
National University of Science and Technology
Department of Technical Teacher Education
P. O. Box AC 939
Ascot
BULAWAYO

Dear Mr Phuthi

RE: REQUEST FOR PERMISSION TO COLLECT DATA FOR A RESEARCH STUDY

Reference is made to your letter dated 30 March 2011.

I regret to inform you that your request to collect data for research purposes at the University of Zimbabwe has been turned down.

Please be advised accordingly.

Yours sincerely

N. TAKAWIRA
Acting Registrar
/mm

APPENDIX XIV – Anonymity and coding

ANONYMITY AND CODING FOR INTERVIEW RESPONDENTS

#	CODE	CATEGORY	LOCATION	IDENTITY	POSITION
1	NM01	University Management	NUST	Dr E. Mthethwa	Director, Technopark
2	NM02	University Management	NUST	Dr Z. B. Dlodlo	Dean, Industrial Technology
3	NM03	University Management	NUST	Professor Y. Naik	Director, Research & Innovation
4	NL04	Lecturer & Chairman	NUST	Dr A. B. Nyoni	Chairman, Textile Technology
5	NL05	Lecturer & Chairman	NUST	Mr P. Kamwemba	Chairman, Civil & Water Engineering
6	NL06	Lecturer & Chairman	NUST	Mr S. Mhlanga	Chairman, Industrial & Manufacturing Engineering
7	NL07	Lecturer & Chairman	NUST	Mr Z. Nyathi	C/M, Electronic Engineering
8	NL08	Lecturer	NUST	Mrs S. Bebova	Lecturer, Electronic Engineering
9	NL09	Lecturer & Chairperson	NUST	Mrs F. Shumba	Chairperson, Accounting
10	NL10	Lecturer & Chairman	NUST	Mr M. J. Ndlovu	Chairman, Business Management
11	NL11	Lecturer & Chairman	NUST	Mr N. Ncube	Chairman, Forest Resources &Wildlife Management
12	NL12	Lecturer	NUST	Professor P. Mundy	Lecturer, Forest Resources &Wildlife Management
13	IND01	Industry Supervisor	PPC (Bulawayo)	Ms Ncube	Supervisor
14	IND02	Industry Supervisor	DatLabs (Bulawayo)	Ms X. Ndebele	Supervisor
15	OUMA01	University Management	MSU	Mr S. D. Gumbo	Director, Work-related Learning
16	OUMB02	University Management	CUT	Mr Kaseke/ and Mr Chisimbo	Deputy Registrar/ and Assistant Registrar
17	OUMC03	University Management	HIT	Mr Muredzi	Dean, Industrial Sciences & Technology
18	OULC04	Lecturer	HIT	Mr L. Mukumba	Industrial Coordinator, Industrial Sciences & Techn
19	OULD05	Lecturer & Head of Dept	LSU	Ms Dlamini	Head, Languages
20	OULE06	Lecturer & Head of Dept	Solusi	Mrs Kunyenyiwa	Head, Agribusiness
21	OULE07	Lecturer	Solusi	Mr Mahaso	Lecturer, Finance
22	OULE08	Lecturer & Head of Dept	Solusi	Mr Makamure	Head, Clothing & Family Studies
23	OULE09	Lecturer & Head of Dept	Solusi	Mrs Makamure	Head, Environmental & Biological Sciences
24	OULE10	Lecturer & Head of Dept	Solusi	Mrs Ndlovu	Head, Accounting

APPENDIX XV - Analysis grid for interview content analysis

INTERVIEW RESPONDENTS		THEMATIC CONTENT CATEGORIES														
		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11	12	13	14	15
1	NM01															
2	NM02															
3	NM03															
4	NL04															
5	NL05															
6	NL06															
7	NL07															
8	NL08															
9	NL09															
10	NL10															
11	NL11															
12	NL12															
13	IND01															
14	IND02															
15	OUMA01															
16	OUMB02															
17	OUMC03															
18	OULC04															
19	OULD05															
20	OULE06															
21	OULE07															
22	OULE08															
23	OULE09															
24	OULE10															

KEY TO THEMATIC CONTENT CATEGORIES

1. Quality issues in academic practices
2. Research and learning
3. Teaching and learning improvement, value-addition, curriculum integration
4. Holistic engagement SMEs
5. Relevance of programme & graduates
6. Comparison of IA format and competition
7. Assessment and supervision
8. Mutual Conception of IA and communication
9. The Model
10. Benefits
11. Challenges
12. Transformation and transformative learning, life enrichment
13. Student preparation and placement
14. Innovation, creativity and entrepreneurship
15. Other (Miscellaneous)

APPENDIX XVI – Questionnaire data summaries

A. Student respondents by faculty and gender

		Gender			
Faculty		**Male**	**Female**	**N/R**	**Total**
FAS	Freq	24.00	27.00	2.00	53.00
	% Freq	6.61	7.44	0.55	14.60
	Row %	*45.28*	*50.94*	*3.77*	
	Col %	11.76	*17.31*	*66.67*	
FOC	Freq	110.00	81.00	0.00	191.00
	% Freq	30.30	22.32	0.00	52.62
	Row %	*57.59*	*42.41*	*0.00*	
	Col %	53.92	*51.92*	*0.00*	
FIT	Freq	66.00	23.00	1.00	90.00
	% Freq	18.18	6.34	0.28	24.79
	Row %	73.33	25.56	1.11	
	Col %	32.35	14.74	33.33	
FCIS	Freq	4.00	25.00	0.00	29.00
	% Freq	1.10	6.89	0.00	7.99
	Row %	13.79	86.21	0.00	
	Col %	1.96	16.03	0.00	
Totals	Freq	**204.00**	**156.00**	**3.00**	**363.00**
	% Freq	**56.19**	**42.99**	**0.83**	**100.00**

B. Student respondents according to age and previous work experience (PWE)

		DURATION OF PREVIOUS WORK EXPERIENCE (PWE)					
AGE		**Nil**	**<6 mths**	**6 - 12 mths**	**>12 mths**	**Nil Response**	**Total**
Below 20	Freq	0	0	0	1	1	2
	% Freq	0	0	0	0.28	0.28	0.55
	Row %	0	0	0	50.00	50.00	
	Col %	0	0	0	4.35	33.33	
20 - 24	Freq	129	63	116	14	2	324
	% Freq	35.54	17.36	31.96	3.86	0.55	89.26
	Row %	39.81	19.44	35.80	4.32	0.62	
	Col %	92.14	92.65	89.92	60.87	66.67	
25 - 29	Freq	9	3	12	6	0	30
	% Freq	2.48	0.83	3.31	1.65	0	8.26
	Row %	30.00	10.00	40.00	20.00	0	
	Col %	6.43	4.41	9.30	26.09	0	
30 and above	Freq	0	0	0	2	00	2
	% Freq	0	0	0	0.55	0	0.55
	Row %	0	0	0	100.00	0	
	Col %	0	0	0	8.70	0	
N/R	Freq	2	2	1	0	0	5
	% Freq	0.55	0.55	0.28	0	0	1.38
	Row %	40.00	40.00	20.00	0	0	
	Col %	1.43	2.94	0.67	0	0	
Total	**Freq**	**140**	**68**	**129**	**23**	**3**	**363**
	% Freq	**38.57**	**18.73**	**35.54**	**6.34**	**0.83**	**100**

C. Lecturer respondents according to faculty and gender

Faculty		Male	Female	Total
FAS (9)	Freq	7.0	2.0	9.0
	% Freq	17.5	5.0	22.5
	Row %	77.78	22.22	
	Col %	25.93	15.38	
FOC (11)	Freq	7.0	4.0	11.0
	% Freq	17.5	10.0	27.5
	Row %	63.64	36.36	
	Col %	25.93	30.77	
FIT (17)	Freq	11.0	6.0	17.0
	% Freq	27.5	15.0	42.5
	Row %	64.71	35.29	
	Col %	40.74	46.15	
FCIS (3)	Freq	2.0	1.0	3.0
	% Freq	5.0	2.5	7.5
	Row %	66.67	33.33	
	Col %	7.41	7.69	
Totals	**Freq**	**27.0**	**13.0**	**40.0**
	% Freq	**67.5**	**32.5**	**100.0**

D. Lecturer respondents according to faculty and highest class taught

		Year level					
Faculty		Year 1	Year 2	Year 3	Year 4	Year 5	Total
FAS (9)	Freq	0	1	0	8		9
	% Freq	0	2.5	0	20		22.5
	Row %	0	11.11	0	88.89		
	Col %	0	25	0	47.06		
FOC (11)	Freq	4	2	1	4		11
	% Freq	10	5	2.2	10		27.5
	Row %	36.36	18.18	9.09	36.36		
	Col %	100	50	12.5	23.53		
FIT (17)	Freq	0	1	7	2	7	17
	% Freq	0	2.5	17.5	5	17.5	42.5
	Row %	0	5.88	41.18	11.76	41.18	
	Col %	0	25	87.5	11.76	100	
FCIS (3)	Freq	0	0	0	3		3
	% Freq	0	0	0	7.5		7.5
	Row %	0	0	0	100		
	Col %	0	0	0	17.65		
Totals	**Freq**	**4**	**4**	**8**	**17**	**7**	**40**
	% Freq	**10**	**10**	**20**	**42.5**	**17.5**	**100**

E. Lecturer respondents according to age and duration of previous work experience (PWE)

		Duration of Previous Work Experience (PWE)					
Age		0 yrs	≤ 3 yrs	3≥6 yrs	6≥9 yrs	≥ 9 yrs	Total
25-29	Freq	1	4				5
	% Freq	2.5	10				12.5
	Row %	20	80				
	Col %	11.11	36.36				
>30	Freq	8	7	5	0	15	35
	% Freq	20	17.5	12.5	0	37.5	87.5
	Row %	22.86	20	14.29	0	42.86	
	Col %	88.89	63.64	100	0	100	
Totals	Freq	**9**	**11**	**5**	**0**	**15**	**40**
	% Freq	**22.5**	**27.5**	**12.5**	**0**	**37.5**	**100**

F. Industry respondents according to location and company size

		Size of Company			
Town		**LSE**	**SME**	**N/R**	Total
Harare	Freq	1	0	0	1
	% Freq	2.94	0	0	2.94
	Row %	100	0	0	
	Col %	5.26	0	0	
Bulawayo	Freq	12	2	6	20
	% Freq	35.29	5.88	17.65	58.82
	Row %	60.00	10.00	30.00	
	Col %	63.16	100.00	46.15	
Kwekwe	Freq	5	0	6	11
	% Freq	14.71	0	17.65	32.35
	Row %	45.45	0	54.55	
	Col %	26.32	0	46.15	
Colleen Bawn	Freq	0	0	1	1
	% Freq	0	0	2.94	2.94
	Row %	0	0	100.00	
	Col %	0	0	7.69	
No Response	Freq	1	0	0	1
	% Freq	2.94	0	0	2.94
	Row %	100	0	0	
	Col %	5.26	0	0	
Totals	**Freq**	**19**	**2**	**13**	**34**
	% Freq	**55.88**	**5.88**	**38.24**	**100.00**

APPENDIX XVII – Determination of factors

DESCRIPTIVE STATISTICS OF DATA

VARIABLE NO.	NAME	TOTAL FREQ.	MEAN	STANDARD DEV.	ST.ERR OF MEAN	COEFF OF VAR	SMALLEST VALUE	SMALLEST Z-SCR	SMALLEST CASE	LARGEST VALUE	LARGEST Z-SCR	LARGEST CASE	RANGE
1	V7	345	3.1623	.71306	.03839	.22549	1.0000	-3.03	276	4.0000	1.17	2	3.0000
2	V8	345	3.1739	.75784	.04080	.23877	1.0000	-2.87	91	4.0000	1.09	2	3.0000
3	V9	345	3.3130	.82861	.04461	.25011	1.0000	-2.79	31	4.0000	0.83	4	3.0000
4	V10	345	3.4290	.70404	.03790	.20532	1.0000	-3.45	82	4.0000	0.81	2	3.0000
5	V11	345	3.7101	.54189	.02917	.14606	1.0000	-5.00	226	4.0000	0.53	2	3.0000
6	V12	345	3.5362	.63291	.03407	.17898	1.0000	-4.01	226	4.0000	0.73	2	3.0000
7	V13	345	3.3246	.73064	.03934	.21977	1.0000	-3.18	82	4.0000	0.92	7	3.0000
8	V14	345	3.6899	.58522	.03151	.15860	1.0000	-4.60	45	4.0000	0.53	2	3.0000
9	V15	345	3.3739	.72088	.03881	.21366	1.0000	-3.29	120	4.0000	0.87	2	3.0000
10	V16	345	3.3217	.74570	.04015	.22449	1.0000	-3.11	41	4.0000	0.91	2	3.0000
11	V17	345	3.5507	.65005	.03500	.18308	1.0000	-3.92	16	4.0000	0.69	4	3.0000
12	V18	345	3.3826	.68940	.03712	.20381	1.0000	-3.46	57	4.0000	0.90	2	3.0000
13	V19	345	3.6870	.60085	.03235	.16297	1.0000	-4.47	235	4.0000	0.52	2	3.0000
14	V20	345	3.6232	.62183	.03348	.17162	1.0000	-4.22	226	4.0000	0.61	2	3.0000
15	V21	345	3.7188	.52198	.02810	.14036	1.0000	-5.21	276	4.0000	0.54	2	3.0000
16	V22	345	3.2290	.83685	.04505	.25917	1.0000	-2.66	16	4.0000	0.92	6	3.0000
17	V23	345	3.1333	.91478	.04925	.29195	1.0000	-2.33	46	4.0000	0.95	4	3.0000
18	V24	345	3.1217	.90040	.04848	.28843	1.0000	-2.36	14	4.0000	0.98	4	3.0000
19	V25	345	2.9594	.89805	.04835	.30345	1.0000	-2.18	14	4.0000	1.16	2	3.0000

NUMBER OF VARIABLES TO BE USED. 19
INITIAL COMMUNALITIES ARE SQUARED MULTIPLE CORRELATIONS OR COVARIANCES.
ITERATED PRINCIPAL FACTOR ANALYSIS IS PERFORMED.
NUMBER OF ITERATIONS FOR INITIAL FACTOR EXTRACTION 25
MAXIMUM NUMBER OF FACTORS 3
NUMBER OF FACTORS IS LIMITED TO THE NUMBER OF EIGENVALUES GREATER THAN . . 0.100
TOLERANCE LIMIT FOR MATRIX INVERSION. 0.00010
DIRECT OBLIMIN ROTATION IS PERFORMED.
GAMMA 0.0000
MAXIMUM NUMBER OF ITERATIONS FOR ROTATION 50
CONVERGENCE CRITERION FOR ROTATION 0.0000100
KAISERS NORMALISATION . . . . . YES

SQUARED MULTIPLE CORRELATIONS (SMC) OF EACH VARIABLE WITH ALL OTHER VARIABLES, AND CRONBACH'S ALPHA, WITH THAT VARIABLE REMOVED

		SMC	ALPHA
1	V7	0.19105	0.8678
2	V8	0.29623	0.8673
3	V9	0.35771	0.8622
4	V10	0.39216	0.8640
5	V11	0.26955	0.8628
6	V12	0.42414	0.8589
7	V13	0.35205	0.8598
8	V14	0.32474	0.8611
9	V15	0.34758	0.8598
10	V16	0.27282	0.8626
11	V17	0.30954	0.8640
12	V18	0.46654	0.8564
13	V19	0.38115	0.8599
14	V20	0.32211	0.8604
15	V21	0.38682	0.8582
16	V22	0.33618	0.8603
17	V23	0.34675	0.8645
18	V24	0.47181	0.8635
19	V25	0.50447	0.8628

ALPHA FOR ALL VARIABLES = 0.8683
THIS IS CRONBACH'S STANDARDISED ALPHA, COMPUTED FROM CORRELATIONS.
COMMUNALITY ESTIMATES ARE SQUARED MULTIPLE CORRELATIONS (COVARIANCES).

HISTOGRAM OF INITIAL EIGENVALUES

	EIGENVALUE	HISTOGRAM
1	5.11526	**********
2	1.05133	**********
3	0.862660	**********
4	0.342419	*******
5	0.267050	*****
6	0.196922	****
7	0.137965	***
8	0.956283E-01	**
9	0.701923E-01	*

REMAINING EIGENVALUES ARE TOO SMALL TO APPEAR. THEY ARE--
0.117063E-01-0.190134E-02-0.602368E-01-0.107816 -0.118423 -0.152955
-0.188825 -0.220602 -0.258349 -0.288627

UNROTATED FACTOR LOADINGS (PATTERN)

		FACTOR1 1	FACTOR2 2	FACTOR3 3
V7	1	0.325	0.057	0.215
V8	2	0.348	0.026	0.469
V9	3	0.500	-0.009	0.370
V10	4	0.466	-0.016	0.603
V11	5	0.482	-0.070	0.029
V12	6	0.605	-0.141	-0.109
V13	7	0.569	-0.107	-0.034
V14	8	0.530	-0.168	-0.031
V15	9	0.577	-0.187	-0.078
V16	10	0.495	-0.122	-0.146
V17	11	0.465	-0.110	-0.280
V18	12	0.675	-0.227	-0.083
V19	13	0.564	-0.029	-0.056
V20	14	0.551	-0.069	-0.086
V21	15	0.614	-0.128	-0.085
V22	16	0.552	-0.075	-0.098
V23	17	0.442	0.447	-0.084
V24	18	0.483	0.582	-0.118
V25	19	0.506	0.633	-0.056
	VP	5.136	1.148	0.945

THE VP IS THE VARIANCE EXPLAINED BY THE FACTOR.
IT IS COMPUTED AS THE SUM OF SQUARES FOR THE
ELEMENTS OF THE FACTOR'S COLUMN IN THE FACTOR
LOADING MATRIX.

APPENDIX XVIII - Analysis of factors

Relationship between anticipated and statistically confirmed factors

Items/ variables	Factors anticipated	Factors confirmed statistically	Factor numbering
7,8, 9, [10]	Curriculum Coherence (CC)	Curriculum coherence	1
11,12	Active Learning (AL)	Learning	2
13,22	Self-Directed Learning (SDL)		
14,21	Cooperative Learning (CL)		
16,17,18	Learning Styles (LS)		
19,20	Learning Processes (LP).		
23,24,25	Assessment Processes (AP)	Assessment Processes	3

Mean scores for the 19 variables and 3 factors for Students, Lecturers and Industry Supervisors

Variable and Factors	Student N=363	Lecturer N=40	Industry N=34
V7	3.1598	3.4872	3.0303**
V8	3.1740	3.3000	3.2353
V9	3.3139	3.4250	3.3636
V10	3.4222	3.5500	3.5882
V11	3.6970	3.7250	3.9118*
V12	3.5374	3.4250	3.3529
V13	3.3287	3.1250	3.2941
V14	3.6953	3.6500	3.5882
V15	3.3788	3.5250	3.3529
V16	3.3251	3.3000	3.2941
V17	3.5510	3.4359	3.3824
V18	3.3712	3.3590	3.1471
V19	3.6878	3.8250*	3.7941
V20	3.6171	3.3500	3.4706
V21	3.7245*	3.6000	3.9118*
V22	3.2320	3.1000	3.5000
V23	3.1409	2.9250**	3.5455
V24	3.1129	3.2500	3.0606
V25	2.9669**	3.0000	3.3030
Factor 1 (V7 – V10)	3.2667585 (2)	3.4416667 (2)	3.3112745 (2)
Factor 2 (V11 – V22)	3.5124134 (1)	3.4530303 (1)	3.5000000 (1)
Factor 3 (V23 – V25)	3.0734619 (3)	3.0583333 (3)	3.3030303 (3)

Key: * highest scores; ** lowest scores

Lowest and highest item ratings by students, lecturers and industry supervisors

Item	Student	Lecturer	Industry
7. My earlier university courses and other learning experiences prepared me for IA.			Lowest 3.030303
11. The IA experience has improved my practical skills and workmanship.			Highest (1) 3.9117647
19. My IA experience has prepared me for the realities of the world of work.		Highest 3.825	
21. IA experience has improved students' ability to work closely with different kinds of people.	Highest 3.7245179		Highest (2) 3.9117647
23. I was satisfied with the supervision and assessment by the industry-based supervisor.		Lowest 2.925	
25. The overall process of assessment of my IA experience was adequate and appropriate for me.	Lowest 2.9669421		

Student factor mean scores by faculty

Factor	FAS N=53	FOC N=191	FIT N=90	FCIS N=28
1	3.245283 (2)	3.2565445 (2)	3.3194444 (1)	3.2053571 (2)
2	3.5849057 (1)	3.5132794 (1)	3.3194444 (1)	3.5238095 (1)
3	3.2327044 (3)	3.1465969 (3)	2.8444444 (3)	3.0357143 (3)

Key: **FAS** – Faculty of Applied Sciences; **FOC** – Faculty of Commerce; **FIT** – Faculty of Industrial Technology; **FCIS** – Faculty of Communication and Information Science

Student factor mean scores according to gender

Factor	Male N=205	Female N=155
1	3.298374 (2)	3.2301075 (2)
2	3.5044272 (1)	3.5216031 (1)
3	3.0861789 (3)	3.0602151 (3)

Student factor mean scores according to Age Group

Factor	Below 20 N=2*	20 – 24 N=324	25 – 29 n-30	30 & Above N=2*
1	3.6250 (1)	3.2530864 (2)	3.319444 (2)	3.87500 (1)
2	3.5000 (2)	3.5150299 (1)	3.485101 (1)	3.12500 (2)
3	2.83333 (3)	3.0936214 (3)	2.911111 (3)	2.83333 (3)

*Numbers too small for statistical purposes

Student factor mean scores according to Previous Work Experience (PWE)

Factor	Yes N=220	No N=142
1	3.2299242 (2)	3.3309859 (2)
2	3.4816736 (1)	3.5595391 (1)
3	3.0500000 (3)	3.1056338 (3)

Lecturer factor mean scores according to faculty

Factor	FAS N=9	FOC N=11	FIT N=17	FCIS N=3*
1	3.4907407 (1)	3.4545455 (2)	3.529412 (1)	3.75000 (1)
2	3.462963 (2)	3.6969697 (1)	3.3137255 (2)	3.3181818 (2)
3	3.037037 (3)	3.1818182 (3)	3.0784314 (3)	2.5555556 (3)

Key: **FAS** – Faculty of Applied Sciences; **FOC** – Faculty of Commerce; **FIT** – Faculty of Industrial Technology; **FCIS** – Faculty of Communication and Information Science
*Numbers too small for statistical purposes

Lecturer factor mean scores according to Classes taught

Factor	Year 1 only N=4	Year 2 & below N=4	Year 3 & below N=8	Year 4 & below N=15	Year 5 & below N=9
1	3.5000 (2)	3.5000 (1)	3.46875 (1)	3.49444 (2)	3.27778 (2)
2	3.6667 (1)	3.3333 (2)	3.41667 (2)	3.52778 (1)	3.31902 (1)
3	3.2500 (3)	3.0000 (3)	3.00000 (3)	3.13333 (3)	2.92593 (3)

Lecturer factor mean scores according to gender

Factor	Male N=31	Female N=9
1	3.4691358 (2)	3.3846154 (2)
2	3.4736251 (1)	3.4102564 (1)
3	2.9506173 (3)	3.2820513 (3)

Industry factor mean scores according to location

Factor	Harare N=1*	Bulawayo N=20	Kwekwe N=11	Colleen Bawn N=1*
1	3.25000 (1)	3.3625 (2)	3.1893939 (3)	3.500000 (2)
2	3.00000 (2)	3.5750 (1)	3.3863636 (1)	3.916667 (1)
3	3.00000 (2)	3.3500 (3)	3.2333333 (2)	2.666667 (3)

*Numbers too small for statistical purposes

Industry factor mean scores according to organisation size

Factor	LSE N=19	SME N=2*
1	3.2894737 (2)	3.375000 (3)
2	3.4078947 (1)	3.750000 (1)
3	3.1754386 (3)	3.500000 (2)

Key: **LSE** – Large-scale enterprise; **SME** – Small and medium-scale enterprise
*Numbers too small for statistical purposes

Industry factor mean scores according to organisation type

Factor	Manufacturing N=18	Mining N=2*	Service N=3*	Parastatal N=7
1	3.3796296 (3)	3.25000 (2)	3.250000 (2)	3.250000 (3)
2	3.5231481 (1)	3.66667 (1)	3.638889 (1)	3.452381 (1)
3	3.4509805 (2)	2.66667 (3)	3.111111 (3)	3.333333 (2)

*Numbers too small for statistical purposes

APPENDIX XIX - Analysis of IA benefits to students

Student benefits combined 1st, 2nd and 3rd rankings (Question 32)

#	Benefit	1st	2nd	3rd	Tot	%	Overall Rank
1	Remuneration	20	31	42	**93**	**9.17**	**5**
2	Material benefits and other working conditions	8	17	28	**53**	**5.22**	**7**
3	The organisation's reputation	17	20	22	**59**	**5.82**	**6**
4	Intellectual challenges	36	64	51	**151**	**14.89**	**3**
5	Application of prior knowledge	40	71	54	**165**	**16.27**	**2**
6	Learning new knowledge and skills	167	76	46	**289**	**28.50**	**1**
7	Prospects for future employment	36	43	68	**147**	**14.50**	**4**
8	Offering a service	13	16	23	**52**	**5.13**	**8**
9	I was offered assistance to complete my studies	1			**1**	**0.10**	**11**
10	I gained work experience and exposure			1	**1**	**0.10**	**11**
11	Building a personal character			2	**2**	**0.20**	**9**
12	Managing difficult situations			1	**1**	**0.10**	**11**
Total frequencies		**338**	**338**	**338**	**1014**	**100**	

Lecturer benefits combined 1st, 2nd and 3rd rankings (Question 32)

#	Benefit	1st	2nd	3rd	Tot	%	Overall Rank
1	Remuneration						
2	Material benefits and other working conditions			1	**1**	**0.90**	**6**
3	The organisation's reputation			5	**5**	**4.50**	**5**
4	Intellectual challenges	6	9	12	**27**	**24.32**	**3**
5	Application of prior knowledge	17	13	1	**31**	**27.93**	**2**
6	Learning new knowledge and skills	14	14	4	**32**	**28.83**	**1**
7	Prospects for future employment		1	14	**15**	**13.51**	**4**
8	Offering a service						
9	I was offered assistance to complete my studies						
10	I gained work experience and exposure						
11	Building a personal character						
12	Managing difficult situations						
Total frequencies		**37**	**37**	**37**	**111**	**100**	

Industry benefits combined 1st, 2nd and 3rd rankings (Question 32)

#	Benefit	1st	2nd	3rd	Tot	%	Overall Rank
1	Remuneration			2	**2**	**2.38**	**7.5**
2	Material benefits and other working conditions	2	2	1	**5**	**5.95**	**5.5**
3	The organisation's reputation		4	1	**5**	**5.95**	**5.5**
4	Intellectual challenges	1	4	6	**11**	**13.10**	**3.5**
5	Application of prior knowledge	8	6	8	**22**	**26.19**	**2**
6	Learning new knowledge and skills	15	7	4	**26**	**30.95**	**1**
7	Prospects for future employment	1	5	5	**11**	**13.10**	**3.5**
8	Offering a service	1		1	**2**	**2.38**	**7.5**
9	I was offered assistance to complete my studies						
10	I gained work experience and exposure						
11	Building a personal character						
12	Managing difficult situations						
Total frequencies		**28**	**28**	**28**	**84**	**100**	

Combined groups benefits by combined 1st, 2nd and 3rd rankings (Question 32)

#	Benefit	A	B	C	Tot	%	Overall Rank
1	Remuneration	93	0	2	**95**	**7.86**	**5**
2	Material benefits and other working conditions	53	1	5	**59**	**4.88**	**7**
3	The organisation's reputation	59	5	5	**69**	**5.71**	**6**
4	Intellectual challenges	151	27	11	**189**	**15.63**	**3**
5	Application of prior knowledge	165	31	22	**218**	**18.03**	**2**
6	Learning new knowledge and skills	289	32	26	**347**	**28.79**	**1**
7	Prospects for future employment	147	15	11	**173**	**14.31**	**4**
8	Offering a service	52	0	2	**54**	**4.47**	**8**
9	Offered assistance to complete my studies	1			**1**	**0.08**	**11**
10	Gained work experience and exposure	1			**1**	**0.08**	**11**
11	Building a personal character	2			**2**	**0.17**	**9**
12	Managing difficult situations	1			**1**	**0.08**	**11**
Total frequencies		**1014**	**111**	**84**	**1209**	**100**	

Key: **A – Student** **B – Lecturer** **C – Industry**

APPENDIX XX – Analysis of additions, comments, concerns, explanations

Student responses according to number of categories

Number of Categories	Freq	Cum Freq
Exactly 1 category	105	105
Exactly 2 categories	43	148
Exactly 3 categories	7	155
Exactly 4 categories	1	156
Total	**156**	

Thematic Content Analysis of Additions to Data on Student Questionnaire (Item 37)

Thematic Category (Key Below)	1st Addition (V37)	2nd Addition (V38)	3rd Addition (V39)	4th Addition (V40)	Total Additions	% of all additions	Rank
1	8	1	1		**10**	**4.63**	**6**
2	13	8	3		**24**	**11.11**	**5**
3	37	10			**47**	**21.76**	**2**
4	30	3	2		**35**	**16.20**	**3**
5	48	20		1	**69**	**31.94**	**1**
6	15	9	2		**26**	**12.04**	**4**
7	5				**5**	**2.31**	**7**
Total	**156**	**51**	**8**	**1**	**216**	**100**	

Key to thematic categories:

1. SMEs
2. Supervision and assessment
3. Learning, involvement and IA relevance
4. Preparation and placement
5. Student welfare
6. University-industry communication
7. Conditions

Consolidated Student, Lecturer and Industry Additions

Thematic Category	Student	Lecturer	Industry	Total Additions	% of all additions	Rank
1	10 4.63	5 23.81	2 11.76	**17**	**6.69**	**6**
2	24 11.11	3 14.29	5 29.41	**32**	**12.60**	**4**
3	47 21.76	5 23.81	2 11.76	**54**	**21.26**	**2**
4	35 16.2	2 9.52	5 29.41	**42**	**16.54**	**3**
5	69 31.94	3 14.29	2 11.76	**74**	**29.13**	**1**
6	26 12.04	1 4.76	0 0	**27**	**10.63**	**5**
7	5 2.31	2 9.52	1 5.88	**8**	**3.15**	**7**
	216	**21**	**17**	**254**	**100**	

APPENDIX XXI - Course Outline

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF INDUSTRIAL TECHNOLOGY
DEPARTMENT OF TECHNICAL TEACHER EDUCATION
Post-Graduate Diploma in Higher Education (PGDHE)

Course Outline

Course Code and Title: TDE4220 Workplace-based Learning Credits: 3

Lecturer	Office	Contact details

Course Synopsis:

The theory, philosophy and rationale for workplace-based learning in tertiary and higher education; terminologies, formats and models of workplace-based learning; preparation of students, lecturers and industry participants; student placement; communication and liaison during the student attachment period; student supervision and assessment; report writing; follow-up and evaluation; curriculum innovation, harnessing student innovativeness and creativity.

Course Objectives:

1. The participants will share knowledge and experiences workplace-based learning linking published theory with their own practices.
2. Participants will carry out a small qualitative or quantitative investigation to assist them conceive and write a paper suitable for publication.

Learning Activities

1. Class lectures and online sessions (24 hours)
2. Seminar type student presentations (6 hours)
3. Fieldwork and data organisation (18 hours)

Course Assessment:

1. Oral presentations on experiences and literature (20%)
2. Online quizzes, tests and one assignment (40%)
3. A written paper suitable for publication on any of the topics in the synopsis. (40%)

Study Materials and Reading list

1. Berman, S. (2006). *Service Learning: A guide to planning, implementing and assessing student projects.* Corwin Press, California.
2. Butin, D. W. (Ed) 2005). *Service learning in Higher Education: Critical Issues and Directions.* Palgrave MacMillan, NY.
3. Mezirow, J., E. W. Taylor & Associates (2009). *Transformative Learning in Practice: Insights from Community, Workplace, and Higher Education*. Jossey-Bass, San Francisco.
4. NUST yearbook and other documents
5. Selected journal articles