ENHANCING CO – OPERATIVE EDUCATION THROUGH IMPROVED SERVICE DELIVERY WITH REFERENCE TO CIVIL ENGINEERING TECHNICIANS IN TRAINING

by

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DECLARATION.

I the undersigned, hereby declare that the work contained in this thesis is my own original work and has not previously in its entirety or in part been submitted at any tertiary educational institution for a diploma or a degree. I do further declare that the opinions contained herein are my own and not necessarily those of any technikon.

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Date : _____

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" GOD'S DELAYS ARE NOT GOD'S DENIALS "

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SUMMARY

The education and training of civil engineering technicians is an integrated and dynamic process. The success of any service delivery process will be dependent on the meaningful interaction of all role players, given their understanding and commitment to desirable educational ideals and endeavours.

With the rapid changes in technology and the arrival of democracy in South Africa, an ideal opportunity existed to review current practices and operational procedures, with a view to making some input toward restructuring . A review of service delivery strategies could make a positive contribution to improving the education and training of civil engineering technicians as well as improving the ideals of co-operative education.

The purpose of the study was to analyse the service delivery strategies within the National Diploma in Civil Engineering course by examining the relationship between the views and expectations of students, academic staff and industry towards desirable learning outcomes, against the current status of service delivery strategies. The study then explored success factors that could enhance the development of civil engineering technicians in training, within the co-operative education relationship.

The literature study concentrated on the nature and value of co-operative education. It also highlighted the contributions of the respective role players in educational strategies and their added value to the education of technicians in training. An important distinction was

established between training and learning where training, as a content-driven concept has been redefined to learning, which implies a more student-centred approach in the search for knowledge and the demonstration of skills.

Questionnaires were compiled which attempted to measure views and perceptions on desirable outcomes in relation to current practices prevailing in service delivery strategies by technikons and industry. The survey was completed by a total of 268 respondents consisting of 178 students, 40 academic staff from nine technikons and 50 companies from industry in the Western Cape, Eastern Cape, Kwazulu Natal and Gauteng.

A statistical analysis and observations revealed reasonable consistency in the desirable outcomes of student learning and achievement. The survey also revealed that there were significant differences between the three samples when it came to measuring the contributions and involvement of the three parties in service delivery implementation.

The conclusions flowing from the literature study and the empirical investigation revealed that the gap between the current status and desirable learning outcomes are being prejudiced by the inefficient application and utilisation of available and resources. It also revealed that service delivery within academic and experiential programmes are not geared sufficiently toward improving the quality of learning for civil engineering technicians in training.

The recommendations suggest a formally structured and co-ordinated relationship between technikons, students and industry. Awareness programmes on the concepts and benefits of an outcome-based approach to learning should be explored in relation to all available

resources and constraints.

Quality assurance programmes should be formulated in relation to acceptable and achievable standards and programme review mechanisms should be formally agreed upon.

Orientation programs should underpin the students' entry into the academic programmes as well as exit levels into experiential learning. The experiential learning programme should be planned for an agreed by all stakeholders so as to clarify their respective obligations in achieving desired learning outcomes.

Assessment and evaluation should take a holistic view in monitoring student progress and methods of recording success should be conducive to recognizing predetermined critical cross-field and specific outcomes.

Academic staff and experiential learning supervisors should be trained and equipped to ensure that they have the ability to judge and discriminate as facilitators in the learning process. Academic and experiential learning should be accorded equal status and accreditation within the profile of the qualification.

Advisory committee structures should be restructured to serve more meaningfully in the internal evaluation of the academic programmes.

CHAPTER ONE

THE PROBLEM AND ITS SETTING

1.1 THE AWARENESS OF THE PROBLEM.

Lecturing staff, as custodians of the academic curriculum, are in a favourable position to observe the dynamics prevailing in the education and training of civil engineering technicians.

As lecturing staff strive to implement academic objectives, it became apparent that there could be some factors that frustrate and retard at the level of implementation. Interaction with students from varying backgrounds also highlighted the dilemma many students face in pursuing their career and educational ideals.

The role and expectations of industry, in support of experiential learning, also suggested possible shortcomings which could impact negatively on students, as the products of the education system.

The World Association on Co-operative Education (WACE), at it's various conferences, also highlighted the many initiatives and problems being experienced internationally in striving for improved career orientated education. There appears to be a gap between well-intentioned curriculum programmes, institutional vision and mission statements and the actual implications of quality service delivery. Teaching is causing the adoption of new intellectual paradigms in teaching and learning (Tomkin,1986:24).The emphasis on learning in the education of students is more than just the transfer of knowledge but also an

understanding of how knowledge is obtained. (Blake, 1988:49)

Recent initiatives by the South African Government in their approach to education and training, are reflected in the White Paper on Education and Training. It outlines the need to shift from education and training as two parallel streams and the adoption of a more integrated approach. This integration will be brought about by a National Qualification Framework (NQF), which will provide for all the variations of education and training and their providers, within a single qualification system.

The identification of key success factors in the review and restructuring of educational ideals presupposes the need to move from an understanding of the views and perceptions of all participants as a benchmark in setting goals and strategies for education transformation.

1.1.1 Statement of the problem.

The purpose of this investigation was to analyse the service delivery strategies within the National Diploma in civil engineering course by examining the relationship between the views and expectations of students, academic staff and industry towards desirable learning outcomes and the current status of service delivery strategies so as to identify success factors that will enhance the development of civil engineering technicians training within the co-operative education relationship.

1.1.2 The sub-problems.

The following sub problems were identified :

The first sub-problem was to examine the service delivery strategies of the academic programmes in the National Diploma civil engineering, against the background of the role and perceptions of academic staff to desirable learning outcomes and to determine whether current approaches to service delivery are consistent with these desirable learning outcomes.

The second sub-problem was to examine the views and expectations of students in the learning process, to determine whether their academic needs are being met through effective service delivery strategies.

The third sub-problem was to evaluate the views and expectations of industry, as partners in the training process, in order to establish whether their operational infrastructures were sufficiently geared towards the support and utilization of students during experiential learning.

The fourth sub-problem was to identify the success factors needed to improve the operational efficiency of academic staff, the students' learning environment and the liaison with industry in the co-operative education relationship, with a view to formulating service delivery strategies that would maximize the learning outcomes of civil engineering technicians in training.

1.1.3 Hypotheses.

The following hypotheses emanate from the above sub problems :

Hypothesis one states that the perceptions and views of academic staff and their interpretation of their functions are inconsistent with their ability to give meaningful effect to the best learning outcomes, given the available resources and constraints of prescribed learning programmes.

Hypothesis two states that the learning environment of students and the implementation of service delivery strategies do not focus on the best learning outcomes and this in turn compromises the potential development of students as civil engineering technicians in training.

Hypothesis three states that the policy, infrastructure and functional liaison between technikons and industry in the co-operative education relationship is insufficiently structured and narrowly focussed, resulting in the lack of understanding and appreciation of learning outcomes in the education and training of civil engineering technicians.

Hypothesis four states that the uncertainty around the interpretation and value of agreed standards and quality assurance programmes retards initiatives in the pursuit of improved learning outcomes and as a consequence compromises the efforts of all role players in fulfilling the fundamental objectives of co-operative education.

1.2 DELIMITATIONS OF THE RESEARCH.

The study limited its internal survey to final year S3 and S4 civil engineering students and staff at the Cape Technikon , M.L.Sultan Technikon, Natal Technikon, Peninsula Technikon, Port Elizabeth Technikon, Pretoria Technikon and Vaal Triangle Technikon. The emphasis of the study was to analyse interpretations of service delivery in the training programmes within academic departments and in industry by exploring strengths and weaknesses and the potential benefits of an improved co-operative education relationship.

This study limited its external survey to construction companies, consultants, municipalities and suppliers within the geographical regions of the above-mentioned technikons. Only companies currently involved in the experiential learning of students were considered. The emphasis was to examine existing perceptions and structures in place, with a view to identifying success factors for improved service delivery with respect to co-operative education ideals .

This study **did not :**

- Attempt to draw any negative comparisons with respect to the modus operandi of the various technikons.

- Attempt to highlight or focus on personalities with respect to their involvement in the execution of policy whether such policy exists or not.

1.3 ASSUMPTIONS.

1.3.1 The first assumption was that the contribution of the students from all technikons would be in a positive and constructive manner.

1.3.2 The second assumption was that all technikons subscribed to a prescribed academic programme.

1.3.3 The third assumption was that the co-operative education philosophy for the training of civil engineering technicians would continue.

1.3.4 The fourth assumption was that the principles and recommendations associated with experiential learning in terms of a national training strategy would apply where technikons exist (Human Science Research Council:1991).

1.4 THE SIGNIFICANCE OF THE RESEARCH.

The philosophy of technikon education as a point of departure is in the form of career-orientated education and training aimed at the optimal integration of formal study or instruction with appropriate experiential learning (NATED 02-150).(1994).

Unfortunately this ideal is seldom realized due to the fact that resource and time utilization are not always correctly prioritized and focussed at achieving the best learning outcomes for civil engineering students in training.

The success of technikon education is dependent on the interrelationship

between technikons, students and industry. However, incorrect perceptions and entrenched practices of the past and present could serve to retard, rather than advance the development of well intended stated ideals.

Perception is defined as becoming aware of situations through the medium of sight, hearing, smell and taste (World Book Dictionary,1988:1548). The nature of perceptions is subjective and therefore difficult to reference in literature. As a consequence therefore, negative perceptions in particular, repeated often enough soon become accepted as fact in the minds of people and begin to influence the way in which they think and respond to situations.

1.4.1 The perceptions of industry

The following statements are perceptions occasionally expressed by individuals in industry on the education and training of students :

A number of students have to be retrained in many aspects after qualifying in order to cope with the different expectations of industry; Lecturers do not keep abreast with changing developments in industry; Lecturers generally have too much free time including the school holidays, with sufficient time to pursue other interests, not related to education.

1.4.2 The perceptions of academic staff

The following statements are perceptions occasionally expressed by academic staff on the education and training of students :

There is insufficient time in any one semester to cover adequately the

requirements of the syllabus and academic programme; lecturers spend too much time on administrative duties; lecturers are not encouraged to practise in industry; research time is limited due to the demands of the academic programme; advisory committees, where they exist, do not contribute effectively, due to lack of commitment and clarity of their intended function.

1.4.3 The perceptions of students

The following statements are perceptions occasionally expressed by students on their education and training needs :

Teaching methodology, priorities and learning resource utilization is inconsistent between technikons; Evaluation methods are inadequate, feedback from lecturers is limited, often too late and therefore not meaningful; Students have difficulty in adapting when transferring from one technikon to another if circumstances necessitate this; technikon graduates are inferior products compared to university graduates; managerial opportunities are limited; students have differing views of subject priorities and relevance, resulting in a distorted impression of the role of the civil engineering technicians.

1.4.4 Benefits of the study

The above background highlights the need to draw a clear distinction between the good intentions often formulated in mission and vision statements, elaborate policy documents and actual practices on the ground which retard and complicate any endeavours to maximize learning outcomes. This study also examined the role, understanding and expectations of industry in supporting learning outcomes, given the need to meet the changing demands of industry.

The main benefits of the study will be to identify wrongful perceptions and to give all role players an opportunity to reassess their contributions with a view to focussing more directly on achieving the objectives of learning outcomes.

The outcomes and recommendations flowing from this study could lead to a possible common approach toward nationally accepted unit standards more in line with the career orientated nature of the course. In addition greater clarity will become apparent for academic programme development where the support and participation of industry will greatly enhance employment readiness and the better utilization of technicians to meet the demands of civil engineering in South Africa.

1.5 THE DEFINITION OF CONCEPTS AND TERMINOLOGY.

The following terms are used throughout this document and are listed alphabetically based on the Ministerial Committee Discussion Document: Life Long learning through a National Qualification Framework (1996), as well as service delivery elements identified by the Manchester Polytechnic Staff Development Project (1982), on co-operative education profiling researched in the United Kingdom.

Academic and staff development are strategies and mechanisms that are intended to add value to improved academic delivery.

Academic support refers to student assistants or lecturing assistants employed by the technikon to assist staff and students in the execution of the academic programme.

Administration and non academic functions are processes that underpin and support the academic function of technikons.

Assessment consists of a task in order to obtain information about a learner's competence in the workplace, classroom, projectwork or examination.

Civil engineering technician in training is a student registered at a South African technikon for the National Diploma in Civil Engineering.

Competence involves the capacity for continuing performance within specified ranges and contexts resulting from the integration of a number of specific outcomes.

Curriculum framework sets out the philosophical and organizational framework for a particular curriculum. Curriculum includes all aspects of teaching and learning.

Essential learning outcomes are cross-curricular, broad generic outcomes that inform teaching and learning.

Evaluation is the process whereby the information obtained through assessment is interpreted to make judgements about a learner's competence.

Interpersonal and social skills deals with the ability to cope in human relationships and the ability to interact effectively with other people in the work place.

Learning programmes consist of courses, modules or units of learning

(learning materials combined with methodology) by which learners can achieve agreed learning outcomes spelt out in unit standards.

Learning Outcomes are the results of a learning process, formal, non-formal or informal. In outcomes-based education and training, curriculum developers work backwards from agreed desired outcomes within a particular context which clearly states what the learner should demonstrate, understand and apply appropriately.

Moderation samples and compares assessment to ensure that practitioners are assessing work according to agreed standards, and that there is a consistency from year to year.

National Qualification Framework is a framework that provides for life long learning opportunities utilising nationally recognised accreditation levels.

Orientation is the process of briefing and providing information to the student about the requirements for academic programmes and experiential learning.

Outcomes are the results of a learning process, formal, non-formal or informal. (see also Learning Outcomes).

Placement means opportunities for experiential learning in the workplace.
Quality is the measure of success in achieving the standard of service that a technikon sets out to achieve.

Quality assurance is the process of ensuring that the means of providing the service is always going to meet the standard.

Service delivery can be described as all the elements that are part of the processes in the co-operative education programme that contribute to the quality assurance process to achieve desired standards.

Specific learning outcomes are contextually demonstrated knowledge, skills and values, reflecting essential outcomes.

Standards can be defined as agreed levels of attainment in student performance.

Supervision is when students in training are reporting to a person whose specific task it is to train, motivate and evaluate the students' progress in the workplace.

Teaching methodology will depend on the integration and utilization of resources and methods in the management of the process of learning.

Technical development deals with the development of technical knowledge and expertise in the design and construction of civil engineering elements and the ability to extract information efficiently.

The world of work refers to all factors that influence the students' understanding of their working environment while in training.

1.6 THE RESEARCH METHOD.

The nature of the research problem and the data required were best suited to the descriptive and analytical survey methodologies. These instruments were used to measure the responses of students, academic staff and industry on several aspects relating to the processes that unfold in the implementation of learning programmes.

1.6.1 The descriptive survey method.

The descriptive survey method used a structured questionnaire which was completed by a selected sample of students , academic staff and industry. This gave the researcher the opportunity to observe the views and perceptions of respondents to desirable learning outcomes in relation to current developments prevailing in the pursuit of these outcomes.

The questions in the survey, as the independent variables, were selected to ensure reliability and consistency in the way people responded. To this end respondents were only required to tick off appropriate levels of agreement, importance and desirability to the questions on desirable outcomes. On responses to current developments and practices respondents were only required to select options of "yes "or "no" and "true " or "false". At no stage were respondents required to engage in lengthy subjective comments as this would have increased the risk of bias as well as creating difficulties in the analysis and interpretation.

The next step was to ensure the validity of the results. The intention was to ensure that each independent variable, ie. the questions , was measuring what

was intended, in line with the objectives of the sub problem statements. In order to achieve this, the questions were carefully grouped under identifiable headings where each heading represented an aspect of the service delivery component and its contribution to essential learning outcomes. The identification of these headings was based on the researcher's experience as well as terminology used in the Manchester Polytechnic Staff Development Unit; Training and Instruments Pack (1982), used on student profiling, researched in the United Kingdom. These headings were defined under the definition of concepts and terminology.

1.6.2 The analytical survey method.

This method used a system of numerals in the structure of the questionnaire in order to guide the researcher to the discovery of truth and to statistically test the hypotheses that emanate from the sub problem statements. The numerals represented the dependent variables which were influenced by the independent variables in the form of the questions. (See Annexure A).

The grouping of the questions under service delivery headings represented the controlled variables which were managed so as not to confuse the relationship between the dependent and independent variables. A further advantage of the analytical method was to enable the researcher to examine interrelationships between variables and to draw explanatory inferences.

1.6.3 The data treatment and interpretation.

The data collected from all 268 respondents to the 246 questions was coded into numerical format. This information was entered into the computer application

numerical format. This information was entered into the computer application software called SPSS (Statistical Programme for Social Sciences) where various combinations of presenting the responses could be examined, observed and interpreted. A comprehensive exposition on the background to the questionnaire design, sample selection, data collection logistics as well as the results are discussed in the empirical investigation of Chapter 4.

1.7 OUTLINE OF THE STUDY.

After the above preamble to the study as outlined in this chapter, the remainder of the study will unfold as follows:

In the literature study of **Chapter Two**, attention was given to the contributions of authors, academics and institutions on the philosophies and practices as they relate to co-operative education. Particular reference was made to students as targets of the learning process, academic staff as managers and custodians of the learning environment and industry's needs in the co-operative education relationship.

Chapter Three covered the empirical investigation, its planning, implementation and review. A development plan outlines the logistical considerations, the design and structure of the questionnaires, in line with the literature study and the content of the various sub problem statements. This is followed by the method of assessing, assimilating and the analysis of the data collected.

Chapter Four reported the results of the three sample respondents, students, staff and industry. Observations and interpretation of responses between the three samples were used to draw explanatory inferences with a view to accepting or rejecting the hypotheses emanating from the sub problem statements.

Chapter Five reflected on the study in terms of its findings and the conclusions emanated in line with the literature review and the empirical investigation. Thereafter recommendations were made on guidelines for improved service delivery. The limitations and implications of the research were highlighted and areas for further research were identified.

1.8 SUMMARY

The philosophy of technikon education as a point of departure is in the form of career orientated education training aimed at the optimal integration of formal study or instruction with appropriate experiential learning. The success of technikon education is dependent on the successful inter relationship between technikons, students and industry. The main benefits of the study will be to eliminate wrongful perceptions and to give all role players an opportunity to reassess their respective contributions to desirable learning outcomes.

Chapter one serves as the proposal for this submission, which outlines the problem to be researched. It also serves to spells out how the project will be organized and executed. Specific headings were used to highlight the organization of the thought process. Chapter two , as the literature review, will explore the contributions and thoughts of previous writers on various aspects of learning in the co-operative education environment.

CHAPTER TWO

A REVIEW OF THE RELATED LITERATURE

2.1 INTRODUCTION

The education and training of civil engineering technicians is an integrated process, involving a wide range of factors, influences and interested parties at all levels, over a wide spectrum. Any attempt to simplify the desired outputs would be a denial of the very real differences and disparities which have plagued South African society during the past decades of institutionalised separation. Given the rapid changes in technology, an ideal opportunity presents itself to review current policy, operational procedures and perceptions, with a view to making some contribution toward the restructuring of education and training.

In the discussion that follows an attempt was made to review current strategies and past practices along with the literature and recommendations of other writers and organizations. This served as a basis for this research project, which was intended to recommend an approach to service delivery that will contribute to improving the education and training of civil engineering technicians. The literature will also serve to support the views and expectations of students, academic staff and industry in an attempt to identify the relationship between desirable expectations and the current status of service delivery toward desirable learning outcomes.

2.2 AN OVERVIEW OF VOCATIONAL AND CAREER EDUCATION

2.2.1 A broad definition

The philosophy of career orientated education, (sometimes defined as work integrated learning) and the positive benefits on student development have been regarded as having made a significant contribution to the education and training of technicians.

In broad and general terms, career education can be defined as the personal development of students, using instructional programmes that contain instructional offerings, that will ensure the students' moulding as human beings, plus their general orientation with regard to the vocational world in which they are going to find themselves (NATED 02-150, 1994:8).

2.2.2 The concept of internship

The concept of internship, within formal instructional academic programmes, goes back many decades and the associated benefits have been documented by many writers. English and Koeppen (1952:292) noted the benefits to include broader exposure to techniques and problems not encountered in the classroom, improved understanding of the business world and improved ability to evaluate and assimilate classroom experiences.

Koehler (1987:799) asserted that internships motivated students to work harder earlier in their academic programmes, so as to improve their chances of being offered internship and improved results at the end of the academic programmes.

Siegel and Rigsby (1988:423) listed the benefits of internship programmes as being :

- Greater exposure to the business environment enhancing the students' ability to bridge the gap between school and the business world and accelerating their professional maturity, while enriching their academic work).
- Development of the students' ability to react to others.
- A longer development period in which students may learn what is expected of them.
- Incentives to improve communication and interviewing skills.

The National Diploma in civil engineering is based on the model of internship, where academic studies are linked to a compulsory one year period of experiential learning.

2.2.3 Partnerships with the workplace

The challenge facing South Africa, as the economic leader in Sub-Sahara Africa, has been summed up as to improve the quality and relevance of education at every level and to redirect public resources toward education, health and family planning (World Bank,1989:10). They furthermore stated that co-operative education offers a holistic people development approach and is recognized world wide as one of the best methods of meeting the human resource needs of employers. Davies (1985:15) emphasized the relationship of academics, employers and students, where each contributes to the welfare of and gains benefit from the others. While in principle accepting that such relationships need to exist and grow meaningfully, there is some doubt as to their effectiveness, in

that it seldom takes into consideration the learning environment and neither takes cognisance of internal or external environmental factors (Groenewald,1988:18).

Against the backdrop of South Africa's history and more recently its new found democracy, with its pressing need for development, the success of implementing any meaningful delivery process must be targeted and measured through the ability of individuals and organizations to give meaningful effect to the delivery processes, within a framework that will maximize the advantages to be gained by an integrated approach to education and training.

2.2.4 Integration and the National Qualification Framework

Within the broader context of general education and career education in South Africa, the debate on the integration of general education and career education and training is currently being reviewed.

As early as 1992 the National Education Policy Investigation and the Education Renewal Strategy emphasized the importance of integrating general education and vocational training into a coherent system. It is against this background that the African National Congress (ANC) proposed that a national curriculum provide for both academic and vocational skills (African National Congress, 1994:18).

In 1994 the National Training Board Report fleshed out a concept for the training world, while the Centre for Education Policy Development released its implementation plan for education and training, with a chapter on the National Qualification Framework (NQF) in May 1994 (Ministerial Committee,1996:18).

Toward the end of 1994 an Inter-Ministerial Working Group was mandated by the Ministers of Education and Labour respectively to consider among other issues, the implementation of a NQF. An important first step toward changing the approach to education and training in South Africa, is reflected in the Department of National Education's White Paper on Education and Training. It describes the new policy which indicates a shift away from education and training as two parallel systems.

Education and training was placed squarely within the Reconstruction and Development Programme where the principles, priorities and values that underlie such an integrated education and training system are cited. This integration would be brought about by a National Qualification Framework (NQF) which will provide for all the variations of education and training and their providers, but within a single qualification system, commonly interpreted and understood by all.

The Department of National Education White Paper on Education and Training (1995:26) goes on to refer to the issue of curricula by stating that new flexible and appropriate curricula are needed to cut across traditional divisions of skills and knowledge, with standards defined in terms of learning outcomes and appropriate practices.

Read together these extracts imply that an integrated approach to education and training would mean that perceptions of what knowledge is, of how people learn, and of how learning should be organized, need to change. Knowledge can no longer be equal to content only, but must be recognized as having an independent relationship with skills and attitudes, all of which contribute to competence. Wide participation in defining and developing standards will

facilitate new liaisons between employers, learners, professional bodies, communities, providers and practitioners (Ministerial Committee,1996:20).

Similarly the Department of National Education Green Paper on Higher Education Transformation (1995:32) identifies the criteria for quality in the delivery process by stating that it is linked primarily to the capacity and commitment of the lecturer, the appropriateness of the curriculum and the way standards are set and assessed. The support and involvement of industry are also essential in terms of its added value to the success of the curriculum process.

2.2.5 The position of technikons

All the above has great significance for technikons as career-orientated institutions, because it emphasizes the need for technikons to review their roles in the development of civil engineering technicians. It highlights in particular the need to work toward establishing effective mechanisms and framework parameters or models, that will focus on what is being done, why it is being done and what is being targeted as the end result.

Technikons and industry as role players would have to examine the new paradigm of definitions outlined in the NQF discussion document and then work toward making the necessary adjustment to existing programmes, terminology and methodology to ensure quality through quality assurance, in line with the ethos and image of technikons as tertiary institutions in the new South Africa. The Committee of Technikon Principals (CTP) has indicated that technikons should align their qualifications to outcomes based learning. (CTP, 1995a).

This study and investigation also addressed the above issues, with a view to identifying the key success factors for the formulation of a service delivery framework model for the National Diploma in civil engineering.

2.3 TECHNIKONS: MANAGING THE LEARNING PROCESS

2.3.1 Institutional obligations

The rapid changes in technology is changing the relationship between lecturers on the one hand and the process of student learning on the other hand (Tomkin, 1986:24). The role of the lecturer as educator is therefore central to the successful implementation of any service delivery which not only sets out the philosophical and the organizational framework within a department, but includes all aspects of teaching and learning as well as experiential learning, within the ambit of co-operative education.

As educators and functionaries within the department, the role of the lecturer must be reviewed, to ensure that he/she has the necessary qualifications and skills to facilitate the process of learning toward desirable outcomes for civil engineering technicians.

Technology is causing the adoption of new intellectual paradigms to teaching and learning, where the lecturer is becoming less of a conveyor of knowledge and more a facilitator of learning (Tomkin,1986:26).

Harold, Michael and Goetz (1985:57) identified too much administration interruption, meetings and other non-classroom activities, as well as too heavy

a teaching load, large classes, personal difficulties, organization of time and even personal indolence and inadequacy as factors which could jeopardize well intended ideals.

2.3.2 Staff priorities, qualifications and competence

It therefore becomes crucial that the specific criteria and the role of lecturing staff within the normative requirements of departmental structures be examined, prioritized and reviewed regularly against the background of any constraining factors. A case in point is the extent to which South African research has failed to keep up with the demands of technological progress (Department of National Education Green Paper on Higher Education Transformation, 1996: 12).

The Department of National Education Green Paper on Higher Education Transformation (1996:34) emphasizes that high quality research is intimately linked to high quality teaching and curriculum renewal.

To achieve this aim, there should be close co-operation between technikons, education authorities and their professional councils/bodies. National as well as regional interests should be addressed on an on going basis. The Department of National Education Green Paper on Higher Education Transformation (1996:22) recommends that institutions should develop contract research and consultancy services and develop new funding partnerships with industry, commerce and international funding agencies.

This should also be reflected in the design of educational syllabi and in the compilation of instructional programmes for lecturer education, particularly in

relation to skills and the disposition which the educator has to acquire. This will ensure that the conditions of an intimate relationship between the technikon, the industry and professional councils/bodies are complied with (CTP, 1995a:16).

From the above discussion it is clear that the role of the technikon lecturer primarily is to manage the learning processes of the academic programmes. The lecturer has to facilitate the process by ensuring that the learning environment is effectively organized to include the maximum utilization of all available resources.

Because a formal educational qualification is not a prescribed requirement to lecture at tertiary institutions, many lecturing staff come straight from industry and move into the field of education, with no formal training in education and as a result, difficulties and incompetence could prevail that could impact negatively on the successful implementation of academic programmes, where they exist.

In order to ensure the quality of the education of educators/lecturers, appropriate programmes must be designed. In this way it can be ensured that lecturers possess the knowledge, skills and values to teach learners effectively. These programmes should also enable lecturers to structure, evaluate, offer and manage educational programmes in such a way that learners develop specific intellectual, social and psychomotor skills (CTP,1995 b).

Without the benefit of formal training and orientation, lecturers may develop incorrect perceptions of their work priorities and this could result in difficulties with their time management in relation to the programme objectives. Ineffective time management could be a consequence of perception and incorrect

prioritization.

2.3.3 Teaching and learning strategies

Karbhari (1989:357) has considered what educational objectives are relevant to building and civil engineering where educational goals are discussed in terms of life skills, professional responsibilities, communication skills and others.

An outcomes-based approach is the current concept being adopted in the transformation of education in South Africa. Outcomes are the end products of learning, reflected in either observable changes of behaviour or internal change or both. Although outcomes and objectives are both behavioural, objectives are more often based on learning content, while outcomes focus on activities of the learners to change their behaviour which in turn relates to the acquisition of skills (Genis,1997:250).

This approach is summed up by Spady (1992:67) when he defines "outcome" and "based" as follows:

An outcome is in fact a culminating demonstration of the entire range of learning experiences and capabilities that underlie it, and it occurs in a performance context that directly influences what it is and how it is carried out. These defining elements clearly indicate that an outcome is not simply the name of the learning content, or the name of a concept, or the name of a competence, or a grade or test score, but an actual demonstration in an authentic broad educational context.

Based, means to define, direct, derive, determine, focus, and organise what is done according to the substance and nature of the learning result that is anticipated at the end of the learning process. In other words, if learning were to be based on outcomes, the starting point would be with intended outcomes and then will be defined, derived, developed, and organised to give effect to the curriculum processes, ie. curriculum design, instructional planning, teaching, assessment, evaluation review and development of learners toward such desired ideals.

There is a difference between essential and specific outcomes and a clear distinction between outcomes and competence. Essential outcomes are cross-curricular, broad generic outcomes that inform teaching and learning. Specific outcomes are contextually demonstrated knowledge, skills and values, reflecting essential outcomes. (Ministerial Committee, 1996 :15)

Competence on the other hand involves the capacity for continuing performance within specified ranges and contexts resulting from the integration of a number of specific outcomes (Ministerial Committee, 1996:15). An example would be the recognition of a successful evaluation of the student in all subjects at the S2 level of the National Diploma in civil engineering.

Attempts to include many of these aspects may have been highlighted at educational review sessions, and certain adaptations to instructional programmes may have been made. However, it is often when one moves to implementing revised instructional programmes at the detailed level, that the skills often get replaced by subject lists and syllabi alone (Betts, Liow and Pollock,1993:317).

2.3.4 Assessment and evaluation

Assessment, as part of the process of evaluation and review, is central to the quest for ensuring quality assurance and the maintenance of standards in the educational delivery process. The purpose is to monitor the progress of students, as a mechanism for employers to exercise selection and allocation of opportunity as well as to give feedback about the quality of the institution, monitoring of and nature of standards and curriculum standardization and control. (Broadfoot, 1986: 5).

Assessment, as a feedback mechanism is often erroneously taken to be evaluation. Evaluation implies a process of both measurement and assessment but carries the process one stage further to the formation of value judgements (Meyer and Veenstray, 1986: 59). Evaluation should therefore not be confused with the process of assessment. Rather, it is the judgement placed on the outcome of several assessments normally at the end of a module or instructional programme.

Assessment is therefore more specifically the supply of information to parents, sponsors, academic staff and to potential or existing employers as to the specific accomplishments of individual students (Broadfoot, 1986: 5). The added benefit of assessment for lecturing staff is not only to identify problems that students may have, but also to provide feedback to staff on the quality of their professional work. (Eisner, 1993: 225). There are many modes of assessment and therefore it has to be designed to allow for the best judgements of a student's performance in a given circumstance (Broadfoot, 1987: 234).

As for tertiary institutions, evaluation is the making of judgements about values, of ideas, works, solutions and methods. It involves the use of criteria as well as standards for appraising the extent to which particulars are accurate, effective and economical and satisfying (Bloom , 1985 : 260). Assessment can be further subdivided into formative and summative components. Formative assessment is used to help the student in learning and summative assessment to sum up and report overall progress. (Rowntree, 1981: 221). However, a summative profile might be based on a formative profile but it is unlikely that a single document can perform both functions. (Evans, 1986:174). Formative assessment happens during the improvement and progress of the programme and summative happens after the completion.

2.4 STUDENTS: PRODUCTS OF THE LEARNING PROCESS

2.4.1 Historical perspective

While it is recognized that academic institutions bear the responsibility of articulating, maintaining and disseminating its normative requirements (Anderson , 1994:274), consideration should be given to the wide disparities that exist among students of different cultural and economic backgrounds.

A widely held view that students would need to take increasing responsibility for their own learning. Bruce and Brameld (1983:129) came to the conclusion that it would only become a uniformly viable option if disparities of the past are addressed in instructional and curriculum development.

Technikons in South Africa have a student population where 47% are black

(CTP, 1995a) and where the majority do not have adequate command of the languages of instruction which are English or Afrikaans. Pawson (1995: 205) therefore believes they will experience problems in acquiring, processing, internalizing and applying learning material, as their command of languages is not conducive to academic and scientific thought. This in many cases leads to poor self esteem, unfair failure and drop out rates, coupled with perceptions of a natural inferior status being assumed by academics and industry. The traditional drive for an academic secondary and tertiary education has left the technical institutions, and by implication the technikons, in an invidious position (CTP, 1995b:16).

The above constraining factors cannot be ignored in the planning of instructional programmes because the entrance criteria, initial orientation programmes and academic support do play a vital role in laying a solid foundation to the concept of learning outcomes and the intrinsic motivation required by students to take responsibility for their own learning.

2.4.2 Approaches to learning

Adams (1975: 39), in outlining his "DACUM" (Designing a Curriculum) approach to curriculum design asserts that training systems in Canada have essentially been patterned after instructional models. These models are recommended by learning theorists and researchers who have developed expensive analysis and systems related to hierarchies of learning and the sequencing of instruction. Invariably the content lends itself to analysis and organization to such an extent, that the needs of the learner are often overlooked.

It is more than likely that sequencing and structure of learning are more closely tied to the administration of the institution than to the need for optimizing sequencing and organization of learning. An example would be the prescribed testing of students on a predetermined time schedule regardless of whether it is appropriate in terms of optimizing sequencing with respect to learning outcomes. As part of the rationale to move to an outcome based approach to learning, the proposal is to shift from focussing on teacher input to focussing on learner outcomes (Ministerial Committee, 1996: 3).

Lecturers would still have to clearly identify the objectives of the learning content, but they should be stated in terms of desired outcomes. There should exist agreed common learning outcomes which can be met at different rates by learners with special educational needs who may need a longer time to achieve the desired outcomes.

Those who do not meet the criteria initially should receive clear feedback, indicating which areas need further work, in order for them to meet the required standard. They are thus given the support through remedial type sessions to try again. The concept of pass / fail is therefore radically altered to credit / try again. This approach has the immediate benefit of being a factor which motivates students to work harder at their studies (Crooks, 1988: 6).

2.4.3 Reporting on achievements

There is some concern as to the failure of some traditional methods of assessment with respect to its popularity, reliability and validity in the monitoring of student performance. The objectivity and reference of assessment can be

questioned as they are governed by the lecturer and therefore the acts of choosing what to cover, what questions to ask and which performance criteria to apply are all highly subjective, depending very much on the state of mind, values and priorities of the lecturer as the examiner (Pastoll, 1992: 2).

Traditionally, study/learning is prescribed for a specific period of time at the end of which written or practical examinations are undertaken in order that a single mark or symbol be allocated to the presented work. There is the perception that conventional three-hour examinations, written with no access to books, notes or other resources, still exist with sustained popularity and perhaps need to be questioned as a reliable way of testing ability.

Students will hardly face the same kind of memory test under such extreme time pressure in any subsequent work situation (Gibbs,1991:2). Another disadvantage is how students are expected to accumulate fragments of knowledge only to later regurgitate them in an examination.

It is also common for students to receive only a mark, without any explanatory comment, written or verbal. (Engel- Clough, Davis and Summer,1984: 202). This method of assessment has serious limitations and may prove to be meaningless for guidance and could impact negatively on students' motivation. Students therefore find that they are in a negative cycle of cramming for days to pass an examination, only to forget most of the learning content two or three days later. The assessment is therefore not about how well the student understands or demonstrates the outcomes of learning. It boils down to a measure of how much the student can meet the requirements of a set memorandum on the day.

Pastoll (1992:2) stated that he cannot but marvel at dogged preoccupation with short term memory. The question being asked is when will examination mechanisms encourage deep, retentive learning and how can systems of marking begin to reward students who have understood what has been learnt, in relation to students who simply regurgitate facts (Kirsch,1992:587).

The actual processing of assessment data also needs to be reviewed. Lecturers routinely process assessment data in a number of ways. They convert marks to grades, combine and change marks to different scales, (Engel-Clough, Davis and Summer, 1984: 202). They then reduce all to a final mark (single mark), grade or symbol to represent student achievement in a specific subject. This does not serve as a reliable indicator as would be desired by students, teachers and industry.

If students are being assessed primarily to provide stakeholders with useful information, then the point is being missed. Gibbs (1991:1) mooted the myth that assessment enables employers to select graduates, which is far from the truth. Prospective employers judge students on their presentation of self, articulateness, quick wittedness and work experience rather than on the reported result of their formal education, which only assists them to gain access to the interview (Gibbs, 1991:1).

If an outcome-based approach to learning is to be considered, it will be necessary to review the assessment and evaluation criteria, in determining whether learning has taken place. The way in which success is recorded, should also reflect specific competencies.

2.4.4 Experiential learning

From the student's perspective, experiential learning sometimes still referred to as in-service training, being a compulsory component of the curriculum process, takes on a significance which is not always appreciated. Very often it is perceived purely as the need to find a job while in training, as part of the necessary requirement to complete the diploma. It is therefore not always viewed as a process toward the development of the individual student for the world of work.

Possible factors which give rise to these incorrect perceptions are work place limitations as well as ineffective visitation programmes and reporting mechanisms. The complex nature of the South African work force, given the wide social, political, and cultural diversities, requires of technicians not only to be technically competent, but also to be equipped with interpersonal skills, tolerance, flexibility, teamwork and communication skills to function effectively in the workplace and thereby gain maximum benefit from their experiential learning (De Lange, 1995:552).

Whatever is needed in the way of systems, procedures and mechanisms, the process of social interaction, work attitude and behaviour is the glue that holds organizations together (Guirdham, 1991:39). In addition to being productive workers in a diverse workforce, students have to cope with their dual role of employee and student, understanding what is expected in terms of their jobs, finding their feet in the organization and fitting in with the organizational culture (Schein.1991:685).

In preparing students for their initial entry to experiential learning, proper

orientation or anticipatory socialization informs students of the options, obligations and opportunities that await them in the world of work. Van Maanen (1976:42) found that the adjustment and performance of newcomers to the organization is related to the degree of anticipatory socialization received. Wanous (1973:23) explained that the successful transition to the workplace is dependent on the matching process between the students' abilities and expectations, and the specific job requirements of the organization.

The next phase in the development of the experiential learning programme is the actual training and the extent to which students are effectively being supervised by industry and technikons. The third phase of the process involves the monitoring and in particular the reporting on student progress and achievements.

Several methods for reporting are in place. One of these methods includes the use of a logbook, in which the student documents specific tasks undertaken in the workplace. Another method could be to assign specific workplace projects or assignments or summative reporting at the end of the work term. Submissions could either be in the form of a final report as a written document or a presentation to a selected audience for evaluation.

All of the above can claim various degrees of success but there is no evidence to suggest that there is any one method which can maximize the desired outcomes for a particular discipline in terms of students gaining the maximum benefit from their experiential learning. Technikons and industry need to reach agreement on desired outcomes for specific competencies. This would assist in reaching agreement on the best methods of assessing and evaluating students

2.5 EMPLOYER NEEDS THROUGH CO-OPERATIVE EDUCATION

2.5.1 Defining co-operative education

Barbeau (1985:40) realized that every vocation involves aspects which cannot be taught in the classroom but need to be supplemented by practical experience as some things can only be learnt by experiencing life itself.

Tromp (1984:17) found that the College of Advanced Education introduced "sandwich "courses in 1957 to train technicians. The student attended classes for a semester and then returned to his/her employer for a semester of experiential learning. Many writers have defined co-operative education from various perspectives and points of departure.

A summary and selection from several definitions by other writers and organizations, of the most common ingredients would suggest the following definition: Co-operative education is a training system which alternates academic study with in-service experiential learning . The latter forms an integral part of the learning process and contributes towards producing the desired end product (Groenewald, 1988:18).

Co-operative education is relatively new in South African tertiary education. In recent years great strides have been made nationally and regionally through the establishment of the South African Society of Co-operative Education (SASCE). It has opened the way for all stakeholders to network nationally and internationally on matters of mutual interest through regular meetings, seminars and conferences. What needs to be ascertained, however, is the extent to which such

benefits have been translated into maximizing the learning outcomes and improving the quality and calibre of technicians in training.

It is important to stress that in spite of the definitions stated above, there is an unfortunate tendency to view co-operative education as the industry-linked component where the main emphasis is placed on student placement in the workplace. What is often overlooked is the quality of the learning that takes place and its value in complementing the learning programme toward achieving the qualification.

2.5.2 Experiential learning implications

The above initiatives are commendable and several definitions are generally applicable and can serve as goals, criteria or objectives for the implementation of a co-operative education programme. However, it is important that a distinction be made between definitions, policy statements as documented in vision and mission statements and the extent to which they function and interact within the environment, both within the organization and externally (Lessing, 1985:166).

Many companies support the need for students to undergo experiential learning and indeed many take in students on a regular basis. However, it is often at the level of implementation and supervision that organizations sometimes have a tendency to train in a way that is best suited to their own needs, activities and available resources and where profit orientation limits what can and cannot be afforded (Baldwin,1986:6).

While these factors may be a reality, they are basically flawed as they do not

adequately address the specific training needs of civil engineering technicians. The learning environment of students in the workplace, while in training, is therefore open to inconsistencies in the provision of support and perhaps even exploitation. Finkel (1984:32) is of the opinion that successful learning requires an environment that supports the physical, intellectual and psychological needs of learners.

Zastrau (1986:23) distinguished between three different learning environments, namely :-

- The physical environment.
- The interpersonal climate between participant and mentor.
- Organizational climate which may influence the learning process.

There is therefore a need to examine critically the operational infrastructure of participating companies offering experiential learning, to ensure that their support of, and utilization of students, is more structured to meet the needs of civil engineering students in training.

2.5.3 Academic and workplace supervision

In general terms, technikons and industry links are served by co-ordinators who represent the technikons and who visit students in the workplace to promote the need for continued and additional placement of students. The potential benefits of such visits are recognized, but their direct impact on student development and their added value to the curriculum process raises some concerns.

The advantages that students gain from bringing together work and academic experiences have been well documented (Ashworth and Saxton, 1992:7). However, the roles of both the workplace and academic supervisors where they exist have also been identified as critical to the success of industry-linked education (Loken and Stull, 1993:322).

Geiger-Du Mond and Boyle (1995:51) have discussed the benefits of the workplace supervisor being a mentor or an adviser to a student employee, thereby facilitating his or her development in the workplace. Some of the immediate benefits include the following (Reeve, 1993:285).

- Ensuring the academic integrity of work produced by the student on placement.
- Acting as a mentor to the student, thereby guiding his or her personal as well as academic development.
- Providing a visible link between employers and the academic institution, thereby reinforcing the interface between the academic and work environments . This may well lead to other joint ventures such as applied research and joint consulting opportunities.
- Providing an avenue for feedback on the changing needs of industry, enabling teaching materials and the curriculum to be updated and to be kept relevant.
- Promoting not only the course that the student is currently undertaking, but also the many services offered by the department.

A clear distinction needs to be made between academic supervision and institutional co-ordinators, promoting experiential learning. Ideally, academic

supervision should involve all academic teaching staff so as to contribute collectively to greater awareness of the mutual benefits to be gained by all parties. This suggestion may meet with some resistance, given the demands of the academic programmes as they currently are structured.

On the other hand a general resistance to change is probably one of the weaknesses that can be levelled at the educational process. All participants in the process share the risk of becoming victims of tradition which tends to instill inertia, lethargy, a predilection for procrastination and a reluctance to respond to outside demands (Dockrell, 1989:480). The result is that the opportunity is lost to explore methods of working more efficiently in trying to achieve the best learning outcomes for students. With reference to actual training in the workplace and the daily interpersonal monitoring of student learning, the selection and the role of workplace supervisors will have a direct bearing on student motivation and efficiency.

Workplace supervisors or mentors are active productive entities and at the same time are expected to supervise, support and evaluate student performance. The demands of the productive input therefore can have a negative effect on the quality and commitment of mentors to the training needs of students. Cochius (1986:8) suggested that mentors should undergo some training to prepare them for their roles and is of the opinion that unless mentors understand and accept what is expected of them, success will be limited.

Any delays in, and belated evaluation of logbook entries and the insufficiency of quality feedback, could serve to highlight serious shortcomings in the role of mentors, which would be in conflict with the good intention of industry's

commitment to training at policy level.

2.5.4 The role of advisory committees

As a further medium for interrelationship between technikons and industry, Advisory Committees have been identified by Tromp (1984:17) as a two-way communication system between technikon and employer representatives and a joint decision-making mechanism with respect to co-operative education implementation and the updating of syllabi and local content for local generic needs. The frequency of such contact and the quality of input and review, as well as student representation will determine the added value such bodies will serve.

Advisory Committees as a bodies need to be structured to be fully representative of all stakeholders in the process of career education. The official status and mandate of such committees must be clearly spelt out to ensure accountability in terms of its role and added value to technikons and industry.

2.5.5 Co-operative education administration

World wide, no single or national pattern exists for the administration of co-operative education service rendered to the industrial component of co-operative education programmes (Mc Mullen, 1981:73). The reason is that the needs of various programmes are different as well as the needs of the various institutions. The teaching and learning, which is planned and executed, takes place according to proven methods of administration and control.

The industrial component is just as important but the monitoring and controls very

often are not meaningful and effective. From an investigation done by Koch (1995:329) on the situation in South Africa, it appears that a further aspect that requires urgent attention is the consideration of introducing centralized co-operative education departments.

The administrators , both in centralized and decentralized administrations would require training (Nel,1987:5). Administration as a support service to decentralized departments can help to alleviate the additional burden of routine administration tasks which would have to be shouldered by academic departments.

The administrative service rendered to departments has been summarised by Koch (1995:330) as the recording of student and employer data. Additional administrative service would include institutional data, the liaison function between technikons and industry, the distribution and documentation of information as well as general administrative support.

2.6 CURRICULUM STRATEGIES FOR SUCCESS

2.6.1 Curriculum models

To design a curriculum process which is relevant, requires that the needs and expectations of all parties concerned, as well as the various methods and techniques applied to achieve these, must be investigated. According to Bobbit (1984:292) the first step in curriculum design is to gain an overview of all expectations. Price (1982:26) sees the needs assessment as a process for obtaining and analysing information on which to base educational and training decisions. Rosenberg (1982:44) explains the system of a needs analysis in terms

of the total development of educational and training procedures such as analysis, design, development, implementation and evaluation.

Optimal structuring of the total curriculum, that is , both the experiential learning and the academic component, ensures that the two components will support each other. Price (1982:26) mentioned in his report that greater success is achieved with a curriculum in which a balance exists between the academic component and the experiential learning component according to the needs of industry.

The expectations and the needs of industry are important as they are the end users of the educational product. During the process of curriculation the impact from the employers will determine the direction, but the expectations of the students should be verified during the situation analysis. Mehallis and Fair (1979:182) found that the educational system cannot afford to compile curricula without the active participation of employers even on a more involved level than merely advisory committees participation.

Khan (1983:10) believes that the career analysis will enable the course designer to identify the various competencies and skills which need to be developed. According to Ernst (1989:21) some of the aims of learning programmes in the development of students should include at least the following :

- Their analytical abilities.
- Their ability to innovate and synthesize.
- Their ability to integrate.

Ammerman and Essex (1975:45) refer to curricula as a well-structured series of predetermined outcomes , but only compile a list of behavioural objectives. Pratt (1980:134) goes one step further by coupling the behavioural objectives to

available curriculum materials to determine learning priorities as well as estimated teaching time.

Adams (1975:24) in his DACUM (Designing a curriculum) model sets up a single sheet profile that serves both as a curriculum plan and an evaluation instrument for occupational training programmes, but ignores the intrinsic environment factors which have recently been defined as outcome-based (Ministerial Committee 1996:24).

Betts, Liow, and Pollock (1993:320) confirm that most considerations of educational objectives show preoccupation with topics and few seem to address life skills, professional and practical skills as an essential outcome to disciplines in higher education. They go on to point out that when implementing and planning course design at the detail level, the skills often get replaced by subject lists and syllabi alone.

In a further example of a curriculum design exercise, Coetzee, Marx. and Engelbrecht (1990), compiled various skills profiles of civil engineering technicians from stakeholders in industry and academics. They then statistically prioritized subject relevance in isolation of the need to focus on the realities of how social and historical factors could impede successful implementation of the instructional process.

The White Paper on Education and Training (1995:26), in adopting the NQF as a policy framework, gets to the underlying philosophy of curriculum planning as " the provision of meaningful learning experiences which will prepare learners more effectively for life's opportunities."

While acknowledging the need for divergence, the Department of National Educations' White Paper on Education and Training, (1995:21) goes on to refer to the issue of curricula by stating that new, flexible and appropriate curricula are needed that cut across traditional divisions of skills and knowledge, with standards defined in terms of learning outcomes and appropriate assessment practices. The Green Paper on Higher Education Transformation (1995:15) declares that higher education will necessarily involve different patterns of teaching and learning, new curricula and more varied modes of delivery.

A qualification, at its starting point, should reflect the total range of qualities expected of the student and the learning programme should clearly define the competencies in terms of the essential and specific outcomes in line with the requirements of industry. All learning modules should be agreed upon and the specific role of technikons and industry should be clarified and structured in line with objectives that will reflect the integrated nature of the learning experience.

2.6.2 Curriculum standards and quality assurance

Within the context of the South African situation, the concept of standards and quality is open to a host of interpretations and definitions. Since South Africa is a developing country with strong first and third world components, a sensitivity and acceptance of the inheritance of existing disparities must be taken into account before formulating ideals which can never be met in the short to medium term.

On the other hand, any tendency to compromise willy-nilly on acceptable minimum standards will undermine the necessity to keep in step with the

development potential that needs to be upheld. Despite the complexities surrounding higher education in South Africa, the need exists to examine some of the underlying bases in defining quality, standards and quality assurance. Shippey (1994:148) defines quality as fitness of purpose where the beneficiaries indicate the purpose, and the educator provides the fitness. In other words, this means the specifying of worthwhile educational objectives.

In an attempt to establish what is worthwhile quality in pursuit of any acceptable standard the requirements of employers, the needs of students, the expectations of society and the controlling bodies, all need to be accounted for to a greater or lesser degree (Shippey,1994:149). The success of any curriculum implementation involves choosing and using media and material resources appropriately and applying the results of research findings on how students learn (Ramsden, 1987: 275).

In civil engineering it is helpful to develop a simple learning taxonomy comprising knowledge (information for recall), skills (doing things manually, intellectually or personally) and understanding (to deploy abstract concepts effectively) and finally know-how (the lessons of experience) (Ramsden, 1987:277). An understanding of and successful application of these approaches to learning will begin to enable correct priority profiles in the mind of the students and as a consequence will influence their behavioural approach to learning and eventually their values in the work environment.

Each type of learning experience demands different teaching and assessment methods. Quality involves judging whether the teaching offered and the assessment methods used match the stated learning goals and objectives as an

outcome based experience.

Quality according to the British Higher Education Quality Council (1994:1) is the measure of success with which an institution achieves the standard of service it sets for itself, by effectively managing the process of providing the service. Linked to this is the question of quality assurance which means being certain, or assured that the process of providing the service is always going to achieve the standard.

Standards are levels of attainment in student assessment which are generally agreed upon among those most interested in the performance of the students who are studying. In many disciplines educators are currently trying to ensure that there is a better match between evaluation methods and those objectives which are most commonly expressed. At present, the performance required in examinations, using the systems currently in place, rarely matches these learning goals as well. Only when they do will good student performance provide evidence of quality in teaching (Shippey, 1994:150).

Quality assurance thus refers to the set of procedures by means of which quality, however it is defined or interpreted, is being maintained or improved.

These three aspects of higher education, namely quality, standards, and quality assurance, are quite distinct, and the accreditation of a technikon requires attention to all three. Quality assessment is a matter of ensuring that the teaching methods match the desired educational aims and objectives, including the success with which expected standards are achieved. Quality assurance is assessed by inspecting the procedures by which an institution maintains and improves its own quality and its achievement of standards (Shippey, 1994: 150).

2.6.3 Curriculum implementation for success

A significant step taken by the government to assure quality in technikon education was the establishment of the statutory Certificating Council for Technikon Education (SERTEC) Act 88 of 1986.The objective of SERTEC was to ensure that corresponding technikon certificates issued by the Council represent acceptable standards of education and examination.

The system was a first for South Africa and had a marked impact on quality assurance, as it led to a self-critical evaluation of programmes at all technikons. After the first four-year cycle of visitation by SERTEC, amendment 185 of 1993 changed SERTEC into an accreditation body with a view to the ultimate transfer of certification to technikons. The justification for this, given the fact that not all technikons have developed to the status of national equity, was for technikons to function on the basis of the technikons input into their own self- evaluation and the output or outcomes of self-evaluation (SERTEC, 1996:58). These developments are by no means the final word on standards and quality. One has to determine continually, whose interests are being served, whose interests have priority, what the purpose is for which they were established and when these standards were set. Finally, are they relevant to the future in times of change ?

The difficulty being faced is that perceptions of standards differ widely between different ethnic groupings. Blacks in particular are aware that standards on occasions in the past were used as a smokescreen to exclude them and to create barriers to opportunity (Pawson, 1995:205). When there is lack of trust in the accuracy, efficiency and fairness, then standards begin to look like an artificial stratagem to limit the advancement of one sector of society. Everything will

depend on the resources made available, the quality of lecturers, the reference of the curriculum, the effectiveness of the learning material and the restoration of the learning environment.

It becomes clear therefore that the starting point for the review of any curriculum process would be an investigation and a situation analysis of the various stake holders in the education and training of civil engineering technicians. All aspects need to be considered in terms of their added value to current norms and practices.

The current capacity and effectiveness of all resource utilization, material and human, need to be analysed at every level of the learning and delivery process and in so doing the key success factors can be identified and used as a framework to establish a curriculum framework model that will realistically determine the best possible quality and calibre of civil engineering technicians.

2.7 SUMMARY

The degree of success that is achieved in the implementation of the National Diploma in Civil engineering course programme cannot be based on student examination results alone. The discussions thus far clearly highlighted the complexity and problems that need to be addressed on a continuous basis.

A clear distinction needs to be made between the institutional objectives and the priorities and needs of lecturing staff in fulfilling their employment obligations. There is the requirement that staff manage their role effectively within the available time constraints. At the same time continuous staff development,

research and links with employers, professional bodies, communities, providers and practitioners need to be encouraged and accommodated as added value to the curriculum process without compromising the specific obligation to act in the best interest of the students.

The perceptions and priorities of staff and the institutional needs have to be brought in line to reflect the correct balance of time management in fulfilling the educational objectives of the educational programme. The procedures and mechanisms that are intended to give effect toward successful implementation, involve a variety of individuals and organizations who rightly or wrongly may not be sufficiently geared to maximizing their respective contributions. It is incumbent therefore on all parties to network very closely in defining acceptable standards of quality and quality assurance, while at the same time, working toward extracting a renewed commitment to the education and training of civil engineering technicians.

The outcomes of the learning process need to be correctly presented to students throughout their study time at technikons . Orientation and support will assist in eliminating incorrect perceptions and expectations. Teaching methodology, resource utilization, assessment of components of learning and evaluation at appropriate intervals need to be reassessed in terms of their direct bearing on fulfilling the required competencies, in line with industry requirements and the future career path expectations of the students.

The role of industry, as a partner to the educational process needs to be reviewed. As consumers of the academic output, industry have a direct obligation in ensuring that their organizational infrastructures and resources are made

available to ensure the best opportunities for training. Negative criticism and the incorrect perceptions of the outcomes of technician training can largely be eliminated if industry comes on board more directly, as parties in the whole learning programme. The experiential learning component needs to be appreciated as an integral part of the learning process and needs to be structured in such a way that students are correctly motivated to making the contribution that is expected of them in the workplace, in line with the overall objectives of the learning programme.

The purpose of this study therefore will be to recommend a proposal for a service delivery strategy that will serve to outline a process that will ensure that all parties will be catered for in such a way that the output of all endeavours will focus on the best interests of civil engineering technicians in training. The ultimate beneficiary will be a society that will gain from the contributions to be made by well-trained civil engineering technicians.

Another positive spin-off, as a consequence of better quality education and training, would be the increasing possibilities of self development toward continuing professional development activity.

The civil engineering technician will be the person who will be enthusiastic about learning, be able to identify his or her strengths and weaknesses, be prepared to adapt or change in order to become more competent, have a clear understanding of their competencies and maintain a personal development plan.

In the literature study attention was given to the contributions of writers, academics and institutions on the philosophies and practices as they relate to co-

operative education principles. Particular reference was made to students as products of the learning process, academic staff as managers and custodians of the learning environment and industry needs in the co-operative education relationship.

A development plan will highlight the logistical considerations, the design and structure of questionnaires and their relationship to the literature study and the content of the various sub-problem statements.

This will be followed by the method of assessing, assimilating and the analysis of the data collected in chapter four.

CHAPTER THREE

EMPIRICAL INVESTIGATION

3.1 INTRODUCTION

The discussions that emanated from the literature review served to highlight and confirm that, when viewed in the context of desirable learning outcomes, co-operative education is more than just a relationship between academic institutions and industry.

The literature suggested that the success and implications of service delivery at all levels of the curriculum process are directly related to the understanding of how material and human resources can be managed in achieving desirable outcomes.

In this empirical investigation the strategies and procedures in conducting the investigation will be outlined. This will include the logical basis underlining the sample selection as well as the demographic profiles of the actual participants. The questionnaire, as the instrument of measurement, will be discussed, to include the design, structure, distribution and collection of the relevant data.

The above discussion will be followed by statistical arguments in support of the method of analysing and interpreting the data.

3.2 SAMPLE SELECTION

While the intention of this study was to focus on the learning outcomes of civil engineering students in training, it will be appreciated that the role of industry and academic staff at technikons forms an integral part of this process. The target sample group would therefore be selected from students in training, academic staff as facilitators of learning and industry who were directly involved in experiential learning.

The first consideration in setting up the questionnaire as the measuring instrument was to compile a demographic profile of the participants. These included gaining information with respect to the following :-

- Regional location.
- Type of institution.
- Qualification and experience.
- Rank and position within the institution.
- Age category and sexual orientation.

The main reason for gathering this information was to ensure that the sample selection would be sufficiently representative of the total population involved in the education and training of civil engineering technicians. In the discussion that follows, the information supplied is an actual record of the profile of the **268** participants which consisted of students, academic staff and industry involved in experiential learning. The information on the sample profiles given below are taken from the questionnaires after being completed by all respondents.

3.2.1 Student selection

As this study intended to examine students enrolled for the National Diploma in civil engineering, it was necessary to select students who had been exposed to all aspects of the training programme. Therefore, only students who were studying at the S3 and S4 level in civil engineering were selected, as they would have had some exposure to experiential learning as a mandatory requirement for the second year of study in terms of the current course structure. Furthermore, as the intention was to gain a national and demographically representative perspective it was decided to target the four larger regions in the country, namely the Western Cape, the Eastern Cape, Kwazulu Natal and Gauteng. At the same time it was established from the literature that the following institutions had ethnic distributions as illustrated in table 3.1

TABLE 3.1 ETHNIC % DISTRIBUTION OF STUDENTS AT SELECTED S. A. TECHNIKONS

Racial Group	Pen. Tech.	Cape Tech.	PE Tech	ML Sultan	Natal Tech	Vaal Triangle	Pretoria Tech	Average %
Black	**46.6%**	**9.9%**	**39.8%**	**34.9%**	**33.1%**	**47.2%**	**36.3%**	**35.4%**
Coloured	**49.6%**	**19.3%**	**12.1%**	**2.3%**	**3.85%**	**1.4%**	**1.4%**	**12.85%**
Asian	**1.5%**	**1.7%**	**1.5%**	**57%**	**16.15%**	**1.6%**	**0.8%**	**11.47%**
White	**2.3%**	**69.1%**	**46.6%**	**5.8%**	**46.9%**	**49.8%**	**61.5%**	**40.28%**
TOTALS	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

(CTP:1995a:6)

Out of a total of **268** actual participants in the sample, the numerical breakdown consisted of the following absolute values :

180 students from 7 technikons in the 4 main regions, **40** academic staff from the same technikons and **48** Individuals from 38 companies in the same regions.

TABLE 3.2 DEMOGRAPHIC PROFILES OF THE PARTICIPATING STUDENTS

(TOTAL STUDENTS = 180)

PERCENTAGE DISTRIBUTION OF THE PARTICIPATING STUDENTS			
Western. Cape	32%	Gauteng	22%
Kwazulu Natal	22%	Eastern. Cape	24%
TOTALS	100%		
STUDY LEVELS OF THE PARTICIPATING STUDENTS			
S 1	0%		
S 2	3%		
S 3	68%		
S 4	29%		
TOTALS	100%		
EXPERIMENTAL TRAINING TIME AND COMPANY DISCIPLINES			
0 Months	26%	Company	Discipline
1 - 6 Months	11%	Consultants	39%
7 - 12 Months	40%	Contractors	43%
13 - 18 Months	15%	Municipalities	14%
18 - 24 Months	3%	Suppliers	3%
more than 24 Months	5%	Manufacturers	1%
TOTALS	100%	TOTALS	100%

The above information serves to illustrate that the sample of 180 students participating in the survey was representative in terms of regional distribution, academic competence and experiential learning exposure.

3.2.2 Academic staff selection

In terms of the rationale outlined for students, it became expedient that academic staff of the same institutions be targeted for participation. Academic staff play a direct role in the learning programme of students, as planners, organizers,

teachers, councillors and facilitators of learning. Academic staff carry an important responsibility in setting the correct environment for effective learning to take place and therefore their views, perceptions and opinions, as well as their expertise with respect to qualifications, industry experience and their ability to manage the process will impact directly on the success of any delivery process.

To ensure the willingness of staff to participate, personal telephonic contact was made with each Head of Department to explain the intention and objective of the study. Once the initial response was favourable, a personal letter of invitation was sent to each head of department giving precise details of the procedure to be followed with specific emphasis on the benefits of participation. A reply form with a return fax number was attached to the letter of invitation. This obviated the need for return letters of agreement, postage and delays in waiting for responses. Once they agreed to participate, all that was needed was to tick the appropriate response, indicate the number of staff and students and then to fax off immediately. See example **Annexure B.**

It should be noted that the level of detail as outlined above was specifically intended to maximize participation and cooperation. Simply posting off questionnaires with requests to participate would have caused delays with no guarantee of participation or accountability.

This resulted in **40 academic staff** participating based on the following demographic profile as indicated in table 3.3.

TABLE 3.3 DEMOGRAPHIC PROFILES OF THE PARTICIPATING STAFF

(TOTAL ACADEMIC STAFF = 40)

ACADEMIC STAFF PARTICIPATION BASED ON REGIONAL LOCATION				
Western. Cape	41%	Gauteng	18%	TOTAL = 100%
Kwazulu Natal	23%	Eastern. Cape	18%	

ACADEMIC STAFF LECTURING AND INDUSTRY EXPERIENCE						
Exerience >>	0 -1yrs	2 -5yrs	6 -10yrs	11 -15yrs	15yrs +	TOTALS
Lecturing	13%	21%	26%	16%	24%	100%
Industry	3%	18%	29%	26%	24%	100%

RANK AND POSITION WITHIN THE DEPARTMENTS.				
Lecturer	65%	Head of Department	8%	TOTALS
Senior lecturer	26%	Technician	1%	100%

QUALIFICATION OF THE 40 ACADEMIC STAFF		
National Diploma	5%	
National Higher Diploma	26%	
Masters Diploma in Technology	26%	TOTALS
University or Technikon Degree	24%	100%
Post Graduate Degree or Diploma	16%	
Doctorate	3%	

AGE CATEGORY AND SEXUAL ORIENTATION AS FOLLOWS.					
Age Category >>	20-30 yrs	31-40 yrs	41-50 yrs	over 50 yrs	TOTALS
Male	8%	42%	21%	23%	100%
Female	3%	3%	0%	0%	100%

The above information from the tables illustrates that the respondents were representative as the sample group of 40 academic staff.

3.2.3 Industry selection

The sample selection from industry needed careful planning and execution. It

was accepted that industry generally were focussed on productivity and profit on a day-to-day basis and therefore the participation in an educational survey would not normally be regarded as a priority.

The first decision was to canvass industry role players from all civil engineering disciplines. By contacting each participating technikon, it was decided to target only companies which were actively involved in the experimential learning of students. The names, addresses and contact persons directly involved in the experiential learning of students were given by the technikons from their records. Each contact person received a letter inviting his/her participation. The need for the research was highlighted as well as the benefits to industry and students.

A similar reply form was attached where the company just had to tick if they were willing to participate as well as indicate how many questionnaires they needed based on the numbers of personnel directly involved in experiential learning. A sample of this letter is included as **Annexure B.** This method was designed to ensure a speedy response and questionnaires were dispatched only once such responses were received.

The response was immediate and effective. A record was kept of letters dispatched and responses received. It also became possible to follow up the return of questionnaires, as a record was kept and the contact person could be held accountable for the distribution, collection and return of the questionnaires. Ultimately, **48 companies** agreed to participate and 100% returns on questionnaires were received with some telephonic prompting over a number of weeks. The following is a breakdown of the categories of industry respondents:

TABLE 3.4 DEMOGRAPHIC PROFILES OF THE INDUSTRY PARTICIPANTS.

(TOTAL INDUSTRY = 48)

INDUSTRY PARTICIPANTS BY REGIONAL DISTRIBUTION				
Western. Cape	48%	Gauteng	16%	TOTALS
Kwazulu Natal	19%	Eastern. Cape	17%	100%

INDUSTRY PARTICIPATION BY POSITION IN COMPANY		
Technician	15%	
Senior Technician	13%	
Engineer	40%	TOTALS
Site Agent / Section head	20%	100%
Contracts Manager	9%	
Director	3%	

INDUSTRY PARTICIPATION BY MEMBERS QUALIFICATIONS.		
National Technical Diploma	2%	
National Diploma	9%	
National Higher Diploma	27%	TOTALS
Masters Diploma in Technology	5%	100%
University or Technikon Degree	27%	
Post Graduate Degree or Diploma	23%	
Doctorate	7%	

INDUSTRY PARTICIPATION BY AGE AND SEXUAL ORIENTATION					
Age in years >>	20-30 yrs	31-40 yrs	41-50 yrs	over 50 yrs	TOTALS
Male	11%	33%	25%	21%	100%
Female	3%	7%	0%	0%	100%

The above information serves to illustrate that the participants from industry were representative of industry as employer bodies supporting the experiential learning of students.

3.3 THE QUESTIONNAIRES

3.3.1 Introduction

The objective of the national survey was to fulfill the research objective. Of uppermost concern in the design of the questionnaire was the desire to maximize participation by first asking the respondents for their gift of time and effort and secondly the favour of their reply.

The questions in the survey were designed using two approaches. The one approach attempted to gain a broad overview of the levels of agreement, importance and desirability of learning and operational outcomes between the three samples (industry, staff and students).The second approach focussed on the current situation at technikons and in industry, to examine prevailing practices and delivery mechanisms. In brief, to establish the status quo in terms of striving toward a desired ideal. The success of any delivery strategy can only begin if the people directly involved in the processes are committed and organized to maximize the utilization of all available resources in an effective and efficient manner. Mission and vision statements of intent by companies and academic institutions only point to desirable ideals.

3.3.2 Questionnaire structure

In addition to the two approaches mentioned above, each of these was subdivided under specific headings, each focussing on the same specific learning and training areas related to service delivery aspects of civil engineering technicians in training. Table 3.5 illustrates the two approaches as well as the

specific service delivery groupings.

In the initial interpretation of the data (responses), learning areas were identified and the views and perceptions in terms of desired outcomes were observed in relation to responses on the prevailing situation with a view to establishing if there were any significant differences in the responses between the students, academic staff and industry to the specific questions in each of the learning area.

Secondly, to what extent were current practices reflecting a common approach in the understanding, support and commitment to service delivery procedures? Thirdly, to examine the role and time management of academic staff in their current situation, to see if their role as facilitators of learning were sufficiently geared for efficient service delivery.

In addition to the above, the intention was to make the measuring instruments simple to read and respond to. It was decided therefore, to use a simple tick response method so as to avoid a completion type questionnaire where respondents had to express individual viewpoints. Each questionnaire was then carefully examined and tested for precision of expression, objectivity, relevance and suitability to the problem statement. Table 3.5 gives a diagrammatic layout of the questionnaire design based on sample distribution and learning area categories for experiential and academic learning. Section one focussed on the demographics of the three samples. Section two focussed on desirable expectations and section three gathered responses on the current situation.

TABLE 3.5 THE QUESTIONNAIRE DESIGN

QUESTIONNAIRE STRUCTURE		
3 SAMPLES		
1. STUDENTS	**2. STAFF**	**3. INDUSTRY**
	SECTION 1 **(questions on)**	
	DEMOGRAPHICS	
Location Study level Training duration Language proficiency Company discipline Remuneration Funding Professional links Advisory committee	Location Orientation profile Qualifications Lecturing duration Industry exposure Subjects lectured Student contact language proficiency Professional links Advisory committees	Location Company discipline Rank and position Qualifications Language proficiency Funding Professional links Advisory committees
SECTION 2 (questions on)		**SECTION 3** (questions on)
DESIRABLE OUTCOMES (EXPECTATIONS)		***ACTUAL OUTCOMES (CURRENT STATUS)***
	SERVICE DELIVERY CATEGORIES	
EXPERIENTIAL LEARNING AREAS		**ACADEMIC LEARNING AREAS**
Orientation **Placement** **Supervision** **Evaluation** **World of work** **Interpersonal and Social skills** **Technical development**		**Teaching methods** **Evaluation** **Standards and quality** **Administration** **Staff development** **Academic development**

3.3.3 Pilot study

As a final step, a sample of each questionnaire was handed to a staff and student member at Cape and Peninsula Technikons as well as a member of industry to complete, with a request for comment on content relevance, time to complete and

clarity of expression. From this pilot study it was established that it would take 30 minutes to complete the questionnaire. Some minor adjustments were made, in line with comments and suggestions received.

3.4 DATA COLLECTION

The data collection process was carefully planned to ensure maximum participation, as well as quality returns. To ensure the best control and quality of returns, the researcher visited each participating institution and personally supervised the completion of the questionnaires.

3.4.1 Student participation

Each technikon was contacted and a specific date and time was arranged with the heads of departments where students could be assembled to complete the questionnaire.

All appointments were arranged to occur over a period of eight days, making it possible for the researcher to travel conveniently by car to each region with intermediate days for checking and collecting questionnaires.

In all, the cooperation and support was overwhelming. On each occasion at the agreed time students were seated as arranged. The researcher introduced himself and explained the purpose of the investigation as well as the key elements of how to complete the questionnaire. Prior indication of the time it

would take to complete was highlighted and a request for individual input and honesty was requested. Students then duly completed the questionnaire and the researcher remained present and available for any queries and/or explanation, where required.

3.4.2 Staff participation

At some technikons, staff members completed the questionnaires at the same time with the students and in the same venue. At the remaining institutions questionnaires were handed out and it was agreed that the researcher would personally collect them within a day or two. In all, the process of collection proved a success with many staff personally expressing an interest in the final report of the research project.

3.4.3 Industry participation

Questionnaires were dispatched to specific industry groups identified by their respective disciplines, their current involvement in experiential learning of students and their willingness to participate. A special log sheet was designed to record the names of companies, contact persons, dates of despatch and return of questionnaires.

3.5 DATA TREATMENT

3.5.1 The method of data capture.

Once all the data had been collected through the visitation and by return post, the raw data was processed into CSV (comma, separated variable) format for statistical analysis. The services of a professional data capture organisation IDS, (International Data Systems) was used to capture the data. The advantages of using such a service was one of time and cost effectiveness. Another advantage was their system of verification checks by independent individual data capture personnel to ensure no mistakes in entry, as well as a double-checking facility.

The raw data, in CSV format was then loaded into SPSS software and label names and descriptions were entered by the researcher. Each sample had its own dedicated file. The three sample files were then merged and frequency distributions were calculated, to observe the responses across the three sample categories of students, staff and industry.

It should be pointed out at this stage that the actual questionnaire format to measure responses was constructed using a differential sliding rating scale. The original intention was to measure the various degrees of intensity of the views of respondents for each separate sample. However, since the objective was to compare the relationship between the three sample groups it was decided to limit the range of responses to positive, negative and neutral in the actual reporting on the results as it would not prejudice the intention of the researcher in establishing the relationship between desirable outcomes and the current status of service delivery, in line with the research objectives.

3.5.2 Statistical overview.

The fundamental premise on which the questionnaires was structured was the creation of independent and dependent variables . The independent variables were the actual questions asked of the respondent groups as they pertained to the service delivery categories identified within the two learning areas of experiential and academic learning. The dependent variables were the actual responses of the participants to their levels of agreement, importance and desirability, as well as definitive responses to the current situations in their particular environments. The respondent groups were the students, academic staff and industry. These groups were managed separately with a view to observing correlations between them.

3.5.3 The theoretical basis for Chi-square

The statistical procedure adopted in this research was to observe the frequency distributions of the responses of each sample in relation to the questions posed as the independent variables. Once the raw data had been processed, frequency distributions for each sample were displayed in the output navigator. The next procedure was to merge the three sample files in order to observe the frequency distribution as a comparison between the three samples. After merging the three sample files, the statistical procedure to establish the chi-square values for each variable was calculated. The logic of using Pearsons chi-square is based on the difference between the observed and expected frequencies. The observed frequencies refer to the actual observations whereas the expected frequencies

were the observations that would have been expected, all things being equal. In other words, expected frequencies refer to the hypothesized outcome. Chi-square is in essence a test of how much the observed and expected frequencies differ from each other. If the differences in the chi-square statistic in the case of the three samples are not significant, it would mean that the observed distribution of the three samples does not differ significantly from the theoretically expected frequencies. Therefore the chi-square statistic is used to test the relation between the three respondent groups.

3.5.4 The research hypotheses and significance levels.

In the formulation of the research hypotheses as outlined in chapter one and in line with the problem statement, it was assumed that there were differences between the control groups in terms of their responses as part of the dependent variables. This inference was the directional hypothesis, which assumed that there were differences between what the respondents in the three samples viewed as desirable outcomes in relation to the current state of service delivery in the implementation processes. These hypotheses would be tested and then either rejected or accepted.

Under the research hypotheses, as formulated from the problem statements, it was assumed that there would be observed differences. If the differences observed fall within the 95% confidence interval (or at the 5% error level) around the mean of the sample distribution, then the research hypotheses will not be rejected.

In addition to the statistical outputs generated for the chi-square values, the Pearson's significance values for $p = < 0.5$ were calculated to serve as the basis for the rejection or the retention of the research hypotheses. This probability or p-value, is a statistically acceptable method to summarize what the data says about the credibility of the research hypotheses.

3.6 SUMMARY

The empirical investigation outlined the theoretical and practical implications of collecting and analysing the data. The importance of the various controls was highlighted to ensure validity and reliability of the representative samples in line with the problem statement. The rationale in designing the structure of the questionnaire was illustrated and the service delivery aspects were related to learning area categories which served as the basis for formulating the actual questions.

The statistical arguments were outlined to support the observation and interpretation of the data. These would be used as the basis for accepting or rejecting the research hypotheses. Thereafter the approach would be to examine the frequency distributions of the survey results in relation to the three samples, through a process of intuitive discernment, as a basis for the interpretation and summative evaluation of the results.

The conclusions that emanate from the study will be illustrated and

discussed by comparing the opinions of students, staff and industry on their desirable expectations to the identified learning aspects of co-operative education and the current status prevailing at technikons and in industry in these same areas. The picture that emerges will be the conclusions to this study in the form of either rejecting or accepting the research hypothesis based on the formulated sub problem statements.

The recommendations will point to the key success factors, toward the formulation of a collective strategy by all role players, to enhance co-operative education through effective service delivery strategies.

CHAPTER FOUR

THE RESULTS : ANALYSIS AND INTERPRETATION

4.1 INTRODUCTION

Before reporting on the observations and interpretation of the data, it is important to be reminded of the assumptions made in defining the problem and its setting. It must be emphasized that section two and three of the questionnaire, which measured the opinions of all the respondents, was intentionally designed with a positive bias, to assess the potential for desirable learning outcomes.

The success of any service delivery strategy will only begin to succeed if all role players are positively disposed toward desirable outcomes. Section four of the questionnaire examined the prevailing situation and a comparison with the opinions will inform on the potential for success in realising educational ideals.

In reporting on the results, the approach will be to observe the responses in terms of the interrelationship between students, academic staff and industry. At the end of the chapter, a separate summary will be made for each sample as it relates to the three hypotheses as outlined in chapter one. The conclusions in chapter five will reflect on sub-problem four, which will serve as a bench mark for recommendations on the key success factors for a co-ordinated service delivery strategy toward improved learning outcomes.

4.1.1 Statistical outputs and interpretations.

The rationale and justification of the statistical reporting has been outlined in paragraphs 3.5.3 and 3.5.4 in chapter three. Reports were generated for each of the independent variables (ie. each question put to the three sample groups). These variables included a comparison between the three sample responses to *desirable outcomes and the current status of service delivery in the co-operative* education environment. A typical example of the outputs generated for each of the independent variables is illustrated in table 4.1.

TABLE 4.1 **SAMPLE OF STATISTICS OUTPUT REPORT**

NO_NEED by SAMPLE_ID		**Student training needs no evaluation** *Identification of data resource*			
		SAMPLE_ID			Page 1 of 1
	Count Exp Val Col Pct	Industry 1	staff 2	students 3	Row Total
NO_NEED					
yes	1	1 3.0 2.3%	0 2.6 .0%	15 10.3 10.1%	16 6.9%
no	2	40 35.4 90.9%	37 30.6 97.4%	109 120.0 73.2%	186 80.5%
unsure	3	3 5.5 6.8%	1 4.8 2.6%	25 18.7 16.8%	29 12.6%
	Column Total	44 19.0%	38 16.5%	149 64.5%	231 100.00%

Chi - Square	Value	DF	Significance
Pearson Likelihood Ratio	15.31447 19.56108	4 4	**.00409** .0061

Minimum expected frequency - 2.632

Cells with Expected Frequency < 5 - 3 of 9 (3.3%)

In total 152 reports were generated, of which 95 responses reflected desirable outcomes to service delivery and 57 related to the current status of service delivery. It was stated earlier in paragraphs 3.5.4 of chapter three that if the differences observed fall within the 95% confidence interval (or at the 5% error level) around the mean of the sample distribution it will fail to reject the research hypotheses. Furthermore it was stated that the probability or p-values would be an acceptable method to summarize what the data said about the credibility of the research hypotheses. A summary of these results is given in table 4.2

TABLE 4.2 **PROBABILITY VALUES BASED ON SAMPLE RESPONSES**

Service delivery responses to.....	Number of variables	Pearsons	significance	probability
		p = < 0.05	p = > 0.05	Total
Desirable outcomes	95 No	25%	75%	100%
Current status	57 No	88%	12%	100%
Total	**152 No**			

From the above table it should be noted that 25% of the 95 variables pertaining to desirable learning outcomes recorded a p-value less than 0.05. Similarly 75% where the p-value was greater than 0.05. This 75% confirms no significant difference and a general agreement between the three samples. This in turn confirms a positive disposition to desirable outcomes of service delivery aspects within the learning environment. The results of the p-values pertaining to the current status record that 88% of the p-values are in fact less than 0.05. This confirms differences between the 3 sample groups to the current status of service delivery in all areas of the learning environment.

The above statistical analysis therefore suggests that differences exist between the sample groups to the current status and no significant differences on desirable outcomes. The results of the these observations can now be explored by examining the content of the actual responses to each service delivery category based on the frequency distributions as well as the p-values, which will serve as a basis for the interpretation and synthesis of the research problem.

4.2 EXPERIENTIAL LEARNING.

4.2.1 Orientation

Orientation is the process of briefing and providing information about the requirements of the experiential learning process. Respondents were asked to indicate the amount of importance they attached to orientation.

Questions relating to the importance of and the need for orientation programmes at the start of the experiential learning period indicated overall support in excess of **90%** by all respondents as shown in table 4.3. It is worth noting that support for orientation is highly rated, the procedures for the evaluation of experiential learning show less support which could mean that the intention is desirable but how it should be measured may need some clarification.

TABLE 4.3 OPINIONS ON ORIENTATION PRIOR TO EXPERIENTIAL TRAINING

Orientation serves	STUDENTS		ACADEMIC STAFF		INDUSTRY	
	Important	Unimportant	Important	Unimportant	Important	Unimportant
To help students to understand the importance of co-operative education.	**96%**	**4%**	**97%**	**3%**	**94%**	**6%**
To help students to appreciate the need for a code of conduct.	**93%**	**7%**	**92%**	**8%**	**85%**	**15%**
To help students to create an awareness of the problems of working life.	**93%**	**7%**	**93%**	**7%**	**86%**	**14%**
To explain to students the procedures for evaluation.	**86%**	**14%**	**93%**	**7%**	**81%**	**19%**
To outline to students the objectives of the training programme.	**95%**	**5%**	**95%**	**5%**	**94%**	**6%**
	(N = 180) = 100%		(N = 40) = 100%		(N = 48) = 100%	

According to staff, only **44%** of technikons ran orientation programmes, **34%** of students were aware of such programmes and only **15%** of industry thought such programmes existed. This implies that **56%** of technikons may not have orientation prior to the experiential learning period, **66%** of students were unaware of such programmes and **85%** of industry were similarly unsure. See table 4.4

Similarly, orientation programmes by industry for students entering the workplace are provided by only half of the respondents. Half the students and only one third of the staff acknowledged the existence of such programmes. Added to this, it is significant that only **56%** of students understood the role of co-operative education as part of the course programme.

TABLE 4.4 THE CURRENT STATUS OF ORIENTATION PROGRAMMES

	STUDENTS			ACADEMIC STAFF			INDUSTRY		
	YES	NO	UNSURE	YES	NO	UNSURE	YES	NO	UNSURE
Does your technikon provide an orientation programme before the start of the experiential training period?	34%	39%	27%	44%	18%	38%	15%	38%	47%
Are you aware of employers' having an orientation programme when students start experiential training?	27%	51%	22%	18%	47%	35%	55%	34%	11%
Does you technikon provide an orientation programme at the commencement of academic studies?	47%	29%	24%	77%	18%	5%	25%	21%	54%
Do you fully understand the role of co-operative education as part of the course programme?	56%	26%	18%	77%	6%	17%	46%	27%	27%
Do you visit students during their period of experiential training?	40%	48%	12%	44%	52%	4%	67%	25%	8%
	(N = 180) = 100%			(N = 40) = 100%			(N = 48) = 100%		

Of greater significance is the fact that less than half of the industry understood the role of co-operative education and the remainder in equal proportions were either not understanding, or were unsure of the role of co-operative education.

The above observations raise questions about the quality of orientation programmes where they do exist and at the same time suggest that the majority of students enter their experiential learning with a limited idea of what is expected of them or what the desired outcomes of the learning should be. Similarly, it is more than likely that the majority of companies which do accept students for training are probably not implementing any structured training programmes.

4.2.2 Placement

Placement means experiential learning opportunities in the workplace. Respondents were asked to indicate to what extent they agreed or disagreed with the statements outlined in table 4.5.

TABLE 4.5 **OPINIONS ON STUDENT PLACEMENT FOR THEIR EXPERIENTIAL LEARNING**

	STUDENTS			ACADEMIC STAFF			INDUSTRY		
Placement in industry helps ...	Agree	Neutral	Disagree	Agree	Neutral	Disagree	Agree	Neutral	Disagree
To assist students in understanding the relevance of the academic course work.	**93%**	**5%**	**2%**	**95%**	**5%**	**0%**	**94%**	**4%**	**2%**
To help lecturing staff to update their own knowledge of developments in industry.	**69%**	**22%**	**9%**	**72%**	**21%**	**7%**	**64%**	**19%**	**17%**
To give employers a chance to get involved in educational issues.	**72%**	**20%**	**8%**	**74%**	**21%**	**5%**	**72%**	**9%**	**19%**
To give employers a chance to select future permanent employees	**82%**	**13%**	**5%**	**85%**	**10%**	**5%**	**89%**	**4%**	**7%**
	(N =180) = 100%			(N =40) = 100%			(N =48) = 100%		

The benefits of student placement were strongly supported by all respondents with more than **70%** agreeing that it allows industry an opportunity to get involved in educational issues. There was also a **64% - 72%** benefit for staff to get involved in updating their knowledge of developments in industry.

Despite these positive benefits only **35%** of students could easily find placement opportunities and **49%** of students experienced difficulty in finding placements.

Sixty-five percent of students had to find placements on their own initiative despite the fact that **85%** of institutions had a co-operative education unit, and only **44%** of students knew of the existence of these units. See table 4.6

TABLE 4.6 **FACTUAL EXPERIENCES OF STUDENT PLACEMENT SUCCESSES**

	STUDENTS			STAFF		
	YES	NO	UNSURE	YES	NO	UNSURE
Is it easy for students to find placement for experiential training.	**35%**	**49%**	**16%**	**36%**	**36%**	**28%**
Did students find placement on their own initiative.	**65%**	**20%**	**15%**	**57%**	**11%**	**32%**
Have you personally assisted in finding placements.	**18%**	**69%**	**13%**	**44%**	**26%**	**30%**
Does your technikon have a Co-operative Education unit.	**44%**	**10%**	**46%**	**85%**	**6%**	**9%**
Do the majority of students secure a placement before completing their S2 level of study.	**34%**	**55%**	**11%**	**29%**	**41%**	**30%**
	(N = 180) = 100%			(N = 40) = 100%		

While the second year of the course is prescribed for experiential learning, only about one third of the students are suitably placed before the end of their first year of study. Lecturing staff's support in assisting students to find placements reflects a low of **44%** in the views of staff, while **18%** of students claim to have received such assistance. Co-operative Education Units, where they exist, are clearly not meeting the needs of students.

The opportunity for securing a placement represents a major step forward for students in pursuit of their academic studies and in many cases it is their first exposure to any working environment. If half the students cannot find a suitable placement at the end of their first period of study, it must cause a fair amount of

frustration and disillusionment about their career opportunities. While it may be encouraging to note that **65%** of students do find placements on their own initiative, it also becomes clear that there is a need to examine the support given by technikons and industry in facilitating such opportunities for placements.

4.2.3 Supervision

Supervision occurs when students doing experiential learning are reporting to a person whose specific task it is to train, motivate and evaluate the students' progress in the workplace.

The supervision of students doing experiential learning is crucial to measure successful learning outcomes. The success of supervision will be determined by the quality and capabilities of the supervisor. In table 4.7 only **51%** of students feel satisfied with the quality of supervision at the workplace. The role of lecturing staff in the supervision of experiential learning is supported by **81%** of students. The role of lecturing staff in the supervision of experiential learning is supported by **74%** of staff, and only **54%** of industry support this view. This clearly indicates that students undergoing experiential learning would appreciate the support of lecturing staff in the supervision of their experiential learning. Lecturing staff themselves appear to be supportive of the idea with industry perhaps having some reservations.

TABLE 4.7 OPINIONS ON THE SUPERVISION OF STUDENTS IN THE WORK PLACE

	STUDENTS			STAFF			INDUSTRY		
	Agree	Neutral	Disagree	Agree	Neutral	Disagree	Agree	Neutral	Disagree
Workplace supervisors are qualified to attend to the *training needs* of students	**51%**	**29%**	**20%**	**64%**	**21%**	**15%**	**65%**	**23%**	**12%**
Lecturing staff should play a role in experiential training *supervision.*	**81%**	**9%**	**10%**	**74%**	**15%**	**11%**	**54%**	**29%**	**17%**
Workplace supervisors do not fully understand the training needs of students.	**56%**	**23%**	**21%**	**68%**	**26%**	**6%**	**55%**	**30%**	**15%**
Workplace supervisors should always be available to attend to students' needs.	**78%**	**13%**	**9%**	**11%**	**60%**	**29%**	**12%**	**36%**	**52%**
Workplace supervisors need special training to attend to students in training.	**66%**	**19%**	**15%**	**76%**	**13%**	**11%**	**47%**	**23%**	**30%**
	(N =180) = 100%			(N =40) = 100%			(N =48) = 100%		

There are also clear indications that work supervisors do not fully understand the training needs of students, with more than half of the respondents supporting this view. This view probably relates to the **81%** of students who desire to have lecturing staff playing a role in work place supervision.

It is also significant that **78%** of students find the need to have their supervisors available to attend to their needs, while only **12%** of industry support this view. If this is related to responses on the need for supervisors to have special training to monitor students, it is interesting to note that **76%** of staff, even more so than students, support this view. In contrast only **47%** of industry agree, which could be interpreted as a defensive response. Poor perceptions by students, lack of supervisor training , tied in with deficiencies in orientation, can impact negatively

on student aspirations.

In table 4.8 the survey showed that more than **60%** of all respondents indicated that supervision is constructive and supportive. It also confirms that supervision is done mostly by the work-based supervisor and to a far lesser extent through visits by the technikon coordinator and lecturing staff

TABLE 4.8 **FACTUAL EXPERIENCES OF STUDENT SUPERVISION IN THE WORK PLACE**

	STUDENTS			STAFF			INDUSTRY		
	YES	NO	UNSURE	YES	NO	UNSURE	YES	NO	UNSURE
Do students have access to their work supervisor at all times?	51%	29%	20%	57%	13%	30%	86%	13%	1%
The technikon coordinators only visit students in the workplace.	19%	62%	19%	41%	36%	23%	34%	19%	47%
Lecturing staff also do student visitations in the work place.	11%	70%	19%	54%	34%	12%	42%	30%	28%
Work supervision is constructive and supportive.	61%	13%	26%	67%	3%	30%	65%	21%	14%
Assessment of student work performance is being done by :									
Supervisor only.	35%	34%	31%	11%	54%	34%	17%	61%	22%
Technikon coordinator only.	11%	52%	37%	6%	60%	29%	3%	71%	26%
Lecturing staff	9%	52%	39%	44%	26%	26%	9%	61%	30%
Supervisor and Technikon coordination.	39%	28%	33%	52%	16	26	82%	7%	11%
	(N =180) = 100%			(N =40) = 100%			(N =48) = 100%		

4.2.4 Assessment and Evaluation

Assessment is more specifically the supply of information to students, parents, teaching staff and sponsors on the specific accomplishments of individual students (Broadfoot, 1987:5). Evaluation implies a process of both measurement and

assessment but carries the process further to the formation of value judgements (Meyer and Veenstray, 1986:59).

In table 4.9 respondents were asked to give their opinions on the effects of assessment and evaluation. The responses revealed agreement in excess of **80%** by all parties that evaluation of experiential learning is a strong motivator to students in the work place, but an admission by **52%** and less that such evaluation occurs on a regular basis.

TABLE 4.9 **FACTUAL RESPONSES ON EXPERIENTIAL LEARNING EVALUATION**

	STUDENTS			ACADEMIC STAFF			INDUSTRY		
	YES	NO	UNSURE	YES	NO	UNSURE	YES	NO	UNSURE
Feedback on students progress helps to motivate them.	**80%**	**6%**	**14%**	**85%**	**0%**	**15%**	**94%**	**3%**	**3%**
Feedback on student progress is done regularly.	**34%**	**41%**	**25%**	**39%**	**21%**	**40%**	**52%**	**21%**	**27%**
Students receive feedback on interpersonal skill's development.	**20%**	**49%**	**31%**	**16%**	**34%**	**50%**	**38%**	**28%**	**34%**
Students are allowed to comment on the Industry support and training provided.	**38%**	**47%**	**15%**	**13%**	**67%**	**20%**	**55%**	**17%**	**28%**
Students are allowed to comment on the Technikon programme and level of service.	**52%**	**41%**	**2%**	**31%**	**54%**	**15%**	**40%**	**15%**	**45%**
	(N =180) = 100%			(N =40) = 100%			(N =48) = 100%		

In table 4.10 on the question of desirable criteria for evaluation, observations show support levels of between **80 %** and **100%** for criteria such as technical knowledge, hands-on skills, communication skills, team work, confidence building, self motivation, decision making and leadership skills.

TABLE 4.10 OPINIONS ON THE DESIRABILITY OF DIFFERENT CRITERIA FOR EVALUATION

	STUDENTS			STAFF			INDUSTRY		
	Desirable	Neutral	Not Desirable	Desirable	Neutral	Not Desirable	Desirable	Neutral	Not Desirable
Technical knowledge	98%	2%	0%	97%	3%	0%	100%	0%	0%
Hands on skills	89%	9%	2%	97%	3%	0%	94%	6%	0%
Self motivation	96%	3%	1%	100%	0%	0%	96%	4%	0%
Communication skills	92%	70%	0%	100%	0%	0%	92%	8%	0%
Team work	94%	5%	1%	97%	3%	0%	92%	6%	2%
Initiative	96%	4%	0%	97%	3%	0%	98%	2%	0%
Punctuality	92%	7%	1%	97%	3%	0%	85%	13%	2%
Independent thought	92%	6%	2%	95%	5%	0%	92%	8%	0%
Decision making	93%	6%	1%	85%	15%	0%	94%	4%	2%
Leadership	96%	4%	0%	87%	13%	0%	92%	6%	2%
	(N =180) = 100%			(N =40) = 100%			(N =48) = 100%		

On the other hand, only between **16% and 38%** of students, staff and industry agree that interpersonal skills form part of any evaluation as shown in table 4.9

The most effective tools for measuring experiential training were rated as shown in table 4.11. These include measuring instruments such as logbooks, oral presentations, project work, assignments and written examinations. Logbooks and projects enjoy the majority support as the most meaningful tool for evaluation. However it is interesting to note that the actual utilization of these tools falls way below their desirability as tools for evaluation from the above table 4.11.1.

TABLE 4.11 **OPINIONS ON THE MOST EFFECTIVE EVALUATION TOOLS**

	STUDENTS			STAFF			INDUSTRY		
	Desirable	Neutral	Not Desirable	Desirable	Neutral	Not Desirable	Desirable	Neutral	Not Desirable
The logbook.	85%	11%	4%	97%	3%	0%	85%	6%	9%
Oral presentation	66%	18%	16%	85%	10%	5%	67%	29%	4%
Project work.	83%	9%	8%	92%	5%	3%	83%	13%	4%
Assignments.	75%	13%	12%	78%	16%	6%	84%	15%	1%
Written exams.	46%	17%	37%	51%	15%	34%	40%	21%	39%
	(N =180) = 100%			(N =40) = 100%			(N =48) = 100%		

TABLE 4.11.1 **COMPARISON OF EVALUATION TOOLS BY ALL SAMPLE GROUPS**

TOOLS	DESIRABILITY	ACTUAL UTILISATION
Logbooks	89%	41%
Orals	73%	39%
Projects/ assignments	86%	57%
Examinations	46%	0%
	(N = 180+40+48 = 268) = 100% of all respondents	

The above results were obtained by averaging the desirable responses of the three samples in table 4.11 and comparing this with the average actual uses of the logbooks from the three samples in table 4.12

TABLE 4.12 **FACTUAL USE OF ASSESSMENT AND EVALUATION TOOLS**

	STUDENTS			STAFF			INDUSTRY		
Assessment and evaluation methods include :-	YES	NO	UNSURE	YES	NO	UNSURE	YES	NO	UNSURE
The use of logbooks only.	48%	32%	20%	39%	47%	14%	36%	42%	22%
Work-based projects or assignments.	53%	23%	24%	47%	26%	27%	67%	19%	14%
Oral or verbal presentations.	40%	35%	25%	44%	36%	20%	34%	44%	22%
	(N =180) = 100%			(N =40) = 100%			(N =48) = 100%		

It is also clear that while aspects relating to interpersonal and social skills are

recognised as relevant to learning outcomes, very little attention is given to their inclusion in the evaluation process judging by the average **39%** response to oral presentation as a tool for assessment and evaluation given in Table 4.12.

For feedback on evaluation to be effective, students were asked to indicate the desirability of the following time scales for assessing experiential training performance as shown in table 4.13.

TABLE 4.13 **DESIRABILITY OF TIME SCALES FOR ASSESSMENT / EVALUATION**

	STUDENTS			STAFF			INDUSTRY		
	Desirable	Neutral	Undesirable	Desirable	Neutral	Undesirable	Desirable	Neutral	Undesirable
Daily feedback	**27%**	**27%**	**46%**	**8%**	**34%**	**58%**	**17%**	**25%**	**58%**
Weekly feedback	**48%**	**25%**	**27%**	**34%**	**29%**	**37%**	**33%**	**37%**	**30%**
Monthly basis	**80%**	**10%**	**10%**	**70%**	**15%**	**15%**	**92%**	**6%**	**2%**
Quarterly basis	**74%**	**14%**	**12%**	**73%**	**14%**	**13%**	**77%**	**19%**	**4%**
End of work term	**71%**	**11%**	**18%**	**73%**	**5%**	**22%**	**81%**	**6%**	**13%**
	(N =180) = 100%			(N =40) = 100%			(N =48) = 100%		

Feed back on monthly, quarterly and end-of-term evaluations appear to enjoy the most support. Weekly and daily feedback receiving less support is understandable given the fact that elements of learning would evolve over a period of time. It is also clear in the opinion of all respondents that students have a role to play in the evaluation of industry and technikon programmes as indicated in table 4.14 below.

TABLE 4.14 THE DESIRABILITY OF STUDENTS EVALUATING TECHNIKONS & INDUSTRY

	STUDENTS			STAFF			INDUSTRY		
	Desirable	Neutral	Undesirable	Desirable	Neutral	Undesirable	Desirable	Neutral	Undesirable
Students should evaluate the training facilities of Companies.	**85%**	**9%**	**6%**	**80%**	**13%**	**7%**	**78%**	**15%**	**7%**
Students should evaluate the Technikon's course relevance to the work place	**93%**	**5%**	**2%**	**85%**	**8%**	**7%**	**91%**	**9%**	**0%**
	(N =180) = 100%			(N =40) = 100%			(N =48) = 100%		

4.2.5 The world of work

The world of work refers to factors that influence the student's understanding of the working environment. Respondents were asked to rate the following statements as meaningful to their understanding of the world of work.

TABLE 4.15 OPINIONS ON ASPECTS RELATING TO THE WORLD OF WORK

	STUDENTS		STAFF		INDUSTRY	
	Important	Unimportant	Important	Unimportant	Important	Unimportant
To develop students' appreciation of the relationships between the various parts of the organization.	**95%**	**5%**	**90%**	**10%**	**96%**	**4%**
To develop the student's ability to *meet deadlines.*	**99%**	**1%**	**97%**	**3%**	**100%**	**0%**
To develop the student's awareness of industry's need for cost effectiveness.	**96%**	**4%**	**100%**	**0%**	**98%**	**2%**
To help students to develop a realistic attitude toward the world of work.	**99%**	**1%**	**100%**	**0%**	**96%**	**4%**
To assist students in future career path planning	**97%**	**3%**	**95%**	**5%**	**85%**	**15%**
	(N =180) = 100%		(N =40) = 100%		(N =48) = 100%	

The responses in table 4.15 relate to some of the essential learning outcomes as

applicable to the workplace. Very often these aspects reflect normal expectations, particularly by industry in the career development of students in training.

All these positive responses by all the sample groups indicate a strong desire to inculcate a work ethic in the students at an early stage of their career path. However, what is often overlooked is that it should form part of the learning environment and should therefore be expressed as an essential outcome of the learning programme with appropriate and formally structured instruments of evaluation.

TABLE 4.16 **FACTUAL EVIDENCE PERTAINING TO THE WORLD OF WORK**

	STUDENTS			STAFF			INDUSTRY		
	YES	NO	UNSURE	YES	NO	UNSURE	YES	NO	UNSURE
Students understand their role in the company organization structure.	**66%**	**11%**	**23%**	**44%**	**18%**	**38%**	**57%**	**21%**	**22%**
Students understand the need to meet work *deadlines*.	**66%**	**11%**	**23%**	**52%**	**16%**	**32%**	**50%**	**20%**	**30%**
Students should be involved in managerial responsibilities.	**66%**	**11%**	**23%**	**52%**	**16%**	**32%**	**61%**	**25%**	**14%**
Students should agree to do unrelated engineering duties.	**41%**	**32%**	**27%**	**65%**	**16%**	**19%**	**30%**	**60%**	**10%**
Students are allowed to work independently.	**16%**	**36%**	**49%**	**66%**	**16%**	**18%**	**68%**	**19%**	**13%**
	(N =180) = 100%			(N =40) = 100%			(N =48) = 100%		

In table 4.16 , the three samples differ on the question of students needing to work independently. Only **16%** of students agree while **66%** of staff and **68%** of industry feel this should be the case. This situation is difficult to understand given the fact that students appear to understand their role in the company's organization

structures and the need to meet deadlines. It may point to inappropriate orientation and poor quality supervision as discussed in relation to table 4.7.

4.2.6 Interpersonal and social skills

Interpersonal and social skills deal with the ability to cope in human relationships and the ability to interact effectively with other people (De Lange, 1995:552). Respondents were asked to indicate how they would rate the importance of the following qualities as indicated in table 4.17.

TABLE 4.17 **OPINIONS ON INTERPERSONAL AND SOCIAL SKILLS IN STUDENT LEARNING**

	STUDENTS		STAFF		INDUSTRY	
	Important	Unimportant	Important	Unimportant	Important	Unimportant
To make students aware of the importance of verbal and non verbal communication at work.	**94%**	**6%**	**100%**	**0%**	**98%**	**2%**
To develop the student's ability to present a case clearly and convincingly.	**99%**	**1%**	**100%**	**0%**	**94%**	**6%**
To enable the student to work as part of a team.	**99%**	**1%**	**95%**	**5%**	**98%**	**2%**
To enable the student's ability to organize the work of others.	**93%**	**7%**	**74%**	**26%**	**73%**	**27%**
To develop the student's ability to accept the authority of others.	**90%**	**10%**	**95%**	**5%**	**81%**	**19%**
	(N =180) = 100%		(N =40) = 100%		(N =48) = 100%	

The recognition of interpersonal and social skills and the potential role they play in career development is highlighted as an important aspect of development in training as shown in table 4.17. The importance of verbal and non-verbal

communication is recognised by all parties in excess of **94%**. The extremely positive responses to the value of interpersonal and social skills in the development of competence in the workplace should be noted in terms of added value to an outcome based approach to learning.

In practice, however, table 4.18 reveals that **43%** of staff and similarly **35%** of students are unsure or negative about whether communication skills do actually improve after experiential learning. This partial uncertainty is probably due to the fact that these aspects are not being evaluated effectively or not at all.

TABLE 4.18 **FACTS ON INTERPERSONAL AND SOCIAL SKILLS IN STUDENT LEARNING**

	STUDENTS			STAFF			INDUSTRY		
	YES	NO	UNSURE	YES	NO	UNSURE	YES	NO	UNSURE
Students' communication skills improved as a result of experiential training.	**65%**	**13%**	**22%**	**57%**	**13%**	**30%**	**58%**	**34%**	**8%**
Students' self confidence improved as a result of experiential training.	**70%**	**8%**	**22%**	**77%**	**3%**	**20%**	**72%**	**8%**	**20%**
Students are accepted as members of the work team.	**70%**	**8%**	**22%**	**77%**	**3%**	**20%**	**82%**	**3%**	**15%**
Racial attitudes influence students' progress negatively.	**70%**	**6%**	**24%**	**59%**	**0%**	**41%**	**92%**	**0%**	**8%**
Students are given positions of authority over others.	**23%**	**49%**	**28%**	**31%**	**21%**	**48%**	**21%**	**59%**	**20%**
	(N =180) = 100%			(N =40) = 100%			(N =48) = 100%		

Improvements in the self confidence after experiential learning is recognised by **70%** of students and even more so by staff and industry.

Racial attitudes do appear to have a negative impact on students' progress. While

not specifically stating which attitudes, it is significant that an average **75%** agree that race can have some negative impact on student progress. Twenty-three *percent of students*, **31 %** *of academic staff, and* **21%** *of industry say students are* given positions of authority over others while **21%** of staff say no and **48%** are unsure. The role of students in training and in any supervisory role is therefore limited. This is in contrast to a **52%** and **61%** acceptance by staff and industry respectively that students should be involved in managerial responsibilities as *indicated in table* 4.16

4.2.7 Technical development

Wanous (1973:16) explained that transition to the workplace is dependent on the matching process between student abilities and expectations and the specific job requirements of the organisation. Technical development deals with the development of technical knowledge and expertise in the design and construction of civil engineering elements and the ability to extract and use this information in the work environment. Responses to the importance of technical development are shown in table 4.19.

TABLE 4.19 OPINIONS ON THE IMPORTANCE OF TECHNICAL DEVELOPMENT

	STUDENTS		STAFF		INDUSTRY	
Technical development means...	Important	Unimportant	Important	Unimportant	Important	Unimportant
To develop the student's ability to accurately understand the needs of the task.	**98%**	**2%**	**97%**	**3%**	**94%**	**6%**
To enable the student to develop new skills applicable to the work situation.	**100%**	**0%**	**100%**	**0%**	**94%**	**6%**
To give the student the opportunity to appreciate and to apply academic knowledge to the practical problems related to the demands of work.	**98%**	**2%**	**100%**	**0%**	**98%**	**2%**
To help the student to appreciate different approaches to learning.	**86%**	**14%**	**87%**	**13%**	**69%**	**31%**
To provide a contrast between course work and work place demands.	**83%**	**17%**	**87%**	**13%**	**63%**	**37%**
	(N =180) = 100%		(N =40) = 100%		(N =48) = 100%	

All respondents were favourably disposed to learning outcomes which reflect knowledge and skills-based outcomes. The ability to appreciate different approaches to learning and the application of knowledge into practical demonstration deserves priority support in the view of all three respondents.

In table 4.20 **15%** of industry agree that the training technikon students receive can be easily applied in the work place, while **48%** say no and **37%** are unsure, meaning that **84%** give a negative response to the ability of students to use their technikon training effectively in the work place. Only **40%** of the students could use that training effectively with **26%** saying no and **34%** being unsure. This raises questions about the effectiveness of academics in equipping students for the world of work.

TABLE 4.20 THE APPLICATION OF TECHNIKON TRAINING IN THE WORKPLACE

	STUDENTS			STAFF			INDUSTRY		
	YES	NO	UNSURE	YES	NO	UNSURE	YES	NO	UNSURE
It is easy for students to apply training to the demands of the workplace.	**40%**	**26%**	**34%**	**34%**	**21%**	**45%**	**15%**	**48%**	**37%**
The students approach to learning improve after the period of experiential training.	**59%**	**14%**	**27%**	**77%**	**3%**	**20%**	**73%**	**0%**	**27%**
Technikon training is of little help to students in the work place.	**28%**	**45%**	**27%**	**8%**	**77%**	**15%**	**9%**	**84%**	**7%**
Technikon equipment is *outdated.*	**26%**	**41%**	**37%**	**24%**	**59%**	**17%**	**13%**	**19%**	**68%**
Technikon teaching methods are unrelated to industry requirements.	**11%**	**51%**	**38%**	**8%**	**75%**	**17%**	**7%**	**25%**	**68%**
	(N =180) = 100%			(N =40) = 100%			(N =48) = 100%		

Staff also appear to acknowledge these shortcomings with a **21%** no and **45%** uncertainty about the value of academic instruction. When asked if technikon training was of no help at all in the workplace, **28%** of students agreed, **45%** disagreed and **27%** were unsure. In contrast **77%** of staff disagreed, being the academic providers.

It has been demonstrated that there are significant differences between respondents as to the value of academic instruction as it relates to its application in the workplace. It is fair to accept that conveners of learning would defend their various positions. What is clear is that more than half of students are concerned about the effectiveness of such learning and an admission by industry that there is dissatisfaction with aspects of technikon input. This could be the result of ignorance but confirms the need to review carefully these delivery mechanisms.

4.3 ACADEMIC MATTERS

4.3.1 Teaching methodology

The relative success of teaching and learning will depend on the integration and utilization of resources in approaches to teaching methodology. Tomkin, (1986:24) suggests that technology is causing the adoption of new intellectual paradigms to teaching methodology. Table 4.21 shows the opinions of respondents to the effectiveness of the methodologies and resources in the managing of the learning process.

Table 4.21 OPINIONS ON TEACHING METHODOLOGIES AND RESOURCE EFFECTIVENESS

	STUDENTS			STAFF			INDUSTRY		
	Effective	Neutral	Ineffective	Effective	Neutral	Ineffective	Effective	Neutral	Ineffective
Lecturing	87%	10%	3%	85%	10%	5%	73%	21%	6%
Lecturing using overheads	80%	14%	6%	87%	13%	0%	90%	10%	0%
Laboratory work	78%	17%	5%	90%	10%	0%	88%	12%	0%
Site visits	89%	8%	3%	87%	13%	0%	92%	6%	2%
Computers	84%	12%	4%	90%	10%	0%	83%	17%	0%
Library	75%	19%	6%	82%	18%	0%	77%	17%	6%
Project	85%	10%	5%	95%	5%	0%	94%	6%	0%
Visiting lecturers	66%	27%	7%	72%	28%	0%	69%	27%	4%
Self study	83%	11%	6%	76%	21%	3%	85%	13%	2%
Group work	83%	10%	7%	77%	18%	5%	83%	17%	0%
	(N =180) = 100%			(N =40) = 100%			(N =48) = 100%		

There appear to be no significant differences among respondents to the listed teaching and learning methodologies as a media for successful learning outcomes.

An outcome based approach to learning uses as its starting point what the student should be able to demonstrate and have a knowledge of. Respondents were asked to rate the following outcomes in terms of their importance to the successful application of learning.

TABLE 4.22 **OPINIONS ON THE IMPORTANCE LEARNING OUTCOME SKILLS**

	STUDENTS		STAFF		INDUSTRY	
	Important	Unimportant	Important	Unimportant	Important	Unimportant
Technical knowledge.	99%	1%	97%	3%	100%	0%
Technical hands-on skills.	93%	7%	95%	5%	96%	4%
Communication skills.	94%	6%	100%	0%	100%	0%
Life skills.	80%	20%	88%	12%	71%	29%
Team working skills.	98%	2%	95%	5%	92%	8%
Leadership skills.	90%	10%	83%	17%	82%	18%
Management skills.	94%	6%	85%	15%	76%	24%
Entrepreneurship skills.	84%	16%	80%	20%	77%	23%
Labour relations skills.	93%	7%	87%	13%	77%	23%
Confidence building skills.	95%	5%	92%	8%	94%	6%
	(N =180) = 100%		(N =40) = 100%		(N =48) = 100%	

Table 4.22 again shows the importance respondents attach, not only to technical aspects but to interpersonal and social skills as well. Managing available resources effectively would be an indication of how the learning environment of students is being managed. Table 4.23 gives some indication.

TABLE 4.23 TEACHING METHODS AND RESOURCE UTILISATION AT TECHNIKONS

	STUDENTS			STAFF			INDUSTRY		
	YES	NO	UNSURE	YES	NO	UNSURE	YES	NO	UNSURE
Lecturer teaching methods are outdated.	**11%**	**52%**	**37%**	**8%**	**75%**	**17%**	**7%**	**25%**	**68%**
Technikon laboratories are underutilised.	**39%**	**39%**	**22%**	**47%**	**44%**	**9%**	**23%**	**11%**	**66%**
Library resource materials are limited in supply.	**51%**	**35%**	**14%**	**31%**	**54%**	**15%**	**15%**	**7%**	**78%**
Project work forms an integral part of learning.	**74%**	**13%**	**13%**	**93%**	**0%**	**7%**	**69%**	**5%**	**26%**
Computer facilities are limited in supply.	**61%**	**29%**	**10%**	**47%**	**47%**	**6%**	**25%**	**11%**	**64%**
	(N =180) = 100%			(N =40) = 100%			(N =48) = 100%		

The most significant observation from the above is that between **64%** and **78%** of industry are unsure about the availability and utilization of resources being used at technikons. One can immediately see the potential for improved utilization of all available resources if industry's uncertainty could be addressed by facilitating their coming on board with more meaningful participation and contribution.

By carefully observing the responses above, while staff and students do not accept that teaching methods are outdated, both groups acknowledge that library resources are underutilised and that computer facilities are limited in supply. Added to this, project work features as an important component of learning. The responses suggest potential for improving the learning environment if utilization could be maximized and if facilities could be improved. They also raise questions as to how teaching methodology is being applied given the constraints mentioned above.

4.3.2 Assessment, evaluation and review.

Assessment , evaluation and review, in their various forms, are mechanisms that create opportunities for feedback on the successes of learning outcomes. The opinion of respondents to a range of factors as they relate to the assessment of learning outcomes are illustrated in table 4.24.

TABLE 4.24 **OPINIONS ON ASSESSMENT, EVALUATION AND REVIEW**

	STUDENTS			STAFF			INDUSTRY		
	Agree	Neutral	Disagree	Agree	Neutral	Disagree	Agree	Neutral	Disagree
Three hour closed book examinations truly reflect the results of learning.	**52%**	**19%**	**29%**	**46%**	**39%**	**15%**	**38%**	**31%**	**31%**
Remedial classes give slow learners a second chance to improve their learning.	**84%**	**12%**	**4%**	**90%**	**8%**	**2%**	**83%**	**13%**	**4%**
Evaluation of students' achievements should include interpersonal, communication and life skills.	**62%**	**31%**	**7%**	**74%**	**23%**	**3%**	**66%**	**21%**	**13%**
End of semester final examinations should be completely abolished.	**29%**	**24%**	**47%**	**10%**	**28%**	**62%**	**9%**	**13%**	**78%**
Continuous evaluation reflects learning progress more accurately.	**77%**	**15%**	**8%**	**67%**	**28%**	**5%**	**85%**	**13%**	**2%**
A continuous record of student achievement on academic and interpersonal skills should be documented.	**69%**	**10%**	**21%**	**72%**	**18%**	**10%**	**56%**	**27%**	**17%**
	(N =180) = 100%			(N =40) = 100%			(N =48) = 100%		

Significantly, **52%** and fewer of respondents agree that the normal three-hour closed

book examinations truly reflected the results of learning. Actual marks as a means of assessment are recognised as acceptable as an indication of measuring learning success but it is equally significant that timeous feedback with written comments by staff would assist in reinforcing and improving the outcomes of learning.

Continuous assessment enjoys more support than three hour closed book examinations. To the suggestion that final examinations should be abolished **29%** of students agree compared to only **10%** of staff and **9%** of industry. When this is compared to the responses on whether three hour closed book examinations truly reflect the results of learning it becomes clear that there appears to be a contradiction because the majority of the respondents agree that they are not a true reflection of learning.

It is significant that there is strong support for the assessment and evaluation of interpersonal and social skills. If one relates this to the desire to document academic performance along with interpersonal and social skills as a continuous record of student achievement it becomes clear that essential and specific outcomes would give a more holistic view on achievement as well as a better measure of actual progress in learning and development.

Aspects on assessment and evaluation as they relate to current practices revealed the following :

TABLE 4.25 FACTUAL RESPONSES ON ASSESSMENT AND EVALUATION

	STUDENTS			STAFF			INDUSTRY		
	YES	NO	UNSURE	YES	NO	UNSURE	YES	NO	UNSURE
Marks received truly reflect the student's understanding of the learning content.	**42%**	**40%**	**18%**	**44%**	**18%**	**38%**	**34%**	**38%**	**28%**
Marks are always received back in sufficient time for students to appreciate any shortcomings in their grasp of the learning content.	**41%**	**42%**	**17%**	**72%**	**11%**	**17%**	**11%**	**21%**	**68%**
Continuous evaluation motivates students to try harder .	**81%**	**12%**	**7%**	**57%**	**13%**	**30%**	**84%**	**0%**	**16%**
3 Hour closed book examinations gives an accurate assessment of learning .	**34%**	**46%**	**20%**	**26%**	**34%**	**40%**	**28%**	**46%**	**26%**
Feedback on interpersonal, communication and life skills form a regular part of student evaluation at the technikon.	**34%**	**39%**	**27%**	**8%**	**41%**	**51%**	**5%**	**11%**	**84%**
	N =180) = 100%			(N =40) = 100%			(N =48) = 100%		

There appears to be some contradiction in the responses on the value of marks received by students being an effective measure of the successes of learning. Initially when asked if marks scored in assessment exercises truly reflect the success of learning **69% to 82%** agree in table 4.24, yet when asked if such marks reflect understanding of learning content, only **38% to 52%** agree. This apparent contradiction reveals an acceptance of the evaluation procedure but casts some doubt as to its value as an instrument in measuring desired learning outcomes.

In table 4.25 three-hour type closed-book examinations receive **34%** and less support by all as an accurate assessment tool whereas on average **76%** agree that continuous evaluation is better measure of the success of learning as reflected in table 4.24. Feedback on the evaluation also shows inconsistency. In table 4.25 **72%**

of staff indicate that they give feedback regularly to students while only **41%** students agree and **42%** disagree. The diversity of views on the timing of evaluation feedback suggests that inconsistencies prevail and it would suggest that students may not be receiving timeous feedback on learning successes.

On feedback of interpersonal, communication and life skills in table 4.25, only **8%** of staff say it happens at all with **41%** saying not at all and **51%** being unsure. Furthermore **34%** of students say they do receive some feedback and **39%** say not at all with **27%** being unsure. There is clearly no uniform structure in place, hence the differences in perceptions. Again **84%** of industry were unsure, which confirms that they are out of touch with technikon procedures for evaluation.

4.3.3 Administration and non-academic functions.

Administration and non-academic functions are processes that underpin and support the academic function of technikons. Harold, Michael and Goetz (1985:57) identified too much administration as a factor which could jeopardize well-intended educational ideals. Table 4.26 shows the opinions of respondents to the levels of administrative support and related matters.

TABLE 4.26 OPINIONS ON ACADEMIC STAFF'S ADMINISTRATIVE FUNCTIONS

	STUDENTS			STAFF			INDUSTRY		
	Agree	Neutral	Disagree	Agree	Neutral	Disagree	Agree	Neutral	Disagree
Lecturing staff play a valuable role as student counsellors in giving guidance to solve student problems.	69%	22%	9%	80%	20%	0%	66%	24%	10%
Processing of student data including all marks should be done by lecturing staff only.	75%	15%	10%	46%	10%	44%	53%	26%	21%
Access to personal computers should compel lecturers to do all their own typing and administration work.	48%	36%	16%	23%	23%	54%	11%	34%	55%
Lecturing staff serving on technikon internal committees provide a valuable service.	59%	38%	3%	69%	26%	5%	57%	40%	3%
Lecturing staff should be paid overtime for work done at home which cannot be completed in normal hours	37%	36%	27%	69%	26%	5%	26%	38%	36%
	(N =180) = 100%			(N =40) = 100%			(N =48) = 100%		

Table 4.26 confirms that the role of lecturing staff in lending support to students' needs is recognised by all respondents. Processing of students' data as a function of lecturing staff is clearly not accepted by staff even with the assistance of computer technology. Related functions such as serving on internal committees are accepted as necessary but should not impact on tendencies toward inefficient time management. The suggestion to overtime pay for staff received majority support from staff members, while students and industry do not support such a suggestion.

TABLE 4.27 FACTUAL COMMENT ON ADMINISTRATIVE ACTIVITIES OF LECTURING STAFF

	STUDENTS			STAFF			INDUSTRY		
	TRUE	FALSE	UNSURE	TRUE	FALSE	UNSURE	TRUE	FALSE	UNSURE
The technikon has a good departmental administration system.	**51%**	**21%**	**28%**	**62%**	**21%**	**17%**	**23%**	**13%**	**64%**
Lecturing staff spend too much time on administration duties.	**17%**	**42%**	**41%**	**72%**	**11%**	**17%**	**15%**	**5%**	**80%**
Lecturing staff are always available for advice and counselling.	**62%**	**25%**	**13%**	**60%**	**21%**	**19%**	**25%**	**17%**	**58%**
Departmental heads perform an administration function.	**51%**	**8%**	**41%**	**90%**	**3%**	**7%**	**32%**	**3%**	**65%**
Lecturing staff regularly have to complete work at home.	**40%**	**9%**	**51%**	**85%**	**5%**	**10%**	**25%**	**5%**	**70%**
	(N =180) = 100%			(N =40) = 100%			(N =48) = 100%		

It is interesting to note that **85%** of staff regularly have to complete work at home which suggests there could be problems associated with work load, prioritising and time management assuming staff comply with working hour norms.

4.3.4 Standards and quality.

The views of all respondents on matters relating to standards and quality are summed up in table 4.28.

From the point of view of students and staff there is a desire and belief that uniform standards can be applied nationally at all technikons. More than **56%** of staff agree with this notion and **26%** disagree. There are significant differences of opinion on

who should set standards and how they should be applied. The strongest support suggests that standards should be determined by technikons and industry. Significantly very little support is given to SERTEC only, as a body for determining standards.

TABLE 4.28 **OPINIONS ON STANDARDS AND QUALITY**

	STUDENTS			STAFF			INDUSTRY		
	Agree	Neutral	Disagree	Agree	Neutral	Disagree	Agree	Neutral	Disagree
Uniform standards can be applied nationally to all technikons.	**81%**	**10%**	**9%**	**56%**	**18%**	**26%**	**81%**	**11%**	**8%**
Historical political disparities have a role to play in determining standards.	**51%**	**26%**	**23%**	**36%**	**13%**	**51%**	**17%**	**19%**	**64%**
Each technikon has to set it's own standards in line with its ability to deliver quality service.	**43%**	**20%**	**37%**	**57%**	**16%**	**27%**	**24%**	**11%**	**65%**
Some technikons can set higher standards than other technikons.	**48%**	**16%**	**36%**	**56%**	**10%**	**34%**	**34%**	**17%**	**49%**
Technikon standards must be determined by	Agree	Neutral	Disagree	Agree	Neutral	Disagree	Agree	Neutral	Disagree
Technikons and industry.	**88%**	**7%**	**5%**	**100%**	**0%**	**0%**	**98%**	**2%**	**0%**
Industry alone	**19%**	**27%**	**54%**	**5%**	**26%**	**69%**	**0%**	**16%**	**84%**
By SERTEC only.	**22%**	**29%**	**49%**	**8%**	**15%**	**77%**	**16%**	**20%**	**64%**
By technikons collectively.	**68%**	**18%**	**14%**	**75%**	**16%**	**9%**	**73%**	**11%**	**16%**
Each technikon must set their own standards.	**26%**	**20%**	**54%**	**32%**	**31%**	**37%**	**23%**	**10%**	**67%**
By all interested parties.	**61%**	**21%**	**18%**	**70%**	**24%**	**6%**	**52%**	**21%**	**27%**
	(N =180) = 100%			(N =40) = 100%			(N =48) = 100%		

In table 4.29 , **95%** of staff as well as **81%** of students felt their respective institutions set high standards, whereas only **44%** of industry believed this was the case, **23%** saying standards were not high and **33%** being unsure. Despite their claims on high standards only **41%** of staff and **40%** of students were aware of any quality

assurance programmes being in place. A staggering **92%** of industry were unsure of any such programmes and **41%** of staff and **50%** of students were unsure.

On the role of SERTEC as the custodian of standards only **17%** of industry agree that SERTEC visits ensure standards are maintained with **80%** not sure of SERTEC's role. Only **65%** of staff acknowledge SERTEC's role in maintaining standards and **64%** of students were unsure. One of the reasons for this is that only **5%** of all students had access to SERTEC reports.

Despite **95%** of individual institutions claiming they set high standards , **75%** of staff and **51- 55%** of students and industry disagree that standards are the same at all technikons, while **25%** of staff were unsure and over **45%** of industry and students were uncertain. In table 4.28, **81%** of industry and students agree that uniform standards could be applied nationally whereas only **56%** of staff accept this possibility and **26%** of staff disagree with this possibility.

The varying responses above illustrate inconsistencies in the understanding of standards and how they should be applied and monitored. Quality assurance programmes are in limited supply and there appear to be high levels of uncertainty as to whether they exist or not, which confirms shortcomings in how learning success and service delivery are actually measured.

TABLE 4.29 FACTS ON STANDARDS AND QUALITY

	STUDENTS			STAFF			INDUSTRY		
	TRUE	FALSE	UNSURE	TRUE	FALSE	UNSURE	TRUE	FALSE	UNSURE
The technikon I work for sets high standards.	81%	4%	15%	95%	0%	5%	44%	23%	33%
The technikon has a quality assurance programme.	40%	10%	50%	41%	18%	41%	5%	3%	92%
SERTEC visits ensure that standards are maintained.	25%	11%	64%	65%	13%	22%	17%	3%	80%
SERTEC reports are made available to students.	5%	29%	66%	8%	21%	71%	3%	21%	76%
SERTEC *evaluation* visits and reports truly reflect the operational efficiency of technikons.	10%	13%	77%	21%	36%	43%	6%	4%	90%
Standards are the same at all technikons.	4%	51%	45%	0%	75%	25%	0%	55%	45%
	(N =180) = 100%			(N =40) = 100%			(N =48) = 100%		

All respondents also agree that standards are not the same at all technikons

4.3.5 Academic and staff development

Academic and staff development are strategies and mechanisms that are intended to add value to improved academic delivery. Academic staff are responsible for managing the learning process and should therefore be equipped as well as be responsive and pro-active in the delivery of improved service delivery. Responses to questions relating to academic and staff development are illustrated in table 4.30 below.

TABLE 4.30 OPINIONS ON ACADEMIC AND STAFF DEVELOPMENT

	STUDENTS			STAFF			INDUSTRY		
	Agree	Neutral	Disagree	Agree	Neutral	Disagree	Agree	Neutral	Disagree
All technikons should between them establish formal linkages and co-operation agreements.	88%	10%	2%	85%	15%	0%	85%	13%	2%
Technikon research should form an essential component of academic development	90%	10%	0%	54%	28%	18%	81%	15%	4%
Lecturing staff should engage in outside consultancy work to keep abreast with industry developments.	85%	14%	1%	95%	5%	0%	79%	19%	2%
Lecturing staff should be encouraged to improve their qualifications.	86%	13%	1%	90%	10%	0%	87%	11%	2%
All lecturing staff should possess a teaching qualification	73%	20%	7%	31%	31%	38%	64%	26%	10%
	(N =180) = 100%			(N =40) = 100%			(N =48) = 100%		

The majority of respondents support development aspects through linkage and co-operation programmes between technikons. Research is also viewed as a priority. Lecturing staff engaging in consultancy work is also supported as a way of keeping abreast with current developments in industry.

Significantly, while all respondents agree that staff should be encouraged to improve their qualifications, there is a reluctance or unwillingness to recognise the need for, or the benefits of staff possessing a teaching or education qualification. This is ironic given the role of lecturing staff as managers and facilitators of learning programmes.

This ties in with the observation that **85%** of current teaching staff do not possess any formal education or teaching qualification. Furthermore, this also reflects in the current situation as it relates to the role of lecturing staff.

In table 4.30, **79%** industry, **95%** staff and **85%** students support the idea of staff engaging in consulting work to keep abreast with developments in industry and the latest technology, and **86%** and more of all respondents agree that staff should be encouraged to improve their qualifications. Significantly, **73%** of students felt that staff needed a formal education qualification, while **64%** of industry and only **31%** of staff felt this way. The reality is that currently **85%** of staff have no formal education training and **15%** do have a teaching qualification.

TABLE 4.31 **FACTS ON ACADEMIC AND STAFF DEVELOPMENT**

	STUDENTS			STAFF			INDUSTRY		
	TRUE	FALSE	UNSURE	TRUE	FALSE	UNSURE	TRUE	FALSE	UNSURE
Lecturing staff keep abreast with the latest technology.	**51%**	**17%**	**32%**	**49%**	**24%**	**27%**	**13%**	**15%**	**72%**
Lecturing staff are encouraged by the technikon to improve their qualifications	**42%**	**8%**	**50%**	**85%**	**11%**	**4%**	**38%**	**3%**	**59%**
Lecturing staff regularly upgrade their teaching methodology.	**32%**	**18%**	**50%**	**44%**	**26%**	**30%**	**5%**	**9%**	**86%**
Lecturing staff have links with lecturers at other technikons.	**28%**	**7%**	**65%**	**52%**	**11%**	**37%**	**23%**	**5%**	**72%**
I have been or am currently involved in research activity.	**11%**	**76%**	**13%**	**34%**	**66%**	**0%**	**11%**	**65%**	**24%**
	(N =180) = 100%			(N =40) = 100%			(N =48) = 100%		

Table 4.31 shows that staff strongly agree that they are encouraged to improve their qualifications, but only **49%** keep abreast with the latest technology. Only **44%**

acknowledge that they upgrade their teaching methodology and **66%** do not engage in any research activity. The above observations in attitude and practices bring into question the role of lecturers and their perception of priorities as custodians of learning. Industry on the whole are negative about the capability and activities of lecturing staff.

The fact that only **31%** of staff support the need to have a teaching qualification is a cause for great concern. On the other hand in table 4.30, **64%** of industry and **73%** of students support the need to have lecturing staff with a teaching qualification. Lecturing staff clearly need to examine their roles as custodians of learning and their contribution to academic development.

4.3.6 Academic support

Students assistants or lecturing assistants are senior students employed by the technikon to assist staff and students in the execution of the academic programme. Support staff in the form of students could add value to efficient service delivery provided their role and services are clearly defined and understood.

The views of respondents in this regard are illustrated in table 4.32 below.

TABLE 4.32 **OPINIONS ON ACADEMIC SUPPORT**

	STUDENTS			STAFF			INDUSTRY		
Student assistants ...	Agree	Neutral	Disagree	Agree	Neutral	Disagree	Agree	Neutral	Disagree
Should perform lecturing duties .	38%	25%	37%	14%	24%	62%	24%	34%	42%
Should mark students' work.	28%	24%	48%	46%	27%	27%	36%	19%	45%
Can run remedial sessions.	72%	20%	8%	92%	5%	3%	70%	13%	17%
Can assist with research projects.	84%	10%	6%	90%	10%	0%	90%	6%	4%
Can invigilate at examinations.	56%	24%	20%	71%	8%	21%	62%	15%	23%
	(N =180) = 100%			(N =40) = 100%			(N =48) = 100%		

It is clear from the above that the role of student assistants should be confined to assisting with research, support to students in remedial sessions and invigilation duties . Actual practices reveal that this is, in fact, the case as shown in table 4.33.

TABLE 4.33 **FACTS ON ACADEMIC SUPPORT**

	STUDENTS			STAFF			INDUSTRY		
	TRUE	FALSE	UNSURE	TRUE	FALSE	UNSURE	TRUE	FALSE	UNSURE
Our technikon employs student / lecturer assistants.	75%	10%	15%	66%	28%	6%	NA	NA	NA
Student assistants are helpful and supportive.	51%	17%	32%	67%	6%	27%	23%	3%	74%
Student assistants assist in the marking of students' work	21%	24%	55%	11%	62%	27%	7%	5%	88%
Student assistants do invigilation duties.	46%	17%	37%	31%	52%	17%	13%	3%	84%
Student assistants do lecturing duties.	20%	45%	35%	3%	80%	17%	5%	9%	86%
	(N =180) = 100%			(N =40) = 100%			(N =48) = 100%		

Advisory Committees or Liaison Committees consist of representatives from

technikons and employer bodies. Their purpose is to advise and give input on matters such as moderation, syllabus content relevance, evaluation procedures, experiential training and the whole range of issues relating to the course programme.

TABLE 4.34 **OPINIONS ON ADVISORY COMMITTEES**

Advisory Committees.....	STUDENTS			STAFF			INDUSTRY		
	Agree	Neutral	Disagree	Agree	Neutral	Disagree	Agree	Neutral	Disagree
Have a valuable role to play in achieving quality and standards	**86%**	**10%**	**4%**	**93%**	**7%**	**0%**	**91%**	**9%**	**0%**
Should allow for student representation.	**81%**	**17%**	**2%**	**31%**	**39%**	**30%**	**62%**	**19%**	**19%**
Should be represented by industry with formal recognition by their professional bodies.	**79%**	**18%**	**3%**	**85%**	**13%**	**2%**	**89%**	**9%**	**2%**
Need only be an informal arrangement between individual technikon's and industry participation based on the technikon's choice.	**24%**	**43%**	**34%**	**18%**	**46%**	**36%**	**9%**	**19%**	**72%**
Should be represented by all civil engineering disciplines such as consultants, suppliers contractors, municipalities etc.	**90%**	**10%**	**0%**	**92%**	**5%**	**3%**	**87%**	**9%**	**4%**
	(N =180) = 100%			(N =40) = 100%			(N =48) = 100%		

The importance of Advisory Committees is recognised by all as entities that should be formally recognised by their respective professional bodies with representation by all disciplines of industry. Students and industry support the idea of student representation but staff appear to be reluctant or unsure. The current situation on the status of advisory committees is reflected in table 4.35.

TABLE 4.35 FACTS ON ADVISORY COMMITTEES

	STUDENTS			STAFF			INDUSTRY		
	TRUE	FALSE	UNSURE	TRUE	FALSE	UNSURE	TRUE	FALSE	UNSURE
Advisory Committees exist in our Department.	**30%**	**14%**	**56%**	**72%**	**16%**	**12%**	**30%**	**0%**	**70%**
Advisory Committees render a useful service.	**36%**	**8%**	**56%**	**68%**	**6%**	**26%**	**28%**	**0%**	**72%**
Students also serve on Advisory Committees.	**15%**	**17%**	**68%**	**3%**	**62%**	**36%**	**7%**	**7%**	**84%**
I know who our Advisory Committee members are.	**11%**	**53%**	**36%**	**49%**	**29%**	**22%**	**11%**	**30%**	**59%**
	(N =180) = 100%			(N =40) = 100%			(N =48) = 100%		

Advisory committees exist according to **72%** of staff at technikons. Significantly **70%** of industry were unsure or unaware of the existence of such bodies. **68%** of staff find that advisory committees do serve a valuable role, but only **28%** of industry agree and **72%** are unsure. This is particularly significant given the fact that advisory committees form the essential link between technikons and industry in the formulation, approval and review of acceptable standards.

The existence of advisory committees is acknowledged by the majority of staff but not by students and significantly great uncertainty prevails among industry. In fact, industry are clearly in the dark as to the importance of this important linkage, and this from companies which are engaged in the experiential learning of students.

This confirms that the profile, function, representation and accountability of advisory committees need to be reviewed.

4.4 SYNTHESIS OF THE RESULTS.

In this chapter the responses of students, academic staff and industry to specific service delivery categories were evaluated as an integral part of the learning process. Differences were observed and interpreted in relation to the way they impacted on the collective contribution to improved service delivery effectiveness.

4.4.1 Rationale

When viewed in broad terms the frequency distribution of responses to individual questions were rated as percentages of agreement, importance and desirability within specific service delivery categories such as " orientation" illustrated in table 4.36 below. If the percentage responses to questions within the service delivery category of orientation were averaged and recorded, it would give an indication of the views of respondents to the importance of orientation prior to experiential learning.

Similarly, if the percentage responses to questions within the service delivery category of orientation on the current status were averaged and recorded, it would give an indication of the views of respondents to the current status of orientation programmes. Table 4.36 shows the averaging out of the percentage responses to all questions pertaining to orientation. This approach was similarly applied to all responses in each learning category.

TABLE 4.36 AVERAGING OF RESPONSES ON ORIENTATION

Orientation serves	STUDENTS		STAFF		INDUSTRY	
	Important	Unimportant	Important	Unimportant	Important	Unimportant
To help students to understand the importance of co-operative education.	96%	4%	97%	3%	94%	6%
To help students to appreciate the need for a code of conduct.	93%	7%	92%	8%	85%	15%
To help students to create an awareness of the problems of working life.	93%	7%	93%	7%	86%	14%
To explain to students the procedures for evaluation.	86%	14%	93%	7%	81%	19%
To outline to students the objectives of the training programme.	95%	5%	95%	5%	94%	6
	Based on the above frequency distributions					
% AVERAGES =	93%	7%	94%	6%	88%	12%

The questions which required a definitive "yes/true" or " no/false" response served as an indication that respondents could confirm or deny with certainty to the questions being posed. However, when respondents said " unsure", it confirmed a degree of uncertainty or lack of knowledge of the questions being posed. Therefore, if the percentage responses to questions within the service delivery category of orientation on the current status were averaged and recorded, it would give an indication of the degree of uncertainty or lack of knowledge of the current status of orientation programmes. Table 4.37 illustrates the averaging out of the responses using the orientation category as a typical example. This approach was applied to all the tables that measured the responses of the three samples to all the aspects of service delivery based on the questionnaires.

TABLE 4.37 AVERAGING OF RESPONSES TO THE CURRENT STATUS OF ORIENTATION

	STUDENTS			STAFF			INDUSTRY		
	YES	NO	UNSURE	YES	NO	UNSURE	YES	NO	UNSURE
Does your technikon provide an orientation programme before the start of the experiential training period?	34%	39%	27%	44%	18%	38%	15%	38%	47%
Are you aware of employers' having an orientation programme when students start experiential training?	27%	51%	22%	18%	47%	35%	55%	34%	11%
Does you technikon provide an orientation programme at the commencement of *academic studies*?	47%	29%	24%	77%	18%	5%	25%	21%	54%
Do you fully understand the role of co-operative education as part of the course programme?	56%	26%	18%	77%	6%	17%	46%	27%	27%
Do you visit students during their period of experiential training?	40%	48%	12%	44%	52%	4%	67%	25%	8%

Based on the above frequency distributions.

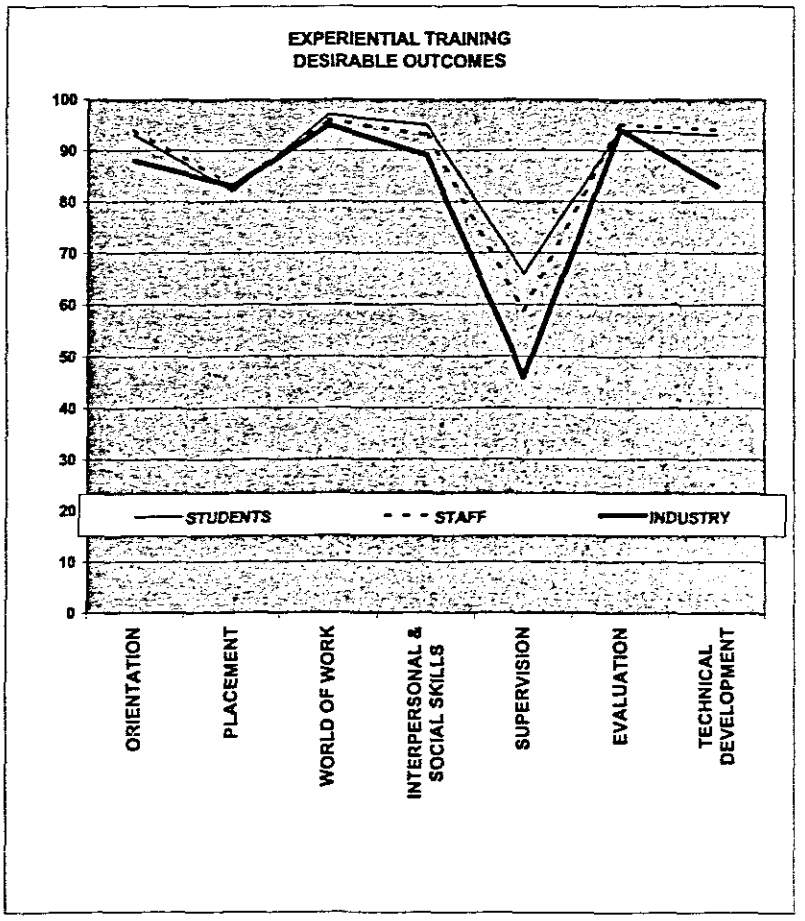
AVERAGES %	41%	39%	20%	52%	28%	20%	39%	29%	32%

Based on arguments outlined above, graphical summaries of the average percentage responses were prepared for each service delivery category. Comparisons between desirable expectations and the current situation were made and these were then related to the degree of uncertainty. The degree of uncertainty graph was extracted to highlight and compare uncertainties between respondents and to substantiate the conclusions with respect to the current situation.

4.4.2 Synopsis relating to experiential learning.

Graph 4.1 gives an overview and comparison of the views of students, academic staff and industry to service delivery strategies relating to experiential learning.

GRAPH 4.1 EXPERIENTIAL LEARNING: DESIRABLE EXPECTATIONS



Aspects relating to orientation, the world of work, interpersonal and social skills, evaluation and technical development show positive support by all groups. Positive

sentiment relating to placement showed a uniform decline and more especially on aspects relating to supervision. Despite the marginal decline and the minor variations between respondents, the graph illustrates that students, academic staff and industry on the whole show a positive bias toward the desirable aspects of experiential learning.

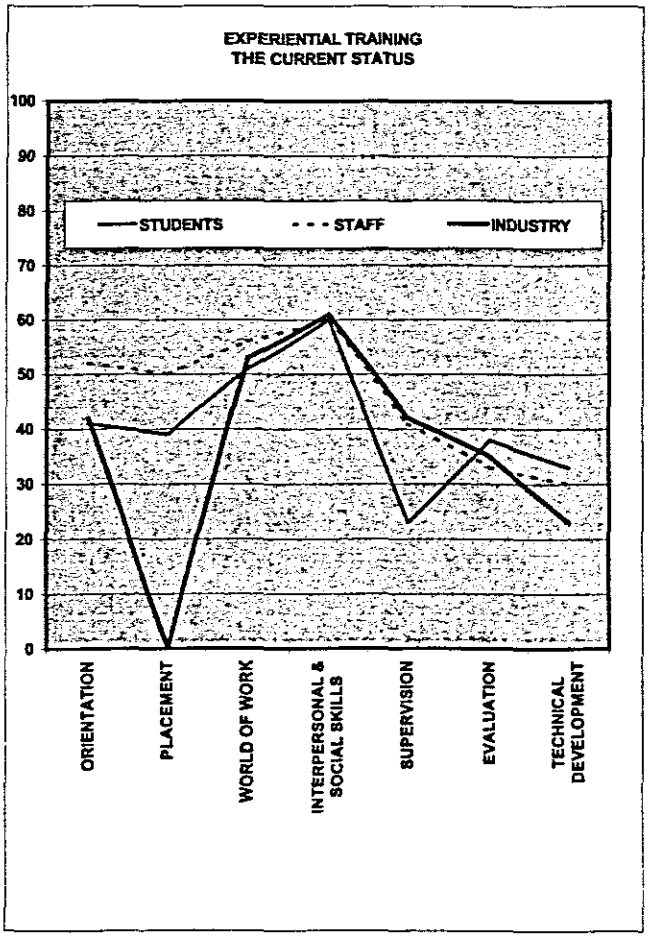
However, when the positive responses of the groups to the current situation for the same service delivery categories are illustrated as per graph 4.2, observations reveal a significant drop in the overall percentage responses of all groups as well as differences in the responses between students , staff and industry. This confirms the gap that exists between desirable outcomes and the current situation on service delivery strategies applicable to experiential training. This observation appears to be in line with the hypotheses formulated in chapter one. Against the background of the interpretation of the results for each category as discussed in this chapter , the following observations can be made with respect to some of the service delivery aspects on experiential learning where differences were more obvious .

Orientation programmes by technikons and industry do not feature at many technikons and many students were not aware of the relevance or existence of such programmes. Students and industry admit to not understanding the true meaning of co-operative education. In preparing the students for the initial entry into the work place proper orientation informs students of their obligations and opportunities in the world of work.

It would appear from the above that orientation as a means of helping students and

industry to focus on their respective role in the learning and working environments need to be encouraged and promoted.

Graph 4.2 **EXPERIENTIAL LEARNING: THE CURRENT STATUS**



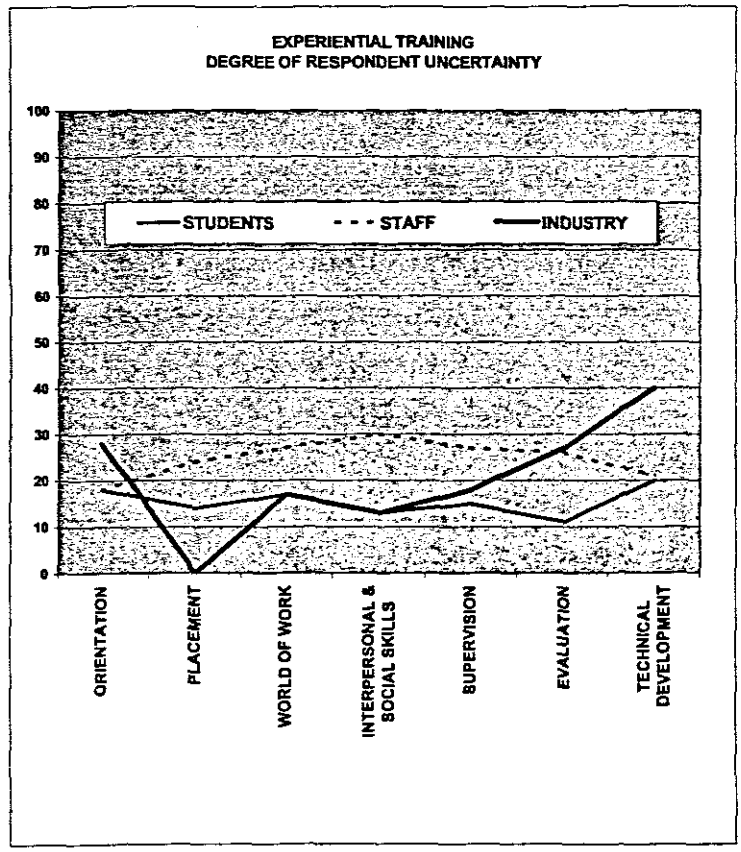
The Graph 4.2 showed a zero response from industry to the category of placement. This was due to the fact that industry were not asked to respond to the questions, which were targeted specifically at students and academic staff (see table 4.4). The notable drop in the overall positive response to placement can be attributed to the fact that the benefits of student placement, in the view of respondents were largely student-centred with lesser acknowledgment of the potential benefits to staff. Despite the existence of co-operative education units at the majority of technikons many students experience difficulty in finding placements prior to the start of the

experiential programme. Co-operative education units attached to some technikons are not succeeding in placing many students and this matter needs closer attention. The role of co-operative education units needs to be examined in terms of their added value as a service component attached to technikons.

Supervision of students during experiential learning is a cause for concern among students. The majority of staff and students as well as industry acknowledge that supervisors or mentors do not understand the training needs of students. Orientation and training programmes for supervisors could have positive benefits in the understanding of student training needs. This supports the view that mentors undergo some training, to gain an understanding and acceptance of what is expected of them. There are clear indications from the results that there is no meaningful relationship between the role of academic staff and the role of supervisors who both have the responsibility of facilitating the learning environment of students.

Academic staff and supervisors should have some meaningful contact where matters relating to student learning needs can be shared and appreciated. Graph 4.3 confirms that the degree of uncertainty on matters relating to experiential learning is the highest among academic staff. It is significant that the degree of uncertainty among academic staff is higher than that of students and staff in all the listed categories in graph 4.3, which confirms that academic staff are mostly unaware of the real experiences of the students in the experiential learning period. A closer liaison between these two parties would begin to address the concerns many students have expressed in the results of the survey. Once again the nil response of industry in graph 4.3 to placements is because industry were not canvassed on this issue.

GRAPH 4.3 EXPERIENTIAL LEARNING: THE DEGREE OF RESPONDENT UNCERTAINTY



Assessment and evaluation methods currently do not reflect or measure the best learning outcomes of the training process. Assessment and evaluation was noted as a strong motivator to students yet they do not occur on a regular and structured basis as reflected in table 4.7. Interpersonal and social skills feature strongly as criteria for evaluation but there is limited evidence from table 4.7 that they form part of any evaluation. Graph 4.2 also confirmed that the gap between desirable expectations and the current situation is the greatest on the evaluation aspects of experiential learning. The opportunities and benefits of initiatives toward an outcome based approach to learning can play a meaningful role in identifying and monitoring the progress of students. A review of the monitoring and evaluation process should reflect technical competence as well as regular feedback to students on essential

outcomes with special emphasis on interpersonal and social skills.

Technical development and the advantages that students gain from bringing together work and academic experience was recognized as the best ways of developing an all-round learning experience for students. Graph 4.1 once again confirmed that there are significant disparities between desirable expectations and current views on the successes of technical development outcomes. In particular industry, appears to be less positive on desirable outcomes as well as showing the highest degree of uncertainty as illustrated in graph 4.6.

Students have indicated that technical training received at technikons cannot be easily applied in the workplace which raises questions about quality, relevance and even the methodologies applied in facilitating the learning environment of students. It is significant that industry shows the highest degree of uncertainty which could be attributed to their ignorance of available learning resources and the methodologies being applied in the academic environment.

These conclusions suggest that closer linkages need to be established between technikons and industry in the prioritizing of expected outcomes related to technical skills and the associated knowledge base requirements for effective learning. Technikons and industry should play a complementary role in the structuring, prioritizing and service delivery mechanisms of educational provision.

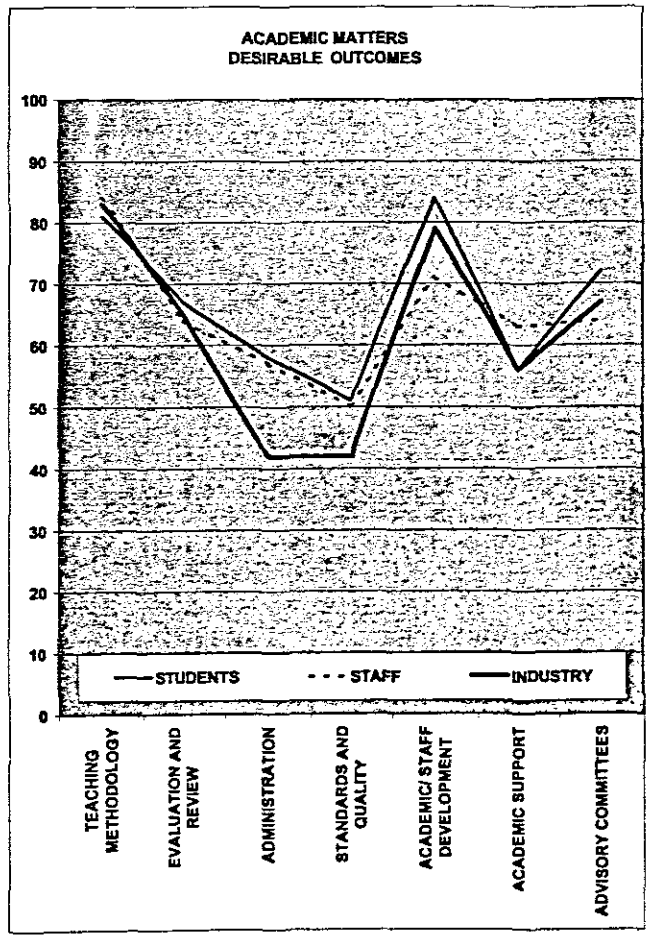
4.4.3 Synopsis relating to academic matters.

Based on the rationale outlined earlier in this chapter, graphs 4.4, 4.5 and 4.6 illustrate the comparative averaged positive responses to desirable expectations, averaged responses to the current situation and the degrees of uncertainty of the three groups relating to academic matters. All three groups are positive in the learning aspects of teaching methodology, evaluation and review, academic development and advisory committees. All around the 70% rating as per graph 4.4.

It is significant to note that all groups were less positive on matters relating to standards, quality and academic support. A possible reason for this is the lack of understanding of the definition of standards, who should be determining standards and what the criteria should be in determining standards.

The lesser response to academic support in graph 4.4 is not significant because the views expressed concur that the role of student assistants should not include lecturing duties and the evaluation of student performance.

GRAPH 4.4 ACADEMIC MATTERS: DESIRABLE EXPECTATIONS

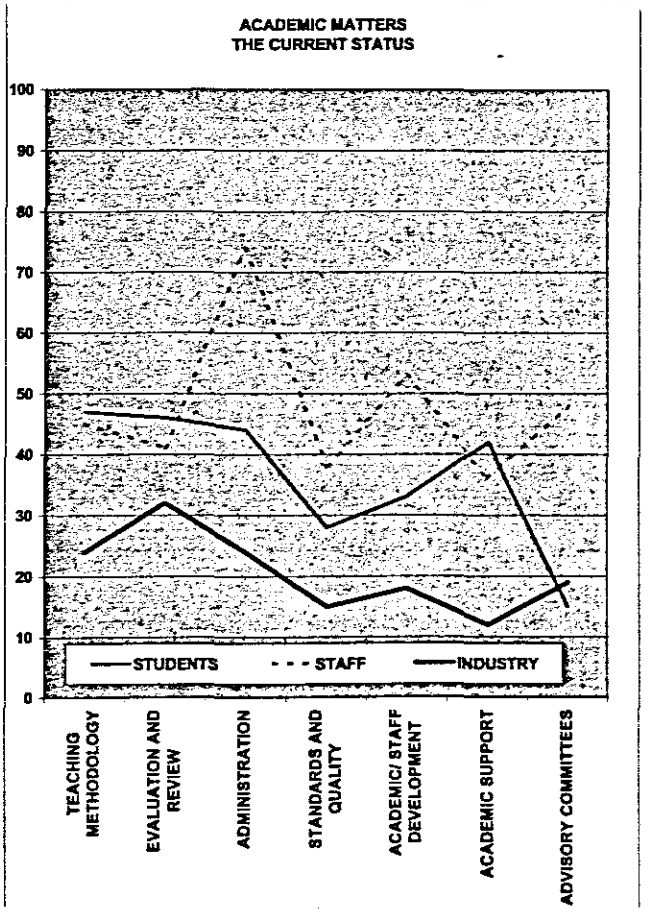


Students, academic staff and industry are in agreement on the desirable aspects of learning outcomes with respect to the range of learning skills outlined in table 4.2 in this chapter. Industry are less positive about the need to regard life skills, management skills, entrepreneurial skills and labour relations skills as part of essential learning outcomes. In spite of the lower priority rating in relation to other learning outcomes, the support is nevertheless encouraging and should be a factor in the teaching and learning process.

When observing the current status of academic service delivery in graph 4.5, an

overall drop between all respondents in relation to desirable outcomes becomes discernable. This also confirms that there is a gap between what respondents desire as an ideal and the ability to give meaningful effect in their respective environments. Specific reference to each category is outlined in chapter four.

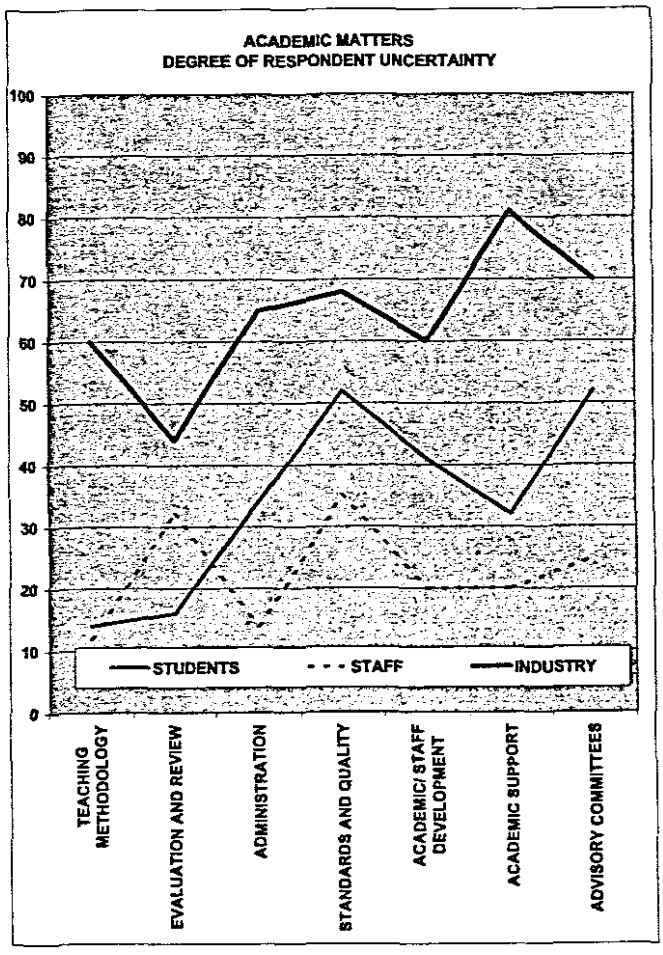
GRAPH 4.5 **ACADEMIC MATTERS: THE CURRENT STATUS**



It is also apparent that the responses in all areas of service delivery show varying responses between students, academic staff and industry. Industry's response to academic matters shows the least positive response, staff appear to be the most positive and students responses ranging between industry and staff. This is understandable and realistic given the role of students as the products of educational provision. However, the difference in positive disposition between academic staff and industry is disturbing and confirms that limited understanding and appreciation exists

of technikon operational procedures. An ideal opportunity exists for technikons to promote their students as well as their operational procedures in the development and training of the technicians for the future.

GRAPH 4.6 **ACADEMIC MATTERS: THE DEGREE OF RESPONDENT UNCERTAINTY**



Even more apparent when referring to graph 4.6 on degrees of uncertainty to categories relating to academic matters, the high rate of uncertainty by industry is an indication of the lack of knowledge, understanding or ignorance of academic processes in the training of students. It is worth noting that academic staff show greater degrees of uncertainty than students on academic service delivery, despite the fact that academic staff are responsible for implementing academic programmes.

Assessment and evaluation methods and their success in measuring learning outcomes revealed notable differences in the responses of the three groups. While the allocation of marks is acceptable as an indication of the results achieved in assessing components of academic learning there are reservations as to whether they reflect a true understanding of the subject learning content.

Final examinations, in the traditional, sense are not regarded as meaningful instruments of assessment and evaluation, yet there is a reluctance to abolish the system as shown in table 4.22. This is a sure indication that a review of assessment and evaluation should be a priority for improved service delivery. Criteria-referenced marking, in which students are required to meet a set of stated criteria and options to repeat on segments of the work if unsuccessful at the first attempt, needs to be explored as an option (SAQA 1995:6).

The results confirm that assessment and evaluation methods currently in place are not measuring the true results of learning and would suggest that an outcome- based approach to learning could have meaningful benefits, given the fact that this approach uses the assessment and evaluation criteria as the starting point in measuring the outcomes of learning.

At the same time the benefits of a continuous record of student achievement could be explored along with mechanisms for regular feedback on a wider range of educational aspects which would include essential and specific outcomes.

Administration duties as a support to academic service delivery are regarded as

essential. However, lecturing staff are concerned about the extent of their involvement in administrative duties. The fact that staff regularly have to complete work at home may have some bearing on this. The reasons are not clear, but it would be safe to conclude that perceptions and the reality of concerns over the extent of administrative duties need to be clarified, along with the role of support staff attached to the departmental structure. At the same time, the job descriptions of academic staff as facilitators of learning should be prioritized to ensure that their time utilization and management are consistent with desirable learning outcomes in relation to the direct benefits to the students and the broader ideals of educational provision.

Standards and quality are recognized by all as essential for the success of measuring effective service delivery. Despite this fact the majority of technikons do not have quality assurance programmes in place. While quality assurance programmes do exist at some technikons, industry on the whole play no role in assessing quality.

Advisory committees, where they do exist may be contributing to aspects of quality but industry who are involved with the training of students are largely unaware of their existence. Industry on the whole are largely ignorant of the existence and role of SERTEC and academic staff have reservations about the role of SERTEC in measuring the operational efficiency of technikon programmes.

Standards, quality and quality assurance programmes appear to be abstract concepts without any meaningful and definitive role in measuring effective service delivery and should be explored, understood and benchmarked as the point of

departure for improved educational provision. Academic and staff development reflected some interesting contradictions. While all parties support the idea of academic staff being encouraged to improve their qualifications, it is significant to note that **85%** percent of academic staff have no formal qualification in education. While there may be valid reasons for this , it is difficult to appreciate how staff can meaningfully contribute to setting and maintaining standards without having had some formal education training.

The need for research as an essential component of academic development received significantly lesser support from academic staff compared to students and industry. Academic staff appear not to be upgrading their teaching methodology and yet there is strong support by academic staff to engage in outside consultancy work. Research activity by academic staff is limited and therefore a cause for great concern.

The above interpretations could be related to the fact that academic staff have difficulty in managing their work load within normal working hours which suggests that their job function priorities are inconsistent with their ability to give meaningful effect to improved learning outcomes within academic programmes. The need for academic staff to engage in outside consultancy work should be viewed in the light of the demands of the academic programme.

Academic support through the use of student assistants is accepted as a support mechanism for the benefit of students, provided they do not relieve academic staff of their primary responsibility.

4.5 SUMMARY.

The empirical investigation in chapter 3 set out the process and parameters in which the survey was planned, structured and implemented. The role of statistics as an enabling tool was described and justified as a method of testing the credibility of the raw data. The theoretical basis for chi-square was explained, as well as the significance of the p-values as a means of testing the research hypotheses.

Chapter 4 concentrated on the results. The results of the statistical outputs were described, discussed and clarified as the tool for determining the non-rejection of the research hypotheses. Using the p-values as the benchmark, the contents within the tables were then observed and interpreted within each service delivery category. At the same time further interpretations and justifications were postulated in terms of the interrelationship between service delivery categories. Thereafter the responses were illustrated in a summarized format in relation to the academic and experiential components.

Based on the procedures outlined above, chapter 5 will formulate the conclusions to this research, which will be followed by specific recommendations that could serve as a guideline for a co-ordinated strategy in the establishment of improved service delivery, that could enhance the ideals of co-operative education.

CHAPTER FIVE

REVIEW OF THE RESEARCH, CONCLUSIONS AND RECOMMENDATIONS

5.1 REVIEW OF THE RESEARCH

The purpose of this investigation was to analyze the service delivery strategies in the curriculum of the National Diploma in civil engineering at South African technikons by synthesizing the perceptions and views of students, academic staff and industry participating in the learning environment with a view to maximizing the learning outcomes of civil engineering technicians in training.

Co-operative education, according to Davies (1985:15), is the relationship between academics, students and industry, where each contributes to the welfare of and gains benefits from the other. It needs to be emphasized that co-operative education should not be viewed merely as the placement of students during academic training but rather as an integral part of the learning process in the training and development of the student.

The first approach in this study was to identify and justify the need for the research which emanated from the problem statement, sub-problems and the hypotheses formulations. Against this background the research parameters and delimitations were formulated.

In order to explore the implications and rationale associated with co-operative education and its relation to learning outcomes, the literature review focused on developments and strategies in educational transformation over a number of years in the areas of career education. These included aspects relating to experiential learning as well as academic processes and their joint contribution to the principles of co - operative education. The literature also confirmed that for any curriculum process to succeed, the needs and expectations of all parties concerned, as well as the various methods and strategies being applied, have to be investigated (Price, 1982:26). This approach supports the view that greater success could be achieved with a curriculum in which a balance existed between the academic component and the experiential learning component according to the needs of industry.

The literature also explored the current initiatives being undertaken by the educational authorities with the establishment of SAQA (South African Qualifications Authority) and the restructuring of education based on the National Qualification Framework. The implications of an outcome-based approach to learning was examined and the subsequent benefits to the learning environment of students was confirmed.

The empirical research method was selected as the vehicle for exploring the needs and expectations of the parties involved in the learning environment. Questionnaires were formulated and responses were broadly categorized into desirable outcomes as the ideal situation on the one hand and the current status on the other, given the influence of any constraining factors to effective service delivery. Statistical analysis assisted in highlighting comparisons and differences between the three respondent groups in the

survey and served as the basis for observations and interpretation of the results.

5.2 CONCLUSIONS

Based on the observations and interpretation of the results as discussed in chapter 4 and the summarized overview, the following conclusions on the position of students, academic staff and industry relating to service delivery in the co-operative education relationship can be outlined.

5.2.1 Students

The position of students as reflected in the outcome of this survey is being undermined by deficiencies in many areas of the learning environment. On the academic side there are clear indications that academic programmes are insufficiently geared toward successful learning outcomes. Orientation programmes, where they exist, are not having the desired effect. Teaching methodologies and resource utilization are not consistently conducive to equipping students for meaningful application during experiential learning. The assessment and evaluation practices are not sufficiently contributing to learning outcomes. Essential learning outcomes relating to assessing interpersonal and social skills are being overlooked to a large extent.

The value and quality of experiential learning programmes are being undermined by poor levels of supervision, irregular periods of assessment and inconsistencies in the provision of structured learning programmes.

The conclusion can therefore be made that the *learning environment of students and the implementation of teaching and learning strategies do not focus on the best learning outcomes and this in turn compromises the potential development of the student as a civil engineering technician in training.* This supports the non-rejection of the research hypothesis as postulated in hypothesis two in chapter one.

5.2.2 Academic staff

The survey revealed that eighty-five percent of academic staff have had no formal training in education and training and this cast some doubt on the ability of staff to appreciate the complexities and benefits of meaningful learning outcomes as desired by such initiatives being currently explored by the National Qualification Framework.

Methods of, and the processes of assessment and evaluation, are not reflecting the true outcomes of learning, and the benefits of academic input are not fully appreciated by industry and not sufficiently beneficial to students during their experiential learning. Teaching and learning resources are limited in supply and underutilized where they do exist.

The conclusion therefore that *the perceptions and views of academic staff and their interpretation of their functions are inconsistent with their ability to give meaningful effect to the best learning outcomes, given the available resources and constraints of prescribed learning programmes* supports the non-rejection of hypothesis one.

5.2.3 Industry

Industry is largely unaware of the processes of learning as practiced by the technikons. By their own admission industry acknowledges a lack of understanding of the true purpose of cooperative education. Orientation programmes at the start of experiential learning are limited and largely non-existent.

Predetermined or structured training programmes are rarely in place and levels of supervision in the work place are undesirable. Where methods of assessment and evaluation exist the actual use of these instruments such as the logbook are not being used to effectively measure learning outcomes.

Many industry partners in co-operative education are not even aware of the existence of advisory committees which are specifically in place to improve the functional liaison and to add value to reviewing academic programmes.

Considering that all participants in the industry sample were companies which are currently involved in the experiential learning of students it must be concluded that the *policies, infrastructure and functional liaison between technikons and industry are not sufficiently structured and narrowly focused, resulting in the misunderstanding of the outcomes of civil engineering technicians as practitioners and employees in the construction industry.* This supports the non-rejection of the research hypothesis three as stated in chapter one.

5.2.4 Summary on conclusions relating to experiential learning.

The above conclusions clearly demonstrate that the policies, where they do exist ,and operational infrastructures relating to service delivery aspects in the training of civil engineering technicians, are not sufficiently geared toward the support and utilization of students during their experiential learning. Careful attention needs to be given to these aspects and recommendations for improvements will emerge out of participation, understanding and role identification between the service providers along with agreements on the best utilization of available resources.

5.2.5 Summary on conclusions relating to academic matters.

The above conclusions confirm that the role, perceptions and views of academic staff and their interpretation of their job function priorities are inconsistent with their ability to give meaningful effect to learning outcomes, given the available resources and constraints of prescribed academic programmes. *It also confirms that the learning environment of students and the implementation of the learning programmes do not focus on the best learning outcomes and this in turn compromises the potential development of the student as a civil technician in training as postulated in hypothesis two.*

Furthermore the policy, infrastructure and functional liaison between technikons and industry in the co-operative education relationship are not sufficiently structured and are narrowly focussed, resulting in a lack of understanding and appreciation of learning

outcomes, in the education and training of civil engineering technicians as postulated in hypothesis three. The uncertainty surrounding the interpretation and value of agreed standards and quality assurance mechanisms retard current initiatives in the pursuit of improved learning outcomes and as a consequence, compromise the effort of all role players in the co-operative education relationship.

5.3 RECOMMENDATIONS

The conclusions that emanated from the empirical investigation and its relationship to the sub-problem statements have been established through this research, and outlined in chapter four. Sub-problems one, two and three focused on the perceptions and views of students, academic staff and industry and their respective contributions towards enhancing the ideals of co-operative education.

The empirical investigation highlighted and confirmed that current developments and practices fall short of desirable expectations in all aspects of service delivery. The recommendations at the conclusion of this study will relate to sub-problem four, which will identify the key success factors to improve operational efficiency of technikons and industry in the co-operative education relationship with a view to maximizing the learning outcomes of civil engineering technicians in training. The recommendations can serve as guidelines for a co-ordinated strategy within an agreed framework, that will ensure participation, awareness, commitment and accountability, with feedback loops for review, research and implementation. Over time, it will be possible to narrow the gap between desirable educational ideals and current educational imperatives.

In order to emphasize the integrated nature of co-operative education and the interrelationship between technikons and industry, the recommendations will be presented in the form of key success factors toward the overall development of civil engineering technicians in training without necessarily prescribing divisions between academic and experiential learning provision. These recommendations will be presented as the *key success factors* in the learning areas that have been identified.

5.3.1 Orientation recommendations

The orientation process should ensure the meaningful participation of all stakeholders in the planning, execution and promotion of co-operative education.

Academic and experiential learning should be accorded equal status and accreditation within the profile of the qualification.

Advisory committee structures should be expanded and promoted as the formal working committees that represent industry and technikons.

The specific role and accountability of advisory committees should be formalized and their outputs should form part of an educational and training audit.

Advisory committees should then have the authority and the status to review and recommend improvements in the provision of service delivery with respect to training needs, resource utilization and funding implications.

Orientation programmes should underpin the students' entry to the academic programme as well as at exit levels into experiential learning. Industry should then follow on with their own orientation programmes at the work place so that students' abilities and expectations can be aligned to specific job requirements of industry.

The experiential learning programme should be planned for the required period. This will help students and supervisors to clearly understand their role and obligations in achieving the desired learning objectives.

Student participation on advisory committees is strongly recommended

Advisory committee members from industry should have representation that is accountable to the existing professional bodies such as SAICE (the South African Institute of Civil Engineers), SAFCEC (the South African Federation of Civil Engineering Contractors) and SAACE,(the South African Association of Consulting Engineers).

5.3.2 Placement recommendations

Opportunities for placement should be expanded by encouraging industry to come on board as partners with technikons.

Co-operative education units should feature at all technikons and their specific role should be clarified and marketed in terms of their added value to the role of academic departments.

5.3.3 Supervision recommendations

Supervisors or mentors need to interact with academic staff so that learning strategies and student needs can be appreciated.

Supervisors need to be exposed to an orientation process of the academic input of technikons so that an appreciation and understanding of student knowledge and skills during academic training can be understood.

The respective roles of supervisors and academic staff should be clarified as a unique contribution toward the total progression and development of the student throughout the prescribed learning programme.

Resource identification and utilization should include both human and material resources. Human resources include academic staff, workplace supervisors, technikon co-ordinators, administration staff as well as managerial support staff in the departments, industry and co-operative education units attached to technikons.

Each one's role should be clarified in terms of their interrelationship to avoid unnecessary duplication.

5.3.4 Evaluation recommendations

Given the current initiatives emanating from the establishment of the South African

Qualification Authority (SAQA) and the initiatives within the National Qualification Framework (NQF), an ideal opportunity exists to promote, explore and incorporate the principles of the NQF with particular reference to an outcome-based approach to learning as part of the restructuring of co-operative education and service delivery strategies. The majority of academic staff and members of industry have had no formal training in the understanding of teaching and learning methodologies.

It is therefore imperative that for the NQF initiative to succeed, appropriate training and orientation should be the starting point in generating understanding and acceptance of an outcome based approach to education and training.

Essential and specific outcomes need to be appreciated by all and incorporated into training programmes along with evaluation criteria that would take into consideration the importance of interpersonal and social skills training as part of total student development.

Evaluation tools in the form of the logbook should be expanded to include interpersonal and social skills in the evaluation process.

5.3.5 Teaching methodology recommendations

Positive elements of the NQF process should be identified and applied in terms of their added value in promoting improved learning outcomes and operational efficiency.

In order to develop improved service delivery in the academic environment, it is recommended that an ongoing academic and organizational audit of the programmes within specialist subject disciplines be implemented, by examining existing strategies and procedures for service delivery, that will serve as a basis for continuous development and review, with a view to maximizing the learning outcomes of students.

The methodology should involve the identification and structuring of a learning cycle that would focus on the best utilization of all material and human resources, which would not only target desired learning outcomes within the departments, but would also explore possibilities for training and capacity building within the broader community.

Academic staff should formulate a learning cycle network that shows the inter-relationship between learning outcomes, resource utilization, mechanisms for review and the potential for capacity building.

Departments should establish clear guidelines and procedures for identification and agreement on desired specific outcomes (*contextually agreed demonstrations of skills and knowledge*) at each level and within acceptable modules, in line with industry demands and with due consideration to constraints such as time, development and physical resources.

Departments should then identify the necessary resources required and focus specifically on the potential of available resources within departments as well as the potential for sharing industry resources where this is feasible and practical. All positive

suggestions should be linked to offers of assistance and the formulating of action plans to ensure accountability of delivery, within specific and agreed time frames.

Departments should highlight the potential for development training and capacity building within the technikons as well as the potential in seeking partnerships with industry, where necessary, to host short courses, seminars, conferences and experiential training initiatives.

5.3.6 Standards and quality assurance recommendations

It is strongly recommended that standards and quality be viewed not purely as the sole preserve of academics but of industry as well, at all levels, in determining criteria for norms, standards and quality assurance programmes.

Assessment and evaluation criteria should be the bench mark of the entire approach to education and training that should underpin the objectives of co-operative education.

The role of industry needs to be promoted and expanded beyond the need purely to find opportunities for placements.

Assessment and evaluation should take a holistic view in monitoring student progress and methods of recording success and progress should be conducive to recognizing predetermined desirable and specific outcomes.

Academic staff and experiential learning supervisors should be qualified and trained to ensure that they possess the abilities to judge and discriminate as facilitators in the learning process. This would eliminate the tendency to be swayed and influenced by subjective evaluations.

The determination and agreement on standards and quality assurance alerts students to expected performance criteria and should be linked to all assessment and evaluation processes for each component of learning programmes. The demystifying of how and what will be evaluated can direct students to begin to take more responsibility for their own learning.

Training opportunities and development plans should be formulated to promote an understanding of the training needs of students in the curriculum process. Opportunities for review should be agreed upon and formally structured.

Material resource needs for effective learning should be identified within the parameters of acceptable minimum standards. Where constraints are identified for effective delivery, opportunities for closer involvement by industry in the sharing of material resources or a greater commitment to financial support could be explored. Utilization should be monitored and used as a criterion for the upgrading of additional resources.

5.3.7 Staff development recommendations

All technikons, as part of a staff development policy should ensure that staff not only

improve their technical qualifications, but also their qualifications in the education of sphere. Academic staff need to keep abreast with the current and the latest initiatives in teaching methodology and developments in the field of education transformation in South Africa. This could be through a formal qualification where feasible or through in-house training programmes.

5.4 LIMITATIONS OF THE RESEARCH.

The objective of the research was to identify key success factors for improved service delivery in the education and training of civil engineering technicians at South African technikons. The empirical methodology evaluated the views of all stakeholders and a comparison was made to establish the relationship between current processes and the desirable expectations of the participants. The literature study explored the recording of outside agencies and developments aligned to improved educational ideals.

Some of the probable shortcomings experienced with the research are acknowledged as follows :

- Given the wide range of factors that impact on co-operative education as a learning concept, it was impossible in this study to relate to the content of improved service delivery specific to the learning programmes .

- In canvassing the views on respondents to developments in their particular situations, it is acknowledged that subjective bias could have influenced the

responses of some of the participants.

- The degrees of uncertainty in unsure responses should not necessarily be seen as entirely negative. It simply could mean that respondents could not make a confident decision, for unknown reasons, at the time of the survey.

5.5 RECOMMENDATIONS FOR FURTHER RESEARCH.

The results and conclusions emanating from this study open up a host of opportunities for further research which could include some of the following :

- *Setting criteria for standards, quality and quality assurance applicable to the* formal qualification should be researched by involving all stakeholders.
- Learning programmes should be researched by exploring outcomes-based learning and its applicability to improved learning outcomes where the identification of knowledge and skills-based ratios could be identified.
- Assessment and evaluation processes should be researched to identify the specific criteria for measuring the true outcomes of learning.
- Ways for better resource utilization and availability should be researched to establish the constraints and potential for improved access to material and human resources through training and development.
- *Ways to enhance the potential for improved access to learning outside the* formal stream should be researched where learning modules could promote the recognition of prior learning in line with NQF principles.

5.6 CLOSING REMARKS.

The researcher, as a lecturer in the civil engineering department, has always been concerned at the quality of learning taking place and the parameters and constraints that govern the service delivery process. These concerns also related to the sometimes negative responses from industry which were recipients of academic input by technikons.

Another concern was the very real uncertainties experienced by students in understanding what was expected of them, and the lack of certainty particularly around the benefits and profile of experiential learning as a compulsory component of the qualification. The researcher wishes to emphasize that this study should not be regarded as typical to all qualifications and learning programmes. It was merely an opportunity to highlight a niche in educational research.

Finally, the researcher wishes to express the hope that the findings and recommendations of this research will make industry, technikons and students more sensitive to the many issues which impact on the provision of the teaching and learning phenomenon. It is further hoped that wider consultation and in-depth research from the recommendations could lead to the formulation of a total quality management system for co-operative education.

THE END

BIBLIOGRAPHY

ADAMS, R. E. 1975:
DACUM: Approaches to curriculum, learning and evaluation in occupational training.
Department of Regional Economics Expansion. Canada: Globe Printing.
pp. 24-39.

AFRICAN NATIONAL CONGRESS 1994:
A policy framework for education and training.
Discussion document. Johannesburg: ANC Education Department.
Johannesburg.

AMMERMAN, H. L. & ESSEX, D. W. 1975:
Performance content for job training.
Research and Development series, Columbus, Ohio, no 124, pp. 45-49.

ANDERSON, R. E. 1994:
Productivity and Higher Education:
Improving the effectiveness of faculty, facilities and financial resources.
Petersen's Guide Inc. Princeton, p 274.

ASHWORTH, P. & SAXTON, J. 1992:
Managing Work Experience.
London. Routledge, pp. 7-8.

BALDWIN, L. 1986:
Continuous technikon attendance T1-T4.
South African Society for Co-operative Education.
Newsletter, (No 4). pp. 6-11.
Pretoria.

BARBEAU, J. E. 1985:
Second to none: Seventy years of leadership in the Co-operative Education movement.
Boston. North Eastern University, p. 40-48.

BETTS, M. LIOW, S. J. R. & POLLOCK, R. W. 1993:
Different perceptions of the importance of professional issues in engineering.
Education and Practice, vol 3, no 3, pp. 317-327.
USA.

BLAKE, J. (1988).
Continuing professional development for a better tomorrow.
Civil Engineer: Magazine of SAICE, Dec. 1966, p, 16-17.

BLOOM, B. S. & CURZON, L. B. 1985:
A taxonomy of educational objectives: Handbook cognitive domain.
New York. Longman.

BOBBIT, F. 1984:
How to make a curriculum.
New York. Houghton Mifflin Company, pp. 292- 296.

BRITISH HIGHER EDUCATION QUALITY COUNCIL. 1994:
Guidelines on quality assurance.
Higher Education Council.
London.

BROADFOOT, P. M. 1986:
Profiles and records of achievement: A review of issues and practise.
London. Holt, Rhinehart and Winston. Ltd, p 5.

BROADFOOT, P. M. 1987:
Introducing profiling - A practical manuel.
London. Mac Millan Education. (Ltd), p. 234.

BRUCE, C. & BRAMELD, G. H. 1983:
Improving the quality of four year civil engineering research projects through bibliographic instruction.
Research Strategies. Australia. Journal. (1990).vol 8, part 3, pp. 129-136.

COCHIUS, D. D. 1986:
Mentorship: A structured methodology for black advancement.
IPM Journal: vol 5 (2), p. 6-9.
Pretoria.

COETZEE, C ; MARX, A & Engelbrecht, L. 1990:
Beroepsvaardigsheidprofiele van ingenieurswesetegnici. Implikasies vir onderig en opleiding aan technikons.
HSRC report: Pretoria. pp. 1-12.

CROOKS, T. 1988:
Assessing student performance.
Kensington High Research and Development. Australia, p. 6.

CTM : COMMITTEE FOR TUTORIAL MATTERS 1996:
Unpublished minutes of CTM meeting of August.
Pretoria. CTP.

CTP : COMMITTEE OF TECHNIKON PRINCIPALS 1984:
Co-operative Education: South African Technikons - Engineering and Sciences.
Pretoria.

CTP. COMMITTEE OF TECHNIKON PRINCIPALS 1989:
A research philosophy for Technikon Education. Pretoria.

CTP : COMMITTEE OF TECHNIKON PRINCIPALS 1995a:
Profiles of South African Technikons. (Statistics).
Pretoria.

CTP : COMMITTEE OF TECHNIKON PRINCIPALS 1995b:
Report to the National Commissioner on Higher Education.
Pretoria.

DAVIES, L. 1985:
Guidelines for the operation of integrated sandwich courses.
South African Society for Co-operative Education.
Pretoria: Newsletter: no 2, pp. 15-20.

DE LANGE, G. 1995:
The transition of technikon engineering students to the workplace: An identification of the non-technical skills requirements of employers
Report: 9th World Conference on Co-operative Education. p . 552.
Jamaica.

DEPARTMENT OF EDUCATION (DE) 1996:
Life long learning through a National Qualification Framework. Report of the Ministerial Committee for Development Work on the NQF.
Pretoria: DE.

DEPARTMENT OF NATIONAL EDUCATION. 1995:
Green Paper on Higher Education Transformation.
Pretoria, pp 12-34.

DEPARTMENT OF NATIONAL EDUCATION. 1995:
White Paper on Education and Training.
Pretoria, pp 21-26.

DOCKRELL, W. B. 1989:
The changing face of educational assessment.
Journal of Curriculum Studies, vol 21, pp. 478-480.
USA.

EISNER, E. W. 1993:
Reshaping assessment in education: some criteria in search of practise.
Journal of curriculum studies, vol 25 , pp. 219-233.

ENGEL- CLOUGH, E; DAVIS, P. & SUMMER, R. 1984:
Pupil assessment: An interim report on the findings of the NFER ;
Journal of curriculum studies, vol 16 (2), pp. 200-202.
USA.

ENGLISH, D. M. & KOEPPEN, D. R. 1952:
The relationship of internship and subsequent academic performance.
Issues in Accounting Education, vol 8, no 2, pp. 292 - 299.

ERNST, E. W. 1989:
Curriculum Development: Revitalizing undergraduate programmes.
Engineering Education. Journal, pp. 20-24.
London.

EVANS, A. 1986:
Profiles and records of Achievement. Issues and practise.
London; Holt, Rhinehart and Winston Ltd, pp. 169-182.

FINKEL,C. 1984:
Where learning happens: Training and Development.
Development Journal, vol 38 (4), pp. 32-36.
Pretoria.

GEIGER - DU MOND, A. & BOYLE, S. K. 1995:
Mentoring: A Practitioners Guide.
Training and Development Journal, March, pp. 51-54.

GENIS, E. 1997:
The implications of a National Qualification Framework for curriculum development in technikon education.
Doctoral thesis, p. 248 - 250.
University of Pretoria.

GIBBS, G. 1991:
Eight myths about assessment.
The New Academic, vol 1 (1), pp. 1-4.
London.

GROENEWALD, T. 1988:
A Co-operative System Model.
Thesis, BA (Hons), p. 18.
Johannesburg.

GUIRDHAM, M. 1991:
Interpersonal skills at work.
New York. Prentice Hall, pp. 39-43.

HAROLD, L.; MICHAEL, A, G . & GOETZ, P. 1985:
Professional activities of civil engineering educators.
ASCE, Journal, pp. 57-67.

HUMAN SCIENCE RESEARCH COUNCIL. 1991:
Research perspectives on education.
Institute for Educational Research.
Pretoria.

KARBHARI, V. M. 1989:
Quality undergraduate engineering education: a critical perspective.
Journal of Professional Issues in Engineering, 115 (3), pp. 241-244.
ASCE, USA.

KHAN, S. 1983:
Occupational Course Development.
Refeaat; Annual National HERDSA Conference, pp. 10-14.
Brisbane.

KIRSCH, R. 1992:
They know enough who know how to learn.
South African Medical Journal; vol 81, pp. 587-589.
Pretoria.

KOCH, A. 1995:
Developing effective co-operative education administration.
9th World Conference on Co-operative Education, Jamaica. pp 329-336.

KOEHLER, R. W. 1987:
The effect of internship on subsequent college performance.
The Accounting Review. October, pp. 799-807.

LESSING, B. C. 1985:
Training Management: Interdisciplinary approach to the development of adult learners in the work situation.
Rand Afrikaans University.
Johannesburg.

LOKEN,M. & STULL, W. A. 1993:
A model for mentoring Co-operative Education.
8th World Conference on Co-operative Education. pp. 322-328.
Dublin.

MANCHESTER POLYTECHNIC STAFF DEVELOPMENT PROJECT. 1982:
Training instruments pack : A CNAA sponsored project, p. 26.
Manchester Polytechnic.
Council for National Academic Awards.

MC MULLEN, W. 1981:
The impact of the title VIII Funding and Operational characteristics of Two and Four year co-operative education programmes.
Journal of C-operative Education, vol 18 (1), pp. 67-78.

MEHALLIS, M. V. & FAIR, K. 1979:
Occupational Analysis: A basis for curriculum development.
Broward Community College. p 182.
Fort Lauderville, Florida, USA.

MEYER, E. & VEENSTRAY, A. 1986:
Teaching bread and butter; A practical guide to effective teaching and learning.
Johannesburg. Mc Gray Hill. p. 59.

NATED. 02-150. (94/01). 1994:
Requirements for National Instructional Programmes at Technikons.
Department of National Education.

NEL, J. G. 1987:
Strategic Marketing Planning at South African Technikons.
Unpublished doctoral thesis: University of Port Elizabeth.
Port Elizabeth.

PASTOLL, G. 1992:
Students and Standards: How written exams hold us back.
University of CapeTown, Engineering Education Journal, pp. 1-2.
Cape Town.

PAWSON, P. 1995:
Language as a factor in a multilingual, multicultural South African workplace.
Report: 9th World Conference on Co-operative Education. Vol 1, p. 205-218.
Jamaica.

PRATT, D. 1980:
Curriculum Design and Development.
Harcourt Brace. Jovanovich.
New York.

PRICE, R. D. 1982:
Determining educational and training needs.
Viewpoint in Teaching and Learning. vol 8, no 3, pp. 24-32.
Pretoria.

RAMSDEN, P. 1987:
Improving teaching and learning in higher education: A case for a relational perspective .
Studies in Higher Education, 12 (3), pp. 275-286.

REEVE, R. S. 1993:
Developing strategies for effective co-op site visits.
University of Victoria, p 285.
Canada.

ROSENBERG, M. J. 1982:
The ABC's of instructional systems design.
Training and development journal. vol.36, no.9, pp. 44-45.
Pretoria.

ROWNTREE, D. 1981:
Developing Courses for students.
Maidenhead, McGraw-Hill, p 221.

SCHEIN, E. H. 1991:
The legitimacy of organizational influence.
American Journal of Sociology, vol.6, pp. 682-689
USA.

SERTEC: CERTIFICATION COUNCIL FOR TECHNIKONS. 1995:
Act 88 of 1986 .
Pretoria.

SOUTH AFRICAN QUALIFICATION AUTHORITY (SAQA). 1995:
Act no 58 of 1995.
Pretoria.

SERTEC 1 - 05 (08/96) 1996:
Manuel for the evaluation of standards at technikons, p. 58.
Alkantrant 0005.
Republic of South Africa.

SHIPPEY, T. C. 1994:
Standards and Quality of Higher Education.
Laureatus Thesis: Laureates in Post School Education.
Cape Technikon, Cape Town. pp 148-150.

SIEGEL, P. H. & RIGSBY, J. T. 1988:
The relationship of accounting internship and subsequent professional performance.
Issues in Accounting Education, pp. 423-432.

SPADY, W. G. 1992:
It's time to take a closer look at Outcomes Based Education.
Outcomes, pp. 67-72.

TOMKIN, H. 1986:
Education in the context of a changing independent world.
Ninth world Conference on Co-operative Education.
Jamaica, vol. 1. pp. 24-30.

TROMP, J. A. 1984:
Funksies van die Ko-ordineerder. South African Association for Co-Operative Education.
Newsletter, No.1, pp. 17-19.
Pretoria.

VAN MAANEN, J. 1976:
Interpersonal skills at work.
New York: Prentice Hall, pp. 39-43.

WANOUS, J. P. 1973:
Effects of a realistic job preview on job acceptance, attitudes and survival.
Journal of applied psychology, vol. 8, p.23.
Pretoria.

WORLD BANK. 1989:
Investing in people, SubSahara Africa from Crisis to Substantial Growth (A long term perspective study).
Washington, D. C, p 10.

WORLD BOOK DICTIONARY. 1988:
The World Book Encyclopedia.
United States of America

ZASTRAU, J. M. A. 1986:
Die meting van die styl van die opleier as groepsaliteerder.
Magisterverhandeling Rand Afrikaans University, p. 23.
Johannesburg.

ANNEXURE A

SAMPLE OF QUESTIONNAIRES

TO

STUDENTS, ACADEMIC STAFF AND INDUSTRY

QUESTIONNAIRE TO STUDENTS

OFFICE USE

Rec. Nr		1
Quest.		2

SECTION ONE

NOTE ! Please respond with an (**X**) in the numbered boxes.

1. In which Province is your Technikon.

Western Cape	1		Gauteng	3
Kwazulu Natal	2		Eastern Cape	4
Other. (Please specify)				5

3

2 . What is your present study level.

S 1	1	
S 2	2	
S 3	3	
S 4	4	4

2 . *What is your age category and sexual orientation.*

	15 yr - 20 yr	21 yr - 25 yr	26 yr - 30 yr	over 30 yr	
Male	1	2	3	4	5
Female	1	2	3	4	6

3 . How far do you stay from the Technikon when studying.

0 - 5	Kilometres	1	
6 - 10	Kilometres	2	
11 - 20	Kilometres	3	
20 - 50	Kilometres	4	
+ 50	Kilometres	5	7

4. How much experiential training time have you completed.

0 Months	1
1 - 6 Months	2
7 - 12 Months	3
13 - 18 Months	4
18 - 24 Months	5
more than 24 Months	6

Where these Companies..	
Consultants ?	1
Contractors ?	2
Municipality ?	3
Supplier ?	4
Manufacturer ?	5
Other ? (specify)	

OFFICE USE

[ ] 8
[ ] 9

5. What was your last experiential training income per month.

Rands per Month	
0 - 500	1
500 - 600	2
600 - 700	3
700 - 800	4
800 - 900	5
900 - 1000	6
1000 - 1500	7
1500 - 2000	8
more than R 2000	9

[ ] 10

6 . Complete the following table on language proficiency.

	Speak	Read	Write	Home language	Your Technikon's **instruction** medium ?	
Afrikaans	1	2	3	1	1	[ ][ ][ ] 11-13
English	1	2	3	2	2	[ ][ ][ ] 14-16
isiNdebele	1	2	3	3	3	[ ][ ][ ] 17-19
Sesotho	1	2	3	4	4	[ ][ ][ ] 20-22
Sesotho sa Leboa	1	2	3	5	5	[ ][ ][ ] 23-25
siSwati	1	2	3	6	6	[ ][ ][ ] 26-28
Xitsonga	1	2	3	7	7	[ ][ ][ ] 29-31
Setswana	1	2	3	8	8	[ ][ ][ ] 32-34
Tshivenda	1	2	3	9	9	[ ][ ][ ] 35-37
isiXhosa	1	2	3	10	10	[ ][ ][ ] 38-40
isiZulu	1	2	3	11	11	[ ][ ][ ] 41-43

7. Indicate how your academic studies are being funded.

OFFICE USE

Company sponsored	1
Bursary (from outside source)	2
Bursary / loan	3
Loan	4
Self supporting	5
By your parents or relatives	6
Other (specify)	7

[ ] 44

8. Are you at present registered with any professional body.

Yes	1
No	2

[ ] 45

If YES please specify :- (Abbreviations are OK !)

1.	[ ] 46
2.	[ ] 47
3.	[ ] 48
4.	[ ] 49

9. Do you or have you personally served on the Advisory Committee attached to your Department to share input on academic matters.

Yes	1
No	2

[ ] 50

SECTION TWO EXPERIENTIAL (IN-SERVICE) TRAINING

10. Have you completed some experiential training.

Yes	1
No	2

[ ] 51

11.

ORIENTATION

OFFICE USE

* **PLEASE NOTE. Co-operative Education** is the term used to describe the essential relationship and formal linkage between the **three partners** in the education of civil engineering technicians.
The three partners are the **students, the technikons and industry.**

Orientation is the process of briefing and providing information about the requirements for experiential training and the world of work. Indicate the **amount of importance** you attach to orientation, based on the following statements.

Orientation serves	Very Important	Quite Important	Not very important	Unimportant		
To help you to understand the importance of **co-operative education. (see Note above)**	1	2	3	4		52
To help you to appreciate the need for a code of conduct.	1	2	3	4		53
To help you create an awareness of the problems of working life.	1	2	3	4		54
To explain to you the procedures for evaluation.	1	2	3	4		55
To outline to you the objectives of the training programme.	1	2	3	4		56

12.

PLACEMENT

Placement means experiential training in the workplace. Please indicate to what extent you agree or disagree with the following statements concerning the benefits of placement

Placement in industry helps ...	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree		
To assist you in understanding the relevance of your academic course work.	1	2	3	4	5		57
To help lecturing staff to update their own knowledge of developments in industry.	1	2	3	4	5		58
To provide you with a range of experiences capable of meaningful analysis after your placement period.	1	2	3	4	5		59
To give employers a chance to get involved in educational issues.	1	2	3	4	5		60
To give employers a chance to select future permanent employees	1	2	3	4	5		61

13.

SUPERVISION

OFFICE USE

Supervision is when students in training are reporting to a person whose specific task it is to train, motivate and evaluate the students progress in the workplace. Indicate the extent to which you agree or disagree with the following statements.

	Strongly agree	Agree	Neither Agree or disagree	Disagree	Strongly disagree		
Workplace supervisors are well equipped to attend to the training needs of students	1	2	3	4	5		62
Lecturing staff have a role to play in experiential training supervision.	1	2	3	4	5		63
Workplace supervisors do not fully understand the training needs of students.	1	2	3	4	5		64
Workplace supervisors should always be available to attend to student's needs.	1	2	3	4	5		65
Workplace supervisors need special training to attend to students in training.	1	2	3	4	5		66

14.

EVALUATION

Evaluation is the opportunity to give feedback to students and to the technikon, on the student's progress on the whole range of skills, competencies and knowledge in the workplace. Please respond to the following statements as indicated below.

How you would rate the following tools as meaningful for student evaluation :-

	Highly Desirable	Desirable	Neither Desirable or undesirable	Undesirable	Totally Undesirable		
The logbook.	1	2	3	4	5		67
Oral presentation	1	2	3	4	5		68
Project work.	1	2	3	4	5		69
Assignments.	1	2	3	4	5		70
Written exams.	1	2	3	4	5		71

How would you rate the following skills and qualities as criteria for meaningful evaluation of students.

OFFICE USE

	Highly Desirable	Desirable	Neither Desirable or undesirable	Undesirable	Totally Undesirable		
Technical knowledge	1	2	3	4	5		72
Hands on skills	1	2	3	4	5		73
Self motivation	1	2	3	4	5		74
Communication skills	1	2	3	4	5		75
Team work	1	2	3	4	5		76
Initiative	1	2	3	4	5		77
Punctuality	1	2	3	4	5		78
Independent thought	1	2	3	4	5		79
Decision making	1	2	3	4	5		80
Leadership	1	2	3	4	5		81

For feedback on evaluation to be effective to students, indicate the desirability of the following time scales for the evaluation of experiential training.

	Highly Desirable	Desirable	Neither Desirable or undesirable	Undesirable	Totally Undesirable		
Daily feedback	1	2	3	4	5		82
Weekly feedback	1	2	3	4	5		83
Monthly basis	1	2	3	4	5		84
Quarterly basis	1	2	3	4	5		85
End of work term	1	2	3	4	5		86

Please rate the desirability of the student's role in the evaluation process as per the following statements.

	Highly Desirable	Desirable	Neither Desirable or undesirable	Undesirable	Totally Undesirable		
Students should evaluate the training facilities of Companies.	1	2	3	4	5		87
Students should evaluate the Technikon's course relevance to the work place	1	2	3	4	5		88

15.

THE WORLD OF WORK

OFFICE USE

The world of work refers to all factors that influence the student's understanding of their working environment while in training. Please indicate how you rate the following statements as meaningful to your understanding of the world of work..

	Very Important	Quite Important	Not very important	Unimportant		
To develop your appreciation of the relationships between the various parts of the organization.	1	2	3	4		89
To develop your ability to meet deadlines.	1	2	3	4		90
To develop your awareness of industry's need for cost effectiveness.	1	2	3	4		91
To help you to develop a realistic attitude toward the world of work.	1	2	3	4		92
To assist you in future career path planning	1	2	3	4		93

16.

INTERPERSONAL AND SOCIAL SKILLS

Interpersonal and social skills deal with the ability to cope in human relationships and the ability to interact effectively with other people in the work place. Please indicate how you rate the following qualities.

	Very Important	Quite Important	Not very important	Unimportant		
To make you aware of the importance of verbal and non verbal communication at work.	1	2	3	4		94
To develop your ability to present a case clearly and convincingly.	1	2	3	4		95
To enable you to work as part of a team.	1	2	3	4		96
To enable your ability to organize the work of others.	1	2	3	4		97
To develop your ability to accept the authority of others.	1	2	3	4		98

17.

TECHNICAL DEVELOPMENT

OFFICE USE

This deals with the development of technical knowledge and expertise in the design and construction of civil engineering elements and the ability to extract information efficiently. How do you rate the following statements.

Technical development means...	Very Important	Quite Important	Not very important	Unimportant		
To develop your ability to accurately understand the needs of the task.	1	2	3	4		99
To enable you to develop new skills applicable to the work situation.	1	2	3	4		100
To give you the opportunity to *appreciate and to apply academic* knowledge to the practical problems related to the demands of work.	1	2	3	4		101
To help you to appreciate different approaches to learning.	1	2	3	4		102
To provide a contrast between coursework and work place demands.	1	2	3	4		103

SECTION THREE ACADEMIC MATTERS

It will be appreciated that not all students have first hand knowledge of the academic processes at technikons. However you are please asked to give an opinion based on your understanding where applicable.

18.

TEACHING METHODOLOGY

The relative success of teaching and learning will depend on the integration and utilization of resources and methods. Rate the following methods and resources in terms of your perceived effectiveness in the teaching process.

	Highly Effective	Effective	Neither Effective or Ineffective	Ineffective	Totally Ineffective		
Lecturing (talking)	1	2	3	4	5		104
Lecturing using overheads	1	2	3	4	5		105
Laboratory work	1	2	3	4	5		106
Site visits	1	2	3	4	5		107
Computers	1	2	3	4	5		108

Library	1	2	3	4	5		109
Projects	1	2	3	4	5		110
Visiting lecturers	1	2	3	4	5		111
Self study	1	2	3	4	5		112
Group work	1	2	3	4	5		113

ın outcome based approach to learning uses as its starting point what the student should be ble to demonstrate and have a knowledge of. Rate the following outcomes in terms of their nportance for the successful application of learning.

OFFICE USE

	Very Important	Quite Important	Not very important	Unimportant		
Technical knowledge.	1	2	3	4		114
Technical hands on skills.	1	2	3	4		115
Communication skills.	1	2	3	4		116
Life skills.	1	2	3	4		117
Team working skills.	1	2	3	4		118
Leadership skills.	1	2	3	4		119
Management skills.	1	2	3	4		120
Entrepreneurship skills.	1	2	3	4		121
Labour relations skills.	1	2	3	4		122
Confidence building skills.	1	2	3	4		123

19.

ASSESSMENT, EVALUATION AND REVIEW.

The above procedures, in various forms, are mechanisms that create opportunities for eedback on the successes of teaching and learning. Indicate the extent to which you agree or disagree with the following statements.

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree		
Three hour closed book examinations truly reflect the results of learning.	1	2	3	4	5		124
Marks scored in tutorials, tests or examinations fairly reflect the success of learning.	1	2	3	4	5		125
Immediate feedback on results help to motivate students to work harder.	1	2	3	4	5		126
Remedial classes give slow learners a second chance to improve their learning.	1	2	3	4	5		127

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree		
A continuous record of student achievement on academic and interpersonal skills should be documented and presented on completion of the diploma	1	2	3	4	5		128
It would be useful for students to receive training in non-related subjects such as human resource management, accounting and tax law etc.	1	2	3	4	5		129
Written comments included with mark allocations help to reinforce the outcomes of learning.	1	2	3	4	5		130
Moderators scrutiny of students work helps to validate the results of learning.	1	2	3	4	5		131
Evaluation of student's achievements should include interpersonal, communication and life skills.	1	2	3	4	5		132
End of semester final examinations should be completely abolished.	1	2	3	4	5		133
Continuous evaluation reflects learning progress more accurately.	1	2	3	4	5		134

20.

OFFICE USE

ADMINISTRATION AND NON ACADEMIC FUNCTIONS.

Administration and non academic functions are processes that underpin and support the academic function of technikons. Indicate your agreement or disagreement with the following.

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree		
Lecturing staff play a valuable role as student councillors in giving guidance to solve student problems.	1	2	3	4	5		135
Processing of student data including all marks should be done by lecturing staff.	1	2	3	4	5		136
Access to personal computers should compel lecturers to do all their own typing and administration work.	1	2	3	4	5		137

Lecturing staff serving on technikon internal committees provide a valuable service.	1	2	3	4	5		138
Lecturing staff should be paid overtime for work done at home which cannot be completed in normal hours.	1	2	3	4	5		139

21

STANDARDS AND QUALITY.

OFFICE USE

Standards can be defined as agreed levels of attainment in student performance.

Quality is the measure of success in achieving the standard of service that a technikon sets for it's self.

Quality assurance is the process of ensuring that the process of providing the service is always going to meet the standard.

Indicate the extent to which you agree or disagree with the following statements

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree		
Uniform standards can be applied nationally to all technikons.	1	2	3	4	5		140
Historical disparities have a role to play in determining standards.	1	2	3	4	5		141
Each technikon has to set it's own standards in line with it's ability to deliver quality service.	1	2	3	4	5		142
Some technikons can set higher standards than other technikons.	1	2	3	4	5		143

Technikon standards must be determined by :-

Technikons collectively.	1	2	3	4	5		144
Technikons and industry.	1	2	3	4	5		145
Industry alone.	1	2	3	4	5		146
By SERTEC only. *(see below)*	1	2	3	4	5		147
By technikons collectively.	1	2	3	4	5		148
Each technikon must set their own standards.	1	2	3	4	5		149
By all interested parties.	1	2	3	4	5		150

PLEASE NOTE.

SERTEC is the **Certification Council for Technikon Education** established by Government to evaluate the operational units and instruction programmes at all Technikons.

22

ACADEMIC AND STAFF DEVELOPMENT

OFFICE USE

Academic and staff development are strategies and mechanisms that are intended to add value to improved academic delivery.

Please indicate your agreement or disagreement with the following statements.

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree		
All technikons should between them establish formal linkages and co-operation agreements.	1	2	3	4	5		151
Technikon research should form an essential component of academic development	1	2	3	4	5		152
Lecturing staff should engage in outside consultancy work to keep abreast with industry developments.	1	2	3	4	5		153
Lecturing staff should be encouraged to improve their qualifications.	1	2	3	4	5		154
All lecturing staff should possess a teaching qualification	1	2	3	4	5		155

23.

ACADEMIC SUPPORT

Students assistants or lecturing assistants are senior students employed by the technikon to assist staff and students in the execution of the academic programme.

Please indicate your view based on the following statements.

Student / lecturing assistants ...	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree		
Should perform lecturing duties	1	2	3	4	5		156
Should mark students work.	1	2	3	4	5		157
Can run remedial sessions.	1	2	3	4	5		158
Can assist with research projects.	1	2	3	4	5		159
Can invigilate at examinations.	1	2	3	4	5		160

Advisory Committees or Liaison Committees consist of representatives from technikons and employer bodies. Their purpose to is advise and give input on matters such as moderation, syllabus content relevance, evaluation procedures, experiential training and the whole range of issues relating to the course programme.

Please indicate you view based on the following statements.

OFFICE USE

Advisory Committees.....	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree		
Have a valuable role to play in achieving quality and standards	1	2	3	4	5		161
Should allow for student representation.	1	2	3	4	5		162
Should be represented by industry with formal recognition by their professional bodies.	1	2	3	4	5		163
Need only be an informal arrangement between individual technikon's and industry participation based on the technikon's choice.	1	2	3	4	5		164
Should be represented by all civil engineering disciplines such as consultants, suppliers contractors, municipalities etc.	1	2	3	4	5		165

SECTION FOUR — A SITUATION ANALYSIS

The following questions are an attempt to get an assessment on the current situation at technikons and in industry with a view to establishing trends and consistencies.
Your response should be your **own experience** at your particular technikon or industry.

24.

ORIENTATION

	YES	NO	UNSURE		
Does your technikon provide an orientation programme before the start of the experiential training period.	1	2	3		166
Did your employer have an orientation programme when you started your in-service training.	1	2	3		167
Does you technikon provide an orientation programme at the commencement of academic studies.	1	2	3		168
Do you fully understand the role of co-operative education as part of the course programme.	1	2	3		169
Did you visit industry before the start of your experiential training.	1	2	3		170

25.

PLACEMENT

OFFICE USE

	YES	NO	UNSURE		
Was it easy to find placement for your experiential training.	1	2	3		171
Did you find a placement on your own initiative.	1	2	3		172
Did your lecturer assist you in finding a placement.	1	2	3		173
Does your technikon have Co-operative Education unit.	1	2	3		174
Did you secure a placement before you completed your S2	1	2	3		175

26.

SUPERVISION

	YES	NO	UNSURE		
I had access to my work supervisor at all times.	1	2	3		176
The technikon co-ordinator visited me in the workplace.	1	2	3		177
Lecturing staff visited me at the workplace.	1	2	3		178
Work supervision is constructive and supportive.	1	2	3		179

Assessment of work performance is being done my :-

Supervisor only.	1	2	3		180
Technikon co-ordinator only.	1	2	3		181
Lecturing staff	1	2	3		182
Supervisor and Technikon co-ordinator.	1	2	3		183

27.

EVALUATION

	YES	NO	UNSURE		
Feedback on my progress helps to motivate me.	1	2	3		184
Feedback on my progress is done regularly.	1	2	3		185
I receive feedback on interpersonal skills development.	1	2	3		186
Students are allowed to comment on the Industry support and training provided.	1	2	3		187
Students are allowed to comment on the Technikon programme and level of service.	1	2	3		188

Assessment and evaluation methods include :-

The use of logbooks only.	1	2	3		189
Work based projects or assignments.	1	2	3		190
Oral or verbal presentations.	1	2	3		191
My training was not evaluated by anyone.	1	2	3		192

THE WORLD OF WORK

OFFICE USE

	YES	NO	UNSURE		
I understood my role in the company organization structure.	1	2	3		193
I regularly had to meet work deadlines.	1	2	3		194
I was involved in managerial responsibilities.	1	2	3		195
I am often compelled to do unrelated engineering duties.	1	2	3		196
I was allowed to work independently.	1	2	3		197

29.

INTER PERSONAL AND SOCIAL SKILLS

	YES	NO	UNSURE		
My communication skills improved as a result of experiential training.	1	2	3		198
My self confidence improved as a result of experiential training.	1	2	3		199
I was fully accepted as a member of the work team.	1	2	3		200
Racial attitudes influenced my progress negatively.	1	2	3		201
I was given positions of authority over others.	1	2	3		202

30.

TECHNICAL DEVELOPMENT

	TRUE	FALSE	UNSURE		
It was easy to apply my technikon training to the demands of the workplace.	1	2	3		203
My approach to learning has improved since in service training.	1	2	3		204
My technikon training was of little help in the work place.	1	2	3		205
Technikon equipment is outdated.	1	2	3		206
Technikon teaching methods are unrelated to industry requirements.	1	2	3		207

31.

TEACHING METHODOLOGY

	TRUE	FALSE	UNSURE		
Lecturer teaching methods are outdated.	1	2	3		208
Technikon laboratories are underutilised.	1	2	3		209
Library resource materials are limited in supply.	1	2	3		210
Project work forms an integral part of learning.	1	2	3		211
Computer facilities are limited in supply.	1	2	3		212

32..

EVALUATION AND ASSESSMENT

OFFICE USE

	TRUE	FALSE	UNSURE		
Marks received truly reflect my understanding of the learning content.	1	2	3		213
Marks are always received back in sufficient time to appreciate any shortcomings in my grasp of the learning content.	1	2	3		214
Continuous evaluation motivates me to try harder .	1	2	3		215
3 Hour closed book examinations gives an accurate assessment of learning .	1	2	3		216
Feedback on interpersonal, communication and life skills form a regular part of my evaluation at the technikon.	1	2	3		217

33.

STANDARDS AND QUALITY.

	TRUE	FALSE	UNSURE		
The technikon I attend sets high standards.	1	2	3		218
The technikon has a quality assurance programme.	1	2	3		219
SERTEC visits ensure that standards are maintained.	1	2	3		220
SERTEC reports are made available to students.	1	2	3		221
SERTEC visits and reports truly reflect the operational efficiency at technikons.	1	2	3		222
Standards are the same at all technikons.	1	2	3		223

34.

ADMINISTRATION AND NON ACADEMIC FUNCTIONS

	TRUE	FALSE	UNSURE		
The technikon has a good departmental administration system.	1	2	3		224
Lecturing staff spend too much time on administration duties.	1	2	3		225
Lecturing staff are always available for advice and counselling.	1	2	3		226
Departmental heads perform an administration function.	1	2	3		227
Lecturing staff regularly have to complete work at home.	1	2	3		228
Lectures should cope, working a regular 40 hour week.	1	2	3		229

35.

ACADEMIC AND STAFF DEVELOPMENT

	TRUE	FALSE	UNSURE	OFFICE USE	
Lecturing staff keep abreast with the latest technology.	1	2	3		230
Lecturing staff are encouraged by the technikon to improve their qualifications	1	2	3		231
Lecturing staff regularly upgrade their teaching methodology.	1	2	3		232
Lecturing staff have links with lecturers at other technikons.	1	2	3		233
I have been or am currently involved in research activity.	1	2	3		234

36.

ACADEMIC SUPPORT

	TRUE	FALSE	UNSURE		
Our technikon employs student assistants.	1	2	3		235
Student assistants are helpful and supportive.	1	2	3		236
Student assistants assist in the marking of students work	1	2	3		237
Student assistants do invigilation.	1	2	3		238
Student assistants do lecturing duties.	1	2	3		239

	TRUE	FALSE	UNSURE		
Advisory Committees exist in our Department.	1	2	3		240
Advisory Committees render a useful service.	1	2	3		241
Students also serve on Advisory Committees.	1	2	3		242
I know who our Advisory Committee members are.	1	2	3		243
Advisory Committee members are our moderators.	1	2	3		244

All our tutorials and class tests submitted for marking are returned back to us within the following approximate time scales.

ONE WEEK	TWO WEEKS	THREE WEEKS	FOUR WEEKS	MORE THAN 4
1	2	3	4	5

☐ 245

THANK YOU FOR YOUR PATIENCE AND CO-OPERATION

QUESTIONNAIRE TO STAFF

OFFICE USE

Rec. Nr		1
Quest.		2

SECTION ONE

NOTE ! Please respond with an (**X**) in the numbered boxes.

1. In which Province is your Technikon.

Western Cape	1		Gauteng	3
Kwazulu Natal	2		Eastern Cape	4
Other. (Please specify)				5

3

2. Indicate you years of experience working in industry and as a lecturer.

years->>>	0 -1	2 -5	6 -10	11 -15	15 +
Lecturing					
Industry					

4
5

3. State your rank or position in your Department or Company.

Student	1	Foreman	8
Junior lecturer	2	Technician	9
Senior lecturer	3	Senior Technician	10
Head of Department	4	Engineer	11
Head of Co-operative education	5	Site Agent	12
Co-op Co-ordinator	6	Contracts Manager	13
School Director or Dean	7	Director	14
Other ? (Specify)			15

6

4. Indicate your highest qualifications obtained.

OFFICE USE

National Technical Certificate	1
National Technical Diploma	2
National Diploma	3
National Higher Diploma	4
Education Diploma	5
Masters Diploma in Technology	6
University Diploma	7
University or Technikon Degree	8
Post Graduate Degree or Diploma (Hons. GDE. Masters etc.)	9
Doctorate	10
Other ? (Specify)	11

[ ] 7

5. Do you have an education or teaching qualification.

YES	NO
1	2

[ ] 8

6. What is your age category and sexual orientation?

	20 yr - 30 yr	31 yr - 40 yr	41 yr - 50 yr	over 50 yr
Male	1	2	3	4
Female	1	2	3	4

[ ] 9

[ ] 10

7. Complete the following table on language proficiency.

	Speak	Read	Write	Home language	Your lecturing **instruction** medium?	
Afrikaans	1	2	3	1	1	[ ][ ][ ] 11-13
English	1	2	3	2	2	[ ][ ][ ] 14-17
isiNdebele	1	2	3	3	3	[ ][ ][ ] 18-20
Sesotho	1	2	3	4	4	[ ][ ][ ] 21-23
Sesotho sa Leboa	1	2	3	5	5	[ ][ ][ ] 24-26
siSwati	1	2	3	6	6	[ ][ ][ ] 27-29
Xitsonga	1	2	3	7	7	[ ][ ][ ] 30-32
Setswana	1	2	3	8	8	[ ][ ][ ] 33-35
Tshivenda	1	2	3	9	9	[ ][ ][ ] 36-38
isiXhosa	1	2	3	10	10	[ ][ ][ ] 39-41
isiZulu	1	2	3	11	11	[ ][ ][ ] 42-44

8. Which of the following subjects are you lecturing in **ONE** semester of 1997.

OFFICE USE

S 1		S 2		
Applied Mechanics	1	Theory of structures	7	45
Mathematics	2	Mathematics	8	46
Construction	3	Construction	9	47
Survey (civil)	4	Survey (civil)	10	48
Drawing	5	Drawing	11	49
Computer skills	6	Communication skills	12	50
S 3		S 4		
Management	13	Documentation	19	51
Structural analysis	14	Structural design	20	52
Structural design	15	Structural analysis	21	53
Water engineering	16	Water Engineering	22	54
Transportation	17	Transportation	23	55
Geotechnical engineering	18	Geotechnical engineering	24	56

9. Indicate the **total number** of students you lecture to in **all subjects** in **one semester.**

No of students	20 - 70	71 - 80	81 - 90	91- 100	101 - 150	
	1	2	3	4	5	57
More than 150 (please specify)						58

10. Are you at present registered with any professional body?

Yes	1
No	2

59

If YES please specify :- (Abbreviation are OK !)

1.	60
2.	61
3.	62
4.	63

11. Do you or have you personally served on the Advisory Committee attached to your Department, to share input on academic matters.

Yes	1
No	2

64

SECTION TWO EXPERIENTIAL (IN-SERVICE) TRAINING

12.

ORIENTATION

OFFICE USE

Orientation is the process of briefing and providing information about the requirements of experiential training and the world of work. Indicate the **amount of importance** you attach to orientation, based on the following statements.

Orientation serves	Very Important	Quite Important	Not very important	Unimportant		
To help students to understand the importance of co-operative education.	1	2	3	4		65
To help students to appreciate the need for a code of conduct.	1	2	3	4		66
To help students to create an awareness of the problems of working life.	1	2	3	4		67
To explain to students the procedures for evaluation.	1	2	3	4		68
To outline to students the objectives of the training programme.	1	2	3	4		69

13.

PLACEMENT

Placement means experiential training in the workplace. Please indicate to what extent you agree or disagree with the following statements concerning the benefits of placement

Placement in industry helps ...	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree		
To assist students in understanding the relevance of the academic course work.	1	2	3	4	5		70
To help lecturing staff to update their own knowledge of developments in industry.	1	2	3	4	5		71
To provide students with a range of experiences capable of meaningful analysis after your placement period.	1	2	3	4	5		72
To give employers a chance to get involved in educational issues.	1	2	3	4	5		73
To give employers a chance to select future permanent employees	1	2	3	4	5		74

14.

SUPERVISION

OFFICE USE

Supervision is when students in training are reporting to a person whose specific task it is to train, motivate and evaluate the student's progress in the workplace. Indicate the extent to which you agree or disagree with the following statements.

	Strongly agree	Agree	Neither Agree or disagree	Disagree	Strongly disagree		
Workplace supervisors are qualified to attend to the *training needs* of students	1	2	3	4	5		75
Lecturing staff should play a role in experiential training supervision.	1		3	4	5		76
Workplace supervisors do not fully understand th training needs of students.	1	2	3	4	5		77
Workplace supervisors should always be available to attend to student's needs.	1	2	3	4	5		78
Workplace supervisors need special training to attend to students in training.	1	2	3	4	5		79

15.

EVALUATION

Evaluation is the opportunity to give feedback to students and to the technikon, on the student's progress on the whole range of skills, competencies and knowledge in the workplace. Please respond to the following statements as indicated below.

How you would rate the following tools as meaningful for student evaluation :-

	Highly Desirable	Desirable	Neither Desirable or undesirable	Undesirable	Totally Undesirable		
The logbook.	1	2	3	4	5		80
Oral presentation	1	2	3	4	5		81
Project work.	1	2	3	4	5		82
Assignments.	1	2	3	4	5		83
Written exams.	1	2	3	4	5		84

How would you rate the following skills and qualities as criteria for meaningful evaluation of students during experiential training.

OFFICE USE

	Highly Desirable	Desirable	Neither Desirable or undesirable	Undesirable	Totally Undesirable		
Technical knowledge	1	2	3	4	5		85
Hands on skills	1	2	3	4	5		86
Self motivation	1	2	3	4	5		87
Communication skills	1	2	3	4	5		88
Team work	1	2	3	4	5		89
Initiative	1	2	3	4	5		90
Punctuality	1	2	3	4	5		91
Independent thought	1	2	3	4	5		92
Decision making	1	2	3	4	5		93
Leadership	1	2	3	4	5		94

For feedback on evaluation to be effective to students, indicate the desirability of the following time scales for assessing experiential training performance.

	Highly Desirable	Desirable	Neither Desirable or undesirable	Undesirable	Totally Undesirable		
Daily feedback	1	2	3	4	5		95
Weekly feedback	1	2	3	4	5		96
Monthly basis	1	2	3	4	5		97
Quarterly basis	1	2	3	4	5		98
End of work term	1	2	3	4	5		99

Please rate the desirability of the student's role in the evaluation process as per the following statements.

	Highly Desirable	Desirable	Neither Desirable or undesirable	Undesirable	Totally Undesirable		
Students should evaluate the training facilities of Companies.	1	2	3	4	5		100
Students should evaluate the Technikon's course relevance to the work place	1	2	3	4	5		101

16.

THE WORLD OF WORK

OFFICE USE

The world of work refers to all factors that influence the student's understanding of their working environment while in training. Please indicate how you rate the following statements as meaningful to your understanding of the world of work.

	Very Important	Quite Important	Not very important	Unimportant		
To develop students' appreciation of the relationships between the various parts of the organization.	1	2	3	4		102
To develop the student's ability to meet deadlines.	1	2	3	4		103
To develop the student's awareness of industry's need for cost effectiveness.	1	2	3	4		104
To help students to develop a realistic attitude toward the world of work.	1	2	3	4		105
To assist students in future career path planning	1	2	3	4		106

17.

INTERPERSONAL AND SOCIAL SKILLS

Interpersonal and social skills deal with the ability to cope in human relationships and the ability to interact effectively with other people in the work place. Please indicate how you rate the following qualities.

	Very Important	Quite Important	Not very important	Unimportant		
To make students aware of the importance of verbal and non verbal communication at work.	1	2	3	4		107
To develop the student's ability to present a case clearly and convincingly.	1	2	3	4		108
To enable the student to work as part of a team.	1	2	3	4		109
To enable the student's ability to organize the work of others.	1	2	3	4		110
To develop the student's ability to accept the authority of others.	1	2	3	4		111

18.

TECHNICAL DEVELOPMENT

OFFICE USE

This deals with the development of technical knowledge and expertise in the design and construction of civil engineering elements and the ability to extract information efficiently. How do you rate the following statements.

Technical development means...	Very Important	Quite Important	Not very important	Unimportant		
To develop the student's ability to accurately understand the needs of the task.	1	2	3	4		112
To enable the student to develop new skills applicable to the work situation.	1	2	3	4		113
To give the student the opportunity to appreciate and to apply academic knowledge to the practical problems related to the demands of work.	1	2	3	4		114
To help the student to appreciate different approaches to learning.	1	2	3	4		115
To provide a contrast between coursework and work place demands.	1	2	3	4		116

SECTION THREE ACADEMIC MATTERS

19.

TEACHING METHODOLOGY

The relative success of teaching and learning will depend on the integration and utilization of resources and methods. Rate the following methods and resources in terms of your perceived effectiveness in the teaching process.

	Highly Effective	Effective	Neither Effective or Ineffective	Ineffective	Totally Ineffective		
Lecturing (talking)	1	2	3	4	5		117
Lecturing using overheads	1	2	3	4	5		118
Laboratory work	1	2	3	4	5		119
Site visits	1	2	3	4	5		120
Computers	1	2	3	4	5		121
Library	1	2	3	4	5		122
Projects	1	2	3	4	5		123
Visiting lecturers	1	2	3	4	5		124
Self study	1	2	3	4	5		125
Group work	1	2	3	4	5		126

An outcome-based approach to learning uses as its starting point what the student should be able to demonstrate and have a knowledge of. Rate the following outcomes in terms of their importance for the successful application of learning.

OFFICE USE

	Very Important	Quite Important	Not very important	Unimportant		
Technical knowledge.	1	2	3	4		127
Technical hands on skills.	1	2	3	4		128
Communication skills.	1	2	3	4		129
Life skills.	1	2	3	4		130
Team working skills.	1	2	3	4		131
Leadership skills.	1	2	3	4		132
Management skills.	1	2	3	4		133
Entrepreneurship skills.	1	2	3	4		134
Labour relations skills.	1	2	3	4		135
Confidence building skills.	1	2	3	4		136

20.

ASSESSMENT, EVALUATION AND REVIEW.

The above procedures, in various forms, are mechanisms that create opportunities for feedback on the successes of teaching and learning. Indicate the extent to which you agree or disagree with the following statements.

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree		
Three hour closed book examinations truly reflect the results of learning.	1	2	3	4	5		137
Marks scored in tutorials, tests and examinations fairly reflect the success of learning.	1	2	3	4	5		138
Immediate feedback on results help to motivate students to work harder.	1	2	3	4	5		139
Remedial classes give slow learners a second chance to improve their learning.	1	2	3	4	5		140
Written comments included with mark allocations help to reinforce the outcomes of learning.	1	2	3	4	5		141
Moderators scrutiny of students work helps to validate the results of learning.	1	2	3	4	5		142

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree		
Evaluation of student's achievements should include interpersonal, communication and life skills.	1	2	3	4	5		143
End of semester final examinations should be completely abolished.	1	2	3	4	5		144
Continuous evaluation reflects learning progress more accurately.	1	2	3	4	5		145
A continuous record of student achievement on academic and interpersonal skills should be documented and presented on completion of the diploma	1	2	3	4	5		146
It would be useful for students to receive training in non-related subjects such as human resource management, accounting and tax law etc.	1	2	3	4	5		147

21.

OFFICE USE

ADMINISTRATION AND NON ACADEMIC FUNCTIONS.

Administration and non academic functions are processes that underpin and support the academic function of technikons. Indicate your agreement or disagreement with the following.

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree		
Lecturing staff play a valuable role as student councillors in giving guidance to solve student problems.	1	2	3	4	5		148
Processing of student data including all marks should be done by lecturing staff only.	1	2	3	4	5		149
Access to personal computers should compel lecturers to do all their own typing and administration work.	1	2	3	4	5		150
Lecturing staff serving on technikon internal committees provide a valuable service.	1	2	3	4	5		151
Lecturing staff should be paid overtime for work done at home which cannot be completed in normal hours	1	2	3	4	5		152

22.

STANDARDS AND QUALITY.

OFFICE USE

Standards can be defined as agreed levels of attainment in student performance.

Quality is the measure of success in achieving the standard of service that a technikon sets for itself.

Quality assurance is the process of ensuring that the process of providing the service is always going to meet the standard.

Indicate the extent to which you agree or disagree with the following statements

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree		
Uniform standards can be applied nationally to all technikons.	1	2	3	4	5		153
Historical political disparities have a role to play in determining standards.	1	2	3	4	5		154
Each technikon has to set it's own standards in line with its ability to deliver quality service.	1	2	3	4	5		155
Some technikons can set higher standards than other technikons.	1	2	3	4	5		156

Technikon standards must be determined by :-

Technikons collectively.	1	2	3	4	5		157
Technikons and industry.	1	2	3	4	5		158
Industry alone	1	2	3	4	5		159
By SERTEC only.	1	2	3	4	5		160
By technikons collectively.	1	2	3	4	5		161
Each technikon must set their own standards.	1	2	3	4	5		162
By all interested parties.	1	2	3	4	5		163

23.

ACADEMIC AND STAFF DEVELOPMENT

OFFICE USE

Academic and staff development are strategies and mechanisms that are intended to add value to improved academic delivery.

Please indicate your agreement or disagreement with the following statements.

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree		
All technikons should between them establish formal linkages and co-operation agreements.	1	2	3	4	5		164
Technikon research should form an essential component of academic development	1	2	3	4	5		165
Lecturing staff should engage in outside consultancy work to keep abreast with industry developments.	1	2	3	4	5		166
Lecturing staff should be encouraged to improve their qualifications.	1	2	3	4	5		167
All lecturing staff should possess a teaching qualification	1	2	3	4	5		168

24.

ACADEMIC SUPPORT

Students assistants or lecturing assistants are senior students employed by the technikon to assist staff and students in the execution of the academic programme.

Please indicate your view based on the following statements.

Student / lecturer assistants ...	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree		
Should perform lecturing duties	1	2	3	4	5		169
Should mark students work.	1	2	3	4	5		170
Can run remedial sessions.	1	2	3	4	5		171
Can assist with research projects.	1	2	3	4	5		172
Can invigilate at examinations.	1	2	3	4	5		173

Advisory Committees or Liaison Committees consist of representatives from technikons and employer bodies. Their purpose is to advise and give input on matters such as moderation, syllabus content relevance, evaluation procedures, experiential training and the whole range of issues relating to the course programme.

OFFICE USE

Please indicate you view based on the following statements.

Advisory Committees.....	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree		
Have a valuable role to play in achieving quality and standards	1	2	3	4	5		174
Should allow for student representation.	1	2	3	4	5		175
Should be represented by industry with formal recognition by their professional bodies.	1	2	3	4	5		176
Need only be an informal arrangement between individual technikon's and industry participation based on the technikon's choice.	1	2	3	4	5		177
Should be represented by all civil engineering disciplines such as consultants, suppliers contractors, municipalities etc.	1	2	3	4	5		178

SECTION FOUR A SITUATION ANALYSIS

The following questions are an attempt to get an assessment on the current situation at technikons and in industry with a view to establishing trends and consistencies.
Your response should be **your own experience** at your particular technikon or industry.

25.

ORIENTATION

	YES	NO	UNSURE		
Does your technikon provide an orientation programme before the start of the experiential training period.	1	2	3		179
Are you aware of employer's having an orientation programme when students start experiential training.	1	2	3		180
Does you technikon provide an orientation programme at the commencement of academic studies.	1	2	3		181
Do you fully understand the role of co-operative education as part of the course programme.	1	2	3		182
Do you visit students during their period of experiential training.	1	2	3		183

26.

PLACEMENT

OFFICE USE

	YES	NO	UNSURE		
Is it easy for students to find placement for experiential training.	1	2	3		184
Did students find placement on their own initiative.	1	2	3		185
Have you personally assisted in finding placements.	1	2	3		186
Does your technikon have a Co-operative Education unit.	1	2	3		187
Do the majority of students secure a placement before completing their S2 level of study.	1	2	3		188

27.

SUPERVISION

	YES	NO	UNSURE		
Should students have access to their work supervisor at all times.	1	2	3		189
The technikon co-ordinator only should visit students in the workplace.	1	2	3		190
Lecturing staff also do student visitation in the work place.	1	2	3		191
Work supervision is constructive and supportive.	1	2	3		192

Assessment of student work performance is being done by :-

Supervisor only.	1	2	3		193
Technikon co-ordinator only.	1	2	3		194
Lecturing staff	1	2	3		195
Supervisor and Technikon co-ordinator.	1	2	3		196

28.

EVALUATION

	YES	NO	UNSURE		
Feedback on students progress helps to motivate them.	1	2	3		197
Feedback on student progress is done regularly.	1	2	3		198
Students receive feedback on interpersonal skills development.	1	2	3		199
Students are allowed to comment on the Industry support and training provided.	1	2	3		200
Students are allowed to comment on the Technikon programme and level of service.	1	2	3		201

	YES	NO	UNSURE	OFFICE USE	
Assessment and evaluation methods include :-					
The use of logbooks only.	1	2	3		202
Work based projects or assignments.	1	2	3		203
Oral or verbal presentations.	1	2	3		204
Student training is not evaluated by anyone.	1	2	3		205

29.

THE WORLD OF WORK

	YES	NO	UNSURE		
Students understood their role in the company organization structure.	1	2	3		206
Students understand the need to meet work deadlines.	1	2	3		207
Students should be involved in managerial responsibilities.	1	2	3		208
Students should agree to do unrelated engineering duties.	1	2	3		209
Students are allowed to work independently.	1	2	3		210

30.

INTERPERSONAL AND SOCIAL SKILLS

	YES	NO	UNSURE		
Students communication skills improved as a result of experiential training.	1	2	3		211
Students self confidence improved as a result of experiential training.	1	2	3		212
Students are accepted as a member of the work team.	1	2	3		213
Racial attitudes influence students progress negatively.	1	2	3		214
Students are given positions of authority over others.	1	2	3		215

31.

TECHNICAL DEVELOPMENT

	TRUE	FALSE	UNSURE		
It is easy for students to apply training to the demands of the workplace.	1	2	3		216
The students approach to learning improve after the period of experiential training.	1	2	3		217
Technikon training is of little help to students in the work place.	1	2	3		218
Technikon equipment is outdated.	1	2	3		219
Technikon teaching methods are unrelated to industry requirements.	1	2	3		220

32.

TEACHING METHODOLOGY

OFFICE USE

	TRUE	FALSE	UNSURE		
Lecturer teaching methods are outdated.	1	2	3		221
Technikon laboratories are underutilised.	1	2	3		222
Library resource materials are limited in supply.	1	2	3		223
Project work forms an integral part of learning.	1	2	3		224
Computer facilities are limited in supply.	1	2	3		225

33.

EVALUATION AND ASSESSMENT

	TRUE	FALSE	UNSURE		
Marks received truly reflect the student's understanding of the learning content.	1	2	3		226
Marks are always received back in sufficient time for students to appreciate any shortcomings in their grasp of the learning content.	1	2	3		227
Continuous evaluation motivates students to try harder .	1	2	3		228
3 Hour closed book examinations gives an accurate assessment of learning .	1	2	3		229
Feedback on interpersonal, communication and life skills form a regular part of student evaluation at the technikon.	1	2	3		230

34.

STANDARDS AND QUALITY.

	TRUE	FALSE	UNSURE		
The technikon I work for sets high standards.	1	2	3		231
The technikon has a quality assurance programme.	1	2	3		232
SERTEC visits ensure that standards are maintained.	1	2	3		233
SERTEC reports are made available to students.	1	2	3		234
SERTEC evaluation visits and reports truly reflect the operational efficiency of technikons.	1	2	3		235
Standards are the same at all technikons.	1	2	3		236

35.

OFFICE USE

ADMINISTRATION AND NON ACADEMIC FUNCTIONS

	TRUE	FALSE	UNSURE		
The technikon has a good departmental administration system.	1	2	3		237
Lecturing staff spend too much time on administration duties.	1	2	3		238
Lecturing staff are always available for advice and counselling.	1	2	3		239
Departmental heads perform an administration function.	1	2	3		240
Lecturing staff regularly have to complete work at home.	1	2	3		241
Lectures should cope, working a regular 40 hour week.	1	2	3		242

36.

ACADEMIC AND STAFF DEVELOPMENT

	TRUE	FALSE	UNSURE		
Lecturing staff keep abreast with the latest technology.	1	2	3		243
Lecturing staff are encouraged by the technikon to improve their qualifications	1	2	3		244
Lecturing staff regularly upgrade their teaching methodology.	1	2	3		245
Lecturing staff have links with lecturers at other technikons.	1	2	3		246
I have been or am currently involved in research activity.	1	2	3		247

37.

ACADEMIC SUPPORT

	TRUE	FALSE	UNSURE		
Our technikon employs student / lecturer assistants.	1	2	3		248
Student assistants are helpful and supportive.	1	2	3		249
Student assistants assist in the marking of students work	1	2	3		250
Student assistants do invigilation duties.	1	2	3		251
Student assistants do lecturing duties.	1	2	3		252
	TRUE	FALSE	UNSURE		
Advisory Committees exist in our Department.	1	2	3		253
Advisory Committees render a useful service.	1	2	3		254
Students also serve on Advisory Committees.	1	2	3		255
I know who our Advisory Committee members are.	1	2	3		256
Advisory Committee members are our moderators.	1	2	3		257

All students tutorials and class tests submitted to me for marking are returned back to the students within the following approximate time scales.

ONE WEEK	TWO WEEKS	THREE WEEKS	FOUR WEEKS	MORE THAN 4
1	2	3	4	5

☐ 258

THANK YOU FOR YOUR PATIENCE AND CO-OPERATION

QUESTIONNAIRE TO INDUSTRY

OFFICE USE

Rec. Nr		1
Quest.		2

SECTION ONE

NOTE ! Please respond with an (**X**) in the numbered boxes.

1. In which Province is your Company.

Western Cape	1		Gauteng	3
Kwazulu Natal	2		Eastern Cape	4
Other. (Please specify)				5

3

2 . What is your age category and sexual orientation.

	20 yr - 30 yr	31 yr - 40 yr	41 yr - 50 yr	over 50 yr
Male	1	2	3	4
Female	1	2	3	4

4

5

3. What is your Company working discipline.

Consultants	1
Contractors	2
Municipality	3
Suppliers or Manufacturers	4

6

4. State your rank or position in your Company.

Student	1	Foreman	8
Junior lecturer	2	Technician	9
Senior lecture	3	Senior Technician	10
Head of Department	4	Engineer	11
Head of Co-operative education	5	Site Agent	12
Co-op Co-ordinator	6	Contracts Manager	13
School Director or Dean	7	Director	14
Other ? (Specify)			15

7

5. Indicate your highest qualifications obtained.

OFFICE USE

National Technical Certificate	1
National Technical Diploma	2
National Diploma	3
National Higher Diploma	4
Education Diploma	5
Masters Diploma in Technology	6
University Diploma	7
University Degree	8
Post Graduate Degree or Diploma (Hons, GDE, Masters)	9
Doctorate	10
Other ? (specify)	11

[ ] 8

6 . Complete the following table on language proficiency.

	Speak	Read	Write	Home language	Your language medium **at work**	
Afrikaans	1	2	3	1	1	[ ] 9 -11
English	1	2	3	2	2	[ ] 12-14
isiNdebele	1	2	3	3	3	[ ] 15-17
Sesotho	1	2	3	4	4	[ ] 18-20
Sesotho sa Leboa	1	2	3	5	5	[ ] 21-23
siSwati	1	2	3	6	6	[ ] 24-26
Xitsonga	1	2	3	7	7	[ ] 27-29
Setswana	1	2	3	8	8	[ ] 30-32
Tshivenda	1	2	3	9	9	[ ] 33-35
isiXhosa	1	2	3	10	10	[ ] 36-38
isiZulu	1	2	3	11	11	[ ] 39-41

7. Indicate if your company assists students financially and by which method.

No financial assistance	1
By bursary	2
Sponsorship	3
Loan	4
Other ? (specify)	5

[ ] 42

8. Are you at present registered with any professional body.

Yes	1
No	2

43

If YES please specify :- (Abbreviations are OK !)

1.	44
2.	45
3.	46
4.	47

9. Do you personally serve on the Advisory Committee attached to any Technikon to share input on academic matters.

Yes	1
No	2

48

SECTION TWO EXPERIENTIAL (IN-SERVICE) TRAINING

* **PLEASE NOTE. Co-operative Education** is the term used to describe the essential relationship and formal linkage between the **three partners** in the education of civil engineering technicians.
The three partners are the **students, the technikons and industry.**

10.

ORIENTATION

OFFICE USE

Orientation is the process of briefing and providing information about the requirements for experiential training and the world of work. Indicate the **amount of importance** you attach to orientation, based on the following statements.

Orientation serves	Very Important	Quite Important	Not very important	Unimportant	
To help students to understand the importance of **co-operative education.** * ***(see Note above)***	1	2	3	4	49
To help students to appreciate the need for a code of conduct.	1	2	3	4	50
To help students to create an awareness of the problems of working life.	1	2	3	4	51
To explain to students the procedures for evaluation.	1	2	3	4	52
To outline to students the objectives of the training programme.	1	2	3	4	53

11.

PLACEMENT

Placement means training in the workplace. Please indicate to what extent you agree or disagree with the following statements concerning the benefits of placement

Placement in industry helps ...	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree		
To assist students in understanding the relevance of the academic course work.	1	2	3	4	5		54
To help lecturing staff to update their own knowledge of developments in industry.	1	2	3	4	5		55
To provide students with a range of experiences capable of meaningful analysis after your placement period.	1	2	3	4	5		56
To give employers a chance to get involved in educational issues.	1	2	3	4	5		57
To give employers a chance to select future permanent employees	1	2	3	4	5		58

12.

SUPERVISION

OFFICE USE

Supervision is when students in training are reporting to a person whose specific task is to train, motivate and evaluate the students progress in the workplace. Indicate the extent to which you agree or disagree with the following statements.

	Strongly agree	Agree	Neither Agree or disagree	Disagree	Strongly disagree		
Workplace supervisors are well equipped to attend to the training needs of students	1	2	3	4	5		59
Lecturing staff should play a role in experiential training supervision.	1	2	3	4	5		60
Workplace supervisors do not fully understand the training needs of students.	1	2	3	4	5		61
Workplace supervisors should always be available to attend to student's needs.	1	2	3	4	5		62
Workplace supervisors need special training to attend to students in training.	1	2	3	4	5		63

13.

EVALUATION (of experiential training)

Evaluation is the opportunity to give feedback to students and to the technikon, on the student's progress on the whole range of skills, competencies and knowledge in the workplace. Please respond to the following statements as indicated below.

How you would rate the following tools as meaningful for student evaluation :-

	Highly Desirable	Desirable	Neither Desirable or undesirable	Undesirable	Totally Undesirable		
The logbook.	1	2	3	4	5		64
Oral presentation	1	2	3	4	5		65
Project work.	1	2	3	4	5		66
Assignments.	1	2	3	4	5		67
Written exams.	1	2	3	4	5		68

How would you rate the following skills and qualities as criteria for meaningful evaluation of students.

OFFICE USE

	Highly Desirable	Desirable	Neither Desirable or undesirable	Undesirable	Totally Undesirable		
Technical knowledge	1	2	3	4	5		69
Hands on skills	1	2	3	4	5		70
Self motivation	1	2	3	4	5		71
Communication skills	1	2	3	4	5		72
Team work	1	2	3	4	5		73
Initiative	1	2	3	4	5		74
Punctuality	1	2	3	4	5		75
Independent thought	1	2	3	4	5		76
Decision making	1	2	3	4	5		77
Leadership	1	2	3	4	5		78

For feedback on evaluation to be effective to students, indicate the desirability of the following time scales for the assessment of experiential training.

	Highly Desirable	Desirable	Neither Desirable or undesirable	Undesirable	Totally Undesirable		
Daily feedback	1	2	3	4	5		79
Weekly feedback	1	2	3	4	5		80
Monthly basis	1	2	3	4	5		81
Quarterly basis	1	2	3	4	5		82
End of work term	1	2	3	4	5		83

Please rate the desirability of the student's role in the evaluation process as per the following statements.

	Highly Desirable	Desirable	Neither Desirable or undesirable	Undesirable	Totally Undesirable		
Students should evaluate the training facilities of Companies.	1	2	3	4	5		84
Students should evaluate the Technikon's course relevance to the work place	1	2	3	4	5		85

14.

THE WORLD OF WORK

OFFICE USE

The world of work refers to all factors that influence the student's understanding of their working environment while in training. Please indicate how you rate the following statements as meaningful to your understanding of the world of work..

	Very Important	Quite Important	Not very important	Unimportant		
To develop students appreciation of the relationships between the various parts of the organization.	1	2	3	4		86
To develop the student's ability to meet deadlines.	1	2	3	4		87
To develop the student's awareness of industry's need for cost effectiveness.	1	2	3	4		88
To help students to develop a realistic attitude toward the world of work.	1	2	3	4		89
To assist students in future career path planning	1	2	3	4		90

15.

INTERPERSONAL AND SOCIAL SKILLS

Interpersonal and social skills deal with the ability to cope in human relationships and the ability to interact effectively with other people in the work place.
Please indicate how you rate the following qualities.

	Very Important	Quite Important	Not very important	Unimportant		
To make students aware of the importance of verbal and non-verbal communication at work.	1	2	3	4		91
To develop the student's ability to present a case clearly and convincingly.	1	2	3	4		92
To enable the student to work as part of a team.	1	2	3	4		93
To enable the student's ability to organize the work of others.	1	2	3	4		94
To develop the student's ability to accept the authority of others.	1	2	3	4		95

16.

TECHNICAL DEVELOPMENT

OFFICE USE

This deals with the development of technical knowledge and expertise in the design an construction of civil engineering and the ability to extract information efficiently.
How do you rate the following statements.

Technical development means...	Very Important	Quite Important	Not very important	Unimportant		
To develop the student's ability to accurately understand the needs of the task..	1	2	3	4		96
To enable the student to develop new skills applicable to the work situation.	1	2	3	4		97
To give the student the opportunity to appreciate and to apply academic knowledge to the practical problems related to the demands of work.	1	2	3	4		98
To help the student to appreciate different approaches to learning.	1	2	3	4		99
To provide a contrast between coursework and work place demands.	1	2	3	4		100

SECTION THREE ACADEMIC MATTERS

It will be appreciated that not all people in industry have first hand knowledge of the academic processes at technikons. However you are please asked to give an opinion based on your understanding where applicable.

17.

TEACHING METHODOLOGY

The relative success of teaching and learning will depend on the integration and utilization of resources and methods. Rate the following methods and resources in terms of your perceived effectiveness in the teaching process.

	Highly Effective	Effective	Neither Effective or Ineffective	Ineffective	Totally Ineffective		
Lecturing (talking)	1	2	3	4	5		101
Lecturing using overheads	1	2	3	4	5		102
Laboratory work	1	2	3	4	5		103
Site visits	1	2	3	4	5		104
Computers	1	2	3	4	5		105
Library	1	2	3	4	5		106
Projects	1	2	3	4	5		107
Visiting lecturers	1	2	3	4	5		108
Self study	1	2	3	4	5		109
Group work	1	2	3	4	5		110

An outcome based approach to learning uses as its starting point what the student should be able to demonstrate and have a knowledge of. Rate the following outcomes in terms of their importance for the successful application of learning.

OFFICE USE

	Very Important	Quite Important	Not very important	Unimportant		
Technical knowledge.	1	2	3	4		111
Technical hands on skills.	1	2	3	4		112
Communication skills.	1	2	3	4		113
Life skills.	1	2	3	4		114
Team working skills.	1	2	3	4		115
Leadership skills.	1	2	3	4		116
Management skills.	1	2	3	4		117
Entrepreneurship skills.	1	2	3	4		118
Labour relations skills.	1	2	3	4		119
Confidence building skills.	1	2	3	4		120

18.

OFFICE USE

ASSESSMENT, EVALUATION AND REVIEW.

The above procedures, in various forms, are mechanisms that create opportunities for feedback on the successes of teaching and learning. Indicate the extent to which you agree or disagree with the following statements.

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree		
Three hour closed book examinations truly reflect the results of learning.	1	2	3	4	5		121
Marks scored in tutorials, tests and examinations fairly reflect the success of learning.	1	2	3	4	5		122
Immediate feedback on results help to motivate students to work harder.	1	2	3	4	5		123
Remedial classes give slow learners a second chance to improve their learning.	1	2	3	4	5		124
Written comments included with mark allocations help to reinforce the outcomes of learning.	1	2	3	4	5		125
Moderators scrutiny of students work helps to validate the results of learning.	1	2	3	4	5		126
Evaluation of student's achievements should include interpersonal, communication and life skills.	1	2	3	4	5		127
End of semester final examinations should be completely abolished.	1	2	3	4	5		128
Continuous evaluation reflects learning progress more accurately.	1	2	3	4	5		129
A continuous record of student achievement on academic and interpersonal skills should be documented and presented on completion of the diploma	1	2	3	4	5		130
It would be useful for students to receive training in non-related subjects such as human resource management, accounting and tax law etc.	1	2	3	4	5		131

19.

OFFICE USE

ADMINISTRATION AND NON ACADEMIC FUNCTIONS.

Administration and non academic functions are processes that underpin and support the academic function of technikons. Indicate your agreement or disagreement with the following.

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree		
Lecturing staff play a valuable role as student councillors in assisting to solve student problems.	1	2	3	4	5		132
Processing of student data including all marks should be done by lecturing staff.	1	2	3	4	5		133
Access to personal computers should compel lecturers to do all their own typing and administration work.	1	2	3	4	5		134
Lecturing staff serving on technikon internal committees provide a valuable service.	1	2	3	4	5		135
Lecturing staff should be paid overtime for work done at home which cannot be completed in normal hours.	1	2	3	4	5		136

20.

STANDARDS AND QUALITY.

OFFICE USE

Standards can be defined as agreed levels of attainment in student performance.
Quality is the measure of success in achieving the standard of service that a technikon sets for it's self.
Quality assurance is the process of ensuring that the process of providing the service is always going to meet the standard.

Indicate the extent to which you agree or disagree with the following statements

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree		
Uniform standards can be applied nationally to all technikons.	1	2	3	4	5		137
Historical disparities have a role to play in determining standards.	1	2	3	4	5		138
Each technikon has to set it's own standards in line with it's ability to deliver quality service.	1	2	3	4	5		139
Some technikons can set higher standards than other technikons.	1	2	3	4	5		140

Technikon standards must be determined by :-

Technikons collectively.	1	2	3	4	5		141
Technikons and industry.	1	2	3	4	5		142
Industry alone.	1	2	3	4	5		143
By SERTEC only. *(see below)*	1	2	3	4	5		144
By technikons collectively.	1	2	3	4	5		145
Each technikon must set their own standards.	1	2	3	4	5		146
By all interested parties.	1	2	3	4	5		147

PLEASE NOTE.

SERTEC is the **Certification Council for Technikon Education** established by Government to evaluate the operational units and instruction programmes at all Technikons.

21.

ACADEMIC AND STAFF DEVELOPMENT

OFFICE USE

Academic and staff development are strategies and mechanisms that are intended to add value to improved academic delivery.

Please indicate your agreement or disagreement with the following statements.

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree		
All technikons should between them establish formal linkages and co-operation agreements.	1	2	3	4	5		148
Technikon research should form an essential component of academic development	1	2	3	4	5		149
Lecturing staff should engage in outside consultancy work to keep abreast with industry developments.	1	2	3	4	5		150
Lecturing staff should be encouraged to improve their qualifications.	1	2	3	4	5		151
All lecturing staff should possess a teaching qualification	1	2	3	4	5		152

22.

OFFICE USE

ACADEMIC SUPPORT

Students assistants or lecturing assistants are senior students employed by the technikon to assist staff and students in the execution of the academic programme.

Please indicate your view based on the following statements.

Student / lecturing assistants ...	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree		
Should perform lecturing duties	1	2	3	4	5		153
Should mark students work.	1	2	3	4	5		154
Can run remedial sessions.	1	2	3	4	5		155
Can assist with research projects.	1	2	3	4	5		156
Can invigilate at examinations.	1	2	3	4	5		157

Advisory Committees or Liaison Committees consist of representatives from technikons and employer bodies. Their purpose is advise and give input on matters such as moderation, syllabus content relevance, evaluation procedures, experiential training and the whole range of issues relating to the course programme.

Please indicate you view based on the following statements.

Advisory Committees.....	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree		
Have a valuable role to play in achieving quality and standards	1	2	3	4	5		158
Should allow for student representation.	1	2	3	4	5		159
Should be represented by industry with formal recognition by their professional bodies.	1	2	3	4	5		160
Need only be an informal arrangement between individual technikon's and industry participation based on the technikon's choice.	1	2	3	4	5		161
Should be represented by all civil engineering disciplines such as consultants, suppliers contractors, municipalities etc.	1	2	3	4	5		162

SECTION FOUR | A SITUATION ANALYSIS

The following questions are an attempt to get an assessment on the current situation at technikons and in industry with a view to establishing trends and consistencies.

It will be appreciated that not all people in Industry have first hand knowledge of the academic processes at Technikons. However you are please asked to respond if you have some understanding, by responding where applicable.

Your response should be your **own experience** within your company as well as your understanding of what happens at the technikon's you deal with.

23.

ORIENTATION

	YES	NO	UNSURE		
Do you know if technikons provide an orientation programme before the start of the experiential training period.	1	2	3		163
Does your company have an orientation programme when students start experiential training.	1	2	3		164
Do you know if technikons provide an orientation programme at the commencement of academic studies.	1	2	3		165
Do you fully understand the role of co-operative education as part of the course programme.	1	2	3		166
Do students visit your company prior to the start of their experiential training.	1	2	3		167

24.

PLACEMENT

OFFICE USE

	YES	NO	UNSURE		
Do you accept students for experiential training after they have completed S2 academic studies.	1	2	3		168
Does experiential training last for a continuous one year period.	1	2	3		169
Do you believe that experiential training can start after completion of S1 academic studies.	1	2	3		170
Does experiential training continue for longer than one year.	1	2	3		171
Do you prefer to do your own selection of students for experiential training.	1	2	3		172
Do you prefer a 6 month experiential training period.	1	2	3		173
Do you prefer a 12 month experiential training period.	1	2	3		174
Do you design a training programme for exp. training	1	2	3		175

25.

SUPERVISION

	YES	NO	UNSURE		
Should students have access to their work supervisor at all times.	1	2	3		176
Should the technikon co-ordinator only should visit students at in the workplace.	1	2	3		177
Lecturing staff should also visit students in the work place.	1	2	3		178
Work supervision is always constructive and supportive.	1	2	3		179

Assessment of student work performance must be done by :-

Supervisor only.	1	2	3		180
Technikon co-ordinator only.	1	2	3		181
Lecturing staff	1	2	3		182
Supervisor and Technikon co-ordinator.	1	2	3		183

26.

EVALUATION

	YES	NO	UNSURE		
Feedback on students progress helps to motivate them.	1	2	3		184
Feedback on student progress is done regularly.	1	2	3		185
Students receive feedback on interpersonal skills development.	1	2	3		186
Students are allowed to comment on the Industry support and training provided.	1	2	3		187
Students are allowed to comment on the Technikon programme and level of service.	1	2	3		188

Assessment and evaluation methods include :-

The use of logbooks only.	1	2	3		189
Work based projects or assignments.	1	2	3		190
Oral or verbal presentations.	1	2	3		191
Student training need not be evaluated at all.	1	2	3		192

27.

THE WORLD OF WORK

OFFICE USE

	YES	NO	UNSURE		
Students understood their role in the company organization structure.	1	2	3		193
Students understand the need to meet work deadlines.	1	2	3		194
Students should be involved in managerial responsibilities while in training.	1	2	3		195
Students should agree to do unrelated engineering duties.	1	2	3		196
Students are allowed to work independently.	1	2	3		197

28.

INTERPERSONAL AND SOCIAL SKILLS

	YES	NO	UNSURE		
Students communication skills improved as a result of experiential training.	1	2	3		198
Students self confidence improved as a result of experiential training.	1	2	3		199
Students are accepted as a member of the work team.	1	2	3		200
Racial attitudes influence students progress negatively.	1	2	3		201
Students are given positions of authority over others.	1	2	3		202

29.

TECHNICAL DEVELOPMENT

	TRUE	FALSE	UNSURE		
It is easy for students to apply training to the demands of the workplace.	1	2	3		203
The students approach to learning improve after the period of experiential training.	1	2	3		204
Technikon training is of little help to students in the work place.	1	2	3		205
Technikon equipment is outdated.	1	2	3		206
Technikon teaching methods are unrelated to industry requirements.	1	2	3		207

30.

TEACHING METHODOLOGY

OFFICE USE

	TRUE	FALSE	UNSURE		
Lecturer teaching methods are outdated.	1	2	3		208
Technikon laboratories are underutilised.	1	2	3		209
Library resource materials are limited in supply.	1	2	3		210
Project work forms an integral part of learning.	1	2	3		211
Computer facilities are limited in supply.	1	2	3		212

31.

EVALUATION AND ASSESSMENT

	TRUE	FALSE	UNSURE		
Marks received truly reflect the student's understanding of the learning content.	1	2	3		213
Marks are always received back in sufficient time for students to appreciate any shortcomings in their grasp of the learning content.	1	2	3		214
Continuous evaluation motivates students to try harder .	1	2	3		215
3 Hour closed book examinations gives an accurate assessment of learning .	1	2	3		216
Feedback on interpersonal, communication and life skills form a regular part of student evaluation at the technikon.	1	2	3		217

32.

STANDARDS AND QUALITY.

	TRUE	FALSE	UNSURE		
The technikons I deal with set high standards.	1	2	3		218
The technikon I deal with has a quality assurance programme.	1	2	3		219
SERTEC visits ensure that standards are maintained.	1	2	3		220
SERTEC reports are made available to industry.	1	2	3		221
SERTEC visits and reports truly reflect the operational efficiency of technikons.	1	2	3		222
Standards are the same at all technikons.	1	2	3		223

33.

OFFICE USE

ADMINISTRATION AND NON ACADEMIC FUNCTIONS

	TRUE	FALSE	UNSURE		
The technikon has a good departmental administration system.	1	2	3		224
Lecturing staff spend too much time on administration duties.	1	2	3		225
Lecturing staff are always available for advice and counselling.	1	2	3		226
Departmental heads perform an administration function.	1	2	3		227
Lecturing staff regularly have to complete work at home.	1	2	3		228
Lectures should cope, working a regular 40 hour week.	1	2	3		229

34.

ACADEMIC AND STAFF DEVELOPMENT

	TRUE	FALSE	UNSURE		
Lecturing staff keep abreast with the latest technology.	1	2	3		230
Lecturing staff are encouraged by the technikon to improve their qualifications	1	2	3		231
Lecturing staff regularly upgrade their teaching methodology.	1	2	3		232
Lecturing staff have links with lecturers at other technikons.	1	2	3		233
I have been or am currently involved in research activity.	1	2	3		234

35.

ACADEMIC SUPPORT

	TRUE	FALSE	UNSURE		
Technikon's employ student assistants.	1	2	3		235
Student assistants are helpful and supportive.	1	2	3		236
Student assistants assist in the marking of students work	1	2	3		237
Student assistants do invigilation duties.	1	2	3		238
Student assistants do lecturing duties.	1	2	3		239

Advisory Committees exist in Technikon departments.	1	2	3		240
Advisory Committees render a useful service.	1	2	3		241
Students also serve on Advisory Committees.	1	2	3		242
I know who the Advisory Committee members are.	1	2	3		243
Advisory Committee members act as moderators.	1	2	3		244

THANK YOU FOR YOUR PATIENCE AND CO-OPERATION

ANNEXURE B

SAMPLE OF CORRESPONDENCE

TO

STUDENTS, ACADEMIC STAFF AND INDUSTRY

ANNEXURE 1

Vaal Triangle Technikon.
Department of Civil Engineering.
FAX NO: 016 855139

Attention : Head of Department.

RE : RESEARCH AND DEVELOPMENT PROJECT

SUBJECT: The education and training of civil engineering technicians.

Dear Sir,

First of all I wish to thank you for your enthusiasm and positive response during our telephonic conversation on the 6 May 1997.Allow me to briefly give you some background to this research initiative

The education and training of civil engineering technicians is a dynamic and integrated process, which primarily involves students, technikons and industry.

Given the rapid changes in technology, the recent developments in higher education transformation and the arrival of a new political order, an excellent opportunity exists to review current perceptions. practices and methodologies with a view to exploring more efficient and effective delivery mechanisms.

Such delivery mechanisms would include teaching and learning strategies, resource utilization, standards, quality assurance, assessment, evaluation and review. Maximizing the inputs and outputs will enhance the ideals of co-operative education, as the medium for networking between the various stakeholders.

Your technikon's participation would involve the completion a questionnaires by S3 and S4 students and departmental staff at a mutually agreed time and place to suite circumstances. With your help and support you will be contributing to an initiative which could affect the operational efficiency and professional stature of all participants and more especially the civil engineering technician, who remains the end product of all our education and training endeavours.

As per our telephonic discussion on the 6 May 1997 I wish to inform you that I will personally visit your Technikon on Monday morning at 9.30 am on the 19 May 1997 as per your suggestion.

My requirements would request that you please arrange the following :-

1.That you inform and arrange for your S3 and S4 students, who have done some in-service training, to complete the questionnaire by seating them together say in a classroom where they can all complete the questionnaire at the same time under controlled conditions. It will take between 30 and 40 minutes.

2. Secondly to inform your staff and to get their co-operation in filling out the questionnaire as well. I will hand it to them on the Monday and if possible They can fill it in and return it either on the same day or the next day.

BRIAN FORBES.
Peninsula Technikon.
Department of Civil Engineering.

>>>>>>>>> FAX. No. (021) 9497329.

ANNEXURE 2

REPLY RESPONSE FORM.

RESEARCH AND DEVELOPMENT PROJECT.

SUBJECT: **The education and training of civil engineering technicians.**

Name of Institution :_____

Department : _____

Head of Department

Name :_____

Contact Tel.( )_____

FAX No:_____

Signed:_____

Co-operative Education.(In service training)

Name :_____

Contact Tel. ( ) _____

FAX No : _____

Signed: _____

It would be appreciated if you could supply the **names and contact numbers of companies** currently participating in the in-service training of your students as follows.

COMPANY NAME	**CONTACT PERSON**	**TELEPHONE** *(Code)+number*	**WORK DISCIPLINE ?*** **consultant, contractor,** ***municipality or supplier***

An even spread of company disciplines will be appreciated and preferably companies within say a +/- 100 km radius where possible.

ANNEXURE 3

NAME OF COMPANY:

_____

ATTENTION OF: _____ **FAX No. (** _____ **)** _____

Subject: The education and training of civil engineering technicians.

Dear Mr / Mrs / Ms. _____

Your name has been forwarded by the Technikons as someone who is associated with the training of civil engineering technicians.

As part of our ongoing initiatives in research and development, we are currently doing a research project which is aimed at improving the quality and effectiveness of civil engineering technicians in training.

Given the rapid changes in technology, the recent developments in higher education transformation and the arrival of a new political order, an excellent opportunity exists to review current perceptions. practices and methodologies with a view to exploring more efficient and effective delivery mechanisms.

Such delivery mechanisms would include teaching and learning strategies, resource utilization, standards, quality assurance, assessment, evaluation and review.

Maximizing the inputs and outputs of all participants will enhance the ideals of co-operative education, as the medium for networking between the various stakeholders.

To this end you are now being invited to participate in a survey, by completing a questionnaire, which will be mailed to you in the near future.

We are convinced that your contribution will be valuable as we seek to examine and review current strategies, that can serve as a basis to make recommendations that will assist in making the process of learning more effective and efficient.

To facilitate the way forward. I have enclosed a **reply response form** on which you are please asked to confirm your interest and support, by filling in the details as requested. It will be appreciated if you could respond **by return fax** at your earliest convenience so that the information can be despatched timeous ly..... My fax details are included on the response form.

Thanking you for your co-operation.

_____

BRIAN FORBES.

ANNEXURE 4

INDUSTRY REPLY RESPONSE FORM.

Please send..... **this return fax to :** Mr. Brian Forbes
Department of Civil Engineering.
Peninsula Technikon. Bellville.

*(Please respond before **Friday 30 May** 1997)*

(You need only complete the form and then fax **only this one sheet**)
To **FAX NO. 021 - 9497329**

We are inviting participation from **as many of** your staff members who in some way play a role in the **training and supervision** of civil engineering technicians.

Name of your Company : _____

Contact Person : _____

Telephone No : Code. (_____) No. _____

Fax. No: Code. (_____) No. _____

Contact Address. _____

_____

(Postal Code) _____

This serves to confirm that I am **prepared / unable** to participate in the proposed survey. Reasons / comments / questions. (If any)

_____

_____

In order to *maximize participation* please forward by mail _____**No. copies of the *survey forms*** which I will distribute, collect and return.

Signed : _____ Date :_____

Name. (Please print). _____

ANNEXURE 5

SUBJECT RESEARCH PROJECT
RE: PILOT STUDY

Allow me to thank you for your willingness to participate in this pilot study.

This survey will be conducted nationally involving certain Technikons based on regional and specific constituency considerations.

The subject matter deals with all the educational aspects of training for the National Diploma in Civil Engineering.

The first important stage of this survey is to test the questionnaires and to iron any ambiguities, misunderstandings and general proof reading.

You are please being asked to participate and to record the following

1. How long it takes you to complete the questionnaire.

2. To highlight any questions that you have difficulty understanding.

3. To pick out any other errors or content that may cause difficulty in completing the survey.

Please record the time you take and feel free to scribble your comments on the actual text or at the end, on any of the blank pages.

Your co-operation and time is greatly appreciated.

Your sincerely,

BRIAN FORBES.