Incorporating the development of non-technical skills in the landscape architecture curriculum in South Africa

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Summary

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The last two decades have been characterised by a debate of increasing urgency regarding pedagogical issues in landscape architecture, such as the nature of the skills of graduates entering the profession. The generic workplace is also undergoing changes. Employers are showing a preference for non-technical skills such as teamwork, communication and self-skills.

With this as background, the following factors serve as motivation for the study; the increasingly unpredictable changes in and broad nature of landscape architecture, the shift in the skills required of graduates entering the generic workplace, and the changing South African educational landscape.

The dissertation thus seeks to identify the major factors motivating a need to shift the outcomes emphasis in the landscape architecture degree programmes in South Africa from technical (subject specific) to non-technical skills and to identify a framework through which to tangibly incorporate non-technical skills landscape architecture curriculum.

The shift in the skills required of the generic workplace is stated together with its effect on higher education. The breadth and future of the profession are discussed to determine the relationship between the profession and non-technical skills. It was found that there is a need to shift the skills required of landscape architecture graduates from technical to non-technical skills.

The degree to which landscape architecture programmes in South Africa are currently addressing non-technical skills is surveyed and it is concluded that these programmes do not tangibly address non-technical skills.

The dissertation proposes a curriculum design process and a framework for facilitating learning which ensures that non-technical skills are tangibly incorporated into landscape architecture curricula.

The dissertation concludes that landscape architecture curriculum in South Africa need to shift the skills emphasis from technical to non-technical skills if they are to remain relevant to the educational and workplace environments in which they operate.

Keywords: landscape architecture, education, skills, non-technical skills, curriculum, learning facilitation, graduates, teaching, learning outcomes, lifelong learning.

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I will counsel you and watch over you." – Psalm 32:8**

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CHAPTER 1 - INTRODUCTION

1.1 PROBLEM SETTING

The last two decades have been characterised by an international debate of increasing urgency regarding pedagogical issues in landscape architecture. Issues such as the breadth of landscape architectural education, the relationship between under-graduate and post-graduate degrees, the products of academic programs, the lack of research and the identification of a core knowledge base have been the focus of the debate. Most of these issues rise from the dynamic between the professional environment and academia. As the professional environment changes it places pressure on landscape architecture programmes to remain relevant and appropriate regarding the skills and knowledge graduates obtain during their tertiary education.

One of the most prominent characteristics of contemporary society that directly transforms the environmental planning professions is change. Within such an ephemeral context, a profession such as landscape architecture undergoes significant changes. "It is wise to be humble when we consider what students need for long-term employment. How many of us would have placed computer skills at the top of the list of necessary design skills three, or even two decades ago? The world will continue to change in ways we cannot anticipate or predict..." (Landscape Architecture Magazine 1998:128). The development of environmental thinking during the 1960's and 1970's also brought about tremendous changes in landscape architectural site planning and design. To attempt an understanding of what the future holds for landscape architecture is difficult to achieve. "And that focus [on the transfer of knowledge] is the source of much of the present crisis within education as a whole, for at best, it is extremely difficult to say what kinds of information are needed for a specific job at the present time, and utterly impossible to project information needs a decade or two into the future" Meehan (1995:17). Schools of landscape architecture are left with a difficult task of preparing students for an unpredictable future.

The situation in South Africa is very similar. South Africa is a country that is undergoing tremendous change in all areas of society. Murphy (1999:100), in a dissertation on the landscape architecture profession in South Africa, states that the conditions thereof reflect the dynamics of the changes the country is experiencing. Murphy (1999:101) goes on to comment that the future trends of the profession are becoming more dynamic and unpredictable.

The unpredictability of the future of the profession seems to render subject specific content-based curriculum design, which is the current norm, ineffective. Subject specific content-based referring to current practice activities and processes. "For this reason it is considered important that professional education and training become more focussed on continual systematic learning and to be more opportunistically creative than to maintain the traditional focus on education to improve competency in the practice based procedures and methods of the past" (Murphy 1999:102). In this statement Murphy addresses the issue of the origin or source of the content of what he believes to be inappropriate landscape architecture curriculum, and begins to suggest a possible solution. His concern is the focus on developing the student's competency regarding landscape architectural methods and procedures of the past. This constitutes

the content-based approach to curriculum design. The solution he presents is that education needs to shift focus toward a continual systematic learning (lifelong learning) model. Lifelong learning focuses on the development of a person's ability to learn and achieves this through developing thinking and attitudinal skills. This points to a possible way of dealing with unpredictability, namely that the focus should be facilitating the learning of the student in a sustainable way which will equip the student with the ability to continually learn whilst active in the changing profession. "However, the need for a learning society which can cope with changing workplace patterns and rapid technological change has shifted the focus again to lifelong learning" (Sutton 1994:3419). The curriculum focus thus becomes the skills necessary for sustained learning in the future and not competencies necessary for successful practice currently. This implies a move from subject specific content (knowledge) toward the thinking and attitudinal aspects which enable lifelong learning. These thinking and attitudinal aspects include many non-technical skills (See 1.5 Definition of Terms).

The generic workplace (across various professions) is also undergoing changes. Employers are reacting to the changing world by expecting employees to have a vastly different set of skills from those employers expected as recently as ten to twenty years ago. "Throughout Europe and America, recent findings indicate that employers show a preference for teamwork, communication, and self-skills, above knowledge, degree classification, intelligence, and reputation of the institution the graduate attended" (Leckey & McGuigan 1997:365). This set of skills can fit into a category called non-technical skills.

The South African education system is also currently undergoing far-reaching transformation. The recently introduced South African Qualifications Authority (SAQA) and the National Qualifications Framework (NQF) no longer allow curriculum design to occur in an isolated content-based manner, but requires that it take cognisance of the guidelines and directives of the SAQA and the policies embedded in the NQF. The NQF is a framework of principles and guidelines that provide a vision, philosophical base and organisational structure for developing a qualifications system (NQF Website). One of the strongest characteristics of the NQF is its tremendous emphasis on all-round skills learners should acquire. These all-round skills are essentially non-technical skills. This is reflected in SAQA's critical and developmental outcomes which describe the skills and competencies people require for work and their day-to-day lives.

1.2 MOTIVATION FOR THE STUDY

The rapid and increasingly unpredictable changes in, and the broad nature of the practice environment of landscape architecture, the shift in the skills required of graduates entering the generic workplace from technical to non-technical skills and the changing South African educational landscape, suggest that for the education of landscape architects to be relevant to the South African workplace, the design of the outcomes of curriculum in South Africa need to more directly reflect non-technical skills.

1.3 STATEMENT OF THE PROBLEM

1.3.1 Main Problem

To identify the major factors motivating a need to shift the outcomes emphasis in the landscape architecture curriculum in South Africa from technical (subject specific) to non-technical skills and to identify a framework through which to tangibly incorporate non-technical skills into a landscape architecture curriculum. These two aspects need to be linked by an investigation into the degree to which the current landscape architecture curriculum in South Africa addresses non-technical skills.

1.3.2 Subproblems

1. Determine the existence and nature of a shift in the skills required of landscape architecture graduates entering the profession as well as the skills emphasis of the new South African education system.
2. Evaluate the degree to which the landscape architecture curriculum in South Africa addresses non-technical skills.
3. Develop a curriculum design process which ensures that non-technical skills are tangibly incorporated into a landscape architecture curriculum.
4. Develop a framework for facilitating the learning of non-technical skills suitable for a landscape architecture curriculum.

1.4 HYPOTHESES

1.4.1 Main Hypothesis

The landscape architecture curriculum in South Africa needs to shift the skills emphasis from technical to non-technical skills if it is to remain relevant to the educational and workplace environments.

1.4.2 Subhypotheses

1. There is a need for the landscape architecture curriculum to acknowledge the shift in emphasis of the skills required of landscape architecture graduates entering the profession from technical to non-technical skills. The shift in emphasis from technical to non-technical skills across all curricula (not only landscape architecture) is endorsed by the new South African education system.
2. The landscape architecture curriculum in South Africa does not tangibly address the broad spectrum of non-technical skills.
3. A curriculum design process can be developed to ensure that non-technical skills are tangibly incorporated into a landscape architecture curriculum.
4. A framework for facilitating the learning of non-technical skills suitable for a landscape architecture curriculum can be developed.

1.5 DEFINITION OF TERMS

1.5.1 Technical and non-technical skills:

The definition of non-technical skills and the range of specific skills which make up the group broadly referred to as non-technical skills is drawn from an article by Kemp (1999:178) entitled; "The identification of the most important non-technical skills required by entry-level engineering students when they assume employment."

According to Straub (1990:45), technical skills comprise the productive part of a job; for example, the typing skills of a secretary that are measurable, whereas non-technical skills represent the aspects common to all jobs, such as following instructions, communicating effectively and cooperating with others in teamwork. Neal (1983:25-27) states that there are two broad categories of non-technical employment qualities or skills. The first category consists of behaviours such as arriving for work on time, following instructions, displaying social skills and conduct acceptable to others and effective communication. The second category consists of attitude related characteristics such as adaptability, self-confidence, persistence, ambition and helpfulness. Bryce (1993:84-89) writes that non-technical skills include communication, inter-personal and problem solving skills.

Munce (1981:76) divides non-technical skills into two categories:

- Functional skills
- Adaptive skills

Functional skills

Functional skills are the basic skills applied to tasks and are used to solve new problems and to go beyond one's training and past experience. Examples of functional skills are questioning, analysing, communicating, organising, listening, decision-making and forecasting (Murphy & Jenks 1982:5-10).

Adaptive skills

Adaptive skills describe the manner in which employees conduct themselves and interact with the working environment, including relations with people, organisations and physical conditions (Murphy *et al.* 1982:5-10). These skills are closely related to personality traits and when used in the appropriate environment, help the worker to adapt to that environment. Adaptive skills are essential to become effective in any work or learning situation. Examples of adaptive skills are flexibility, tactfulness, positive work attitudes, creativity and assertiveness (Breen 1981:2).

In summary the following are the definitions used for non-technical skills:

The skills that are required to compliment job content skills to effectively perform tasks in a workplace environment, include:

Functional skills which are the basic skills applied to tasks such as speaking, reading and writing, and form part of larger actions such as instructing and leading a team of workers; and

Adaptive skills which are required to "fit in" and contribute as a valuable member in the workplace.

Refer to Tables A-1 and A-2 in Appendix 1 for a complete break down of non-technical skills clusters.

1.5.2 Subject specific skills:

The skills originating from the subject specific content of a particular study field. This term is used interchangeably with technical skills.

1.5.3 Discipline specific:

This refers to any aspect of direct relevance to a specific discipline.

1.5.4 Generic workplace:

This represents all types of professional working environments.

1.5.5 Continual systematic learning:

In this dissertation continual systematic learning is essentially lifelong learning. "The function of lifelong learning is to enable a person, an organisation, a community or even a nation to adapt to a changing environment and to different needs and demands which are the result of a worldwide paradigm shift about the nature of knowledge" (Van Niekerk 1999:198).

1.5.6 Landscape architecture curriculum:

The collection of all the courses and modules required to complete a degree in landscape architecture.

1.5.7 Study guide:

A guide which sets out the goals, objectives, syllabus themes and study units of a course or module.

1.5.8 Course / module:

A particular subject studied as part of a landscape architecture curriculum such as Design 100.

1.5.9 Syllabus theme:

A specific subject studied within a course / module. "Psychological aspects of perception" could be a syllabus theme of the course Design 100.

1.5.10 Study unit:

Subdivisions of a syllabus theme. "Various theories of perception" could be a study unit of the syllabus theme "Psychological aspects of perception".

1.5.11 Learning areas:

Clusters of similar activities / tasks needed to successfully perform the role of a particular profession are grouped together to facilitate curriculum design.

1.5.12 Learning tasks:

Any activity designed to facilitate learning. In this dissertation learning tasks and assignments are synonymous.

1.5.13 Learning facilitator:

The person guiding the learning facilitation, such as a lecturer, tutor or teacher.

1.5.14 Pitching level:

The appropriate degree of difficulty of the learning required for a specific course.

1.5 DELIMITATIONS / ASSUMPTIONS

Although the study focuses on the profession of landscape architecture in South Africa, it does however refer to international information.

1.6 RESEARCH METHODOLOGY AND LITERATURE REVIEW

A review of literature on the subject of landscape architectural education, specifically regarding the nature of the skills required of graduates entering the profession, gave rise to the formulation of the main hypothesis. The subproblems were identified as the steps necessary to evaluate the validity of the main hypothesis. The subproblems thus become the investigations used to test the hypothesis.

Subproblem 1 (Chapter 2) investigates different motivations for the need to shift the skills emphasis in the landscape architecture curriculum. It also investigates the requirements of the new South African education system, The National Qualifications Framework, specifically regarding its skills emphasis. Articles on the education of landscape architects from the last five years were sourced from a variety of journals to provide insight into this subproblem. Various material was sourced on the new South African education system to provide insight into the skills the system emphasises. The articles and other sources were studied and any material was identified which could be used to test the hypothesis. A study on the relation between the profession of landscape architecture and the programme in landscape architecture at the University of Pretoria provided valuable insights regarding subproblems 1 and 2.

Subproblem 2 (Chapter3) investigates the degree to which the current outcomes of landscape architecture curriculum in South Africa address non-technical skills. There would be no need to investigate subproblems 3 and 4 if the current curriculum do indeed address non-technical skills. This hypothesis is therefore necessary to justify proceeding from subproblem 1 on to the curriculum development investigations of subproblems 3 and 4. This subhypothesis was tested through analysis of the course content of the two tertiary education institutions currently offering landscape architectural programmes in South Africa.

Subproblem 3 (Chapter 4) and subproblem 4 (Chapter 5) propose how the landscape architecture curriculum can be structured to incorporate non-technical skills. Curriculum development articles on higher education journals provided the research material for testing hypotheses 3 and 4.

Conclusions and recommendations are identified in Chapter 6.

CHAPTER 2 - SHIFTING SKILLS REQUIREMENTS IN LANDSCAPE ARCHITECTURE AND THE NEW EDUCATION SYSTEM

Subproblem 1 - Determine the existence and nature of a shift in the skills required of landscape architecture graduates entering the profession as well as the skills emphasis of the new South African education system.

Subhypothesis 1 - There is a need for the landscape architecture curriculum to acknowledge the shift in emphasis of the skills required of landscape architecture graduates entering the profession from technical to non-technical skills. The shift in emphasis from technical to non-technical skills across all curricula (not only landscape architecture) is endorsed by the new South African education system.

2.1 INTRODUCTION

This chapter investigates the existence and nature of the shift in the skills required of landscape architect graduates entering the profession as well as the skill emphasis of the new South African education system, the National Qualifications Framework.

The general shift in the skills required of the contemporary generic workplace is stated together with its effect on higher education. The degree to which this general shift is relevant to the profession of landscape architecture is then investigated. The breadth and future of the profession are discussed to determine the nature of the relationship between the profession and non-technical skills. A survey is undertaken to determine the extent to which non-technical skills are seen as important in recent articles on the education of landscape architects. The final part of the chapter discusses the new South African education system and its implications for curriculum design specifically regarding incorporating non-technical skills.

2.2 GENERAL SHIFT IN THE SKILLS REQUIRED

2.2.1 Changing society and the changing work environment

One of the most prominent characteristics of our time is rapid change. "The last few years of the 20th century were the most volatile years in economic history. It's as if we are being buffeted by larger and larger waves of change, arriving faster and with greater force" (Grulke & Silber 2000:7). These changes influence the way we interact with our environment and find a great deal of their expression in our places of work. "Industry has commented that the strain on financial resources for training and flatter organisation structures require that graduates adapt much quicker to an increasingly demanding workplace" (LHA Management Consultants 2001:7). Our places of work demand continuously changing knowledge and skills with which we can most successfully fulfil our roles.

2.2.2 Desired skills of the contemporary workplace

Employers are reacting to the changing world by expecting employees to have a different set of skills from those employers expected as recently as ten to twenty years ago. An analysis of the profile of university graduates amongst South African employers sheds light on the nature of the change. "What companies want, are not only well educated people, but also "agents of change", an example of the latter is an architect who is not only well qualified, but similarly a developer of projects thereby able to generate work and jobs. Agents of change are job creators and able to operate in work environments requiring both academic expertise and higher levels of non-technical capabilities" (LHA Management Consultants 2001:7). Academic expertise here refers to subject specific capabilities. "Throughout Europe and America, recent findings indicate that employers show a preference for teamwork, communication, and self-skills, above knowledge, degree classification, intelligence, and reputation of the institution the graduate attended" (Leckey & McGuigan 1997:365).

Kemp (1999:178) summarizes this situation as part of a study identifying the most important non-technical skills required by engineering graduates assuming employment; "Technological, social and economic changes have made organizations more complex and heightened the need for providing skills other than technical skills to employees entering the workplace for the first time. Busse (1992:3) points out that as technology has become more instantaneously available, the skills of employees have become the employers' competitive edge. The workplace requires a new kind of worker with a broad set of skills that include, among others, problem solving, listening, negotiating and communication. Busse (1992:23) states that employers refer to these competencies as non-technical skills."

Van Schoor (2000:41) undertook a study where questionnaires were distributed in various sectors of the South African economy to employers and requested them to list and rank the skills, values and attitudes that they would require from new employees. Seventy percent of the respondents indicated that they regard non-academic factors as equally important as academic factors. The skills (non-academic factors) respondents most frequently cited were; willingness and ability to learn, business skills, interpersonal relations, leadership skills, initiative, integrity and enthusiasm.

2.2.3 The influence of a changing workplace on higher education

Broadly speaking, industry expects two aspects when recruiting graduates: subject specific knowledge and skills, and transferable skills and attitudes. Higher education institutions seem to be successful regarding the first but not the latter, "...a review (Harvey, 1993) of this [the two aspects industry expects] indicates that higher education institutions are not so strong on the development of the competencies effective for its effective application to the world of work" (Leckey *et al.* 1997:366). In an article entitled "An essential addendum to existing education", Meehan (1995:17) begins to explain why this is the case. He states that curriculum content and teaching procedures are at present mainly oriented toward the transfer of bodies of information to the student and goes on to identify the implication thereof; "...the emphasis on information has almost certainly served to reduce, if it has not eliminated entirely, concern for kinds of skills and capacities needed to use information with

competence and integrity – thus reducing the amount of attention given what is perhaps the most important dimension of education or training" (Meehan 1995:17).

Part of education's purpose is to prepare us for our roles in the world of work. Changes in society thus consistently place new demands on education. Education continuously changes to meet these new demands. In an essay on the aspects of lifelong learning, Van Niekerk (1999:198) touches on some of the ways in which education is changing with regard to the desired attributes of the graduates of an educational system; "It is not enough to supply each child early in life with a store of knowledge to be drawn on from then on. Each individual must be equipped to seize learning opportunities throughout life, both to broaden her or his knowledge, skills and attitudes, and to adapt to a changing, complex and interdependent world". These changing demands on people entering the workplace are having tremendous effects on tertiary education. "What is required is a greater role by universities in shaping the all-round capabilities of the student" (LHA management Consultants 2001:7).

Tertiary institutions are currently experiencing an increasing awareness for the need to better equip students for the specific demands of the work environment. "There is a growing gap between the formal education that students receive at tertiary institutions and the needs of employers" (Kemp 1999:179). Kemp (1999:178) goes on to stress that students are adequately prepared to enter the workplace in the technical skills, but have been found lacking in non-technical skills which include communication skills, creative thinking, problem solving, information management, work attitudes and team work skills.

Tertiary institutions will need to react to these changes if they are to remain relevant. "Universities have been transported to the market place and unless they can meet the educational and market needs of society, they will lose their relevance" (Jacobs 1999:135). "The conclusion is that institutions of higher learning will have to do much more to prepare their students to become employable" (Van Schoor 2000:41).

The goal of tertiary education should however be much broader than only equipping students to react to the demands of the changing market place. Education should equip people with the tools necessary to release their potential as human beings. "Education must therefore prepare learners to acquire the knowledge needed not only to survive, but also to live a meaningful life" (Van Niekerk 1999:198). A UNESCO (United Nations Education, Scientific and Cultural Organisation) report states it another way: "It is not enough to supply each child early in life with a store of knowledge to be drawn on from then on. Each individual must be equipped to seize learning opportunities throughout life, both to broaden his or her knowledge, skills and attitudes, and to adapt to a changing, complex and interdependent world" (UNESCO 1996:85).

Van Niekerk (1999) expands upon the qualities a student should possess as a result from his or her education, "Thought should be contemplative rather than calculating. Education should create an awareness in learners of the relationship between language and meaning. We should have learners who are conversant – not education as/for reproduction, but as/for inventiveness. To echo De Beer (1994:9), a post-modern approach to learning should foster learners who are convivial, conscientious,

contemplative, conversant, and willing to confront problems and to improvise" (Van Niekerk 1999:202).

It is important that any attempt at curriculum development acknowledges these issues.

2.3 LANDSCAPE ARCHITECTURE AND NON-TECHNICAL SKILLS

The intention of this section is to investigate certain aspects of landscape architecture that will begin to indicate what the nature of the relationship is between landscape architecture and non-technical skills. Investigating this relationship is important for the following reasons:

- To determine to what degree non-technical skills play a role in the practice of landscape architecture currently and in the future,
- To determine the extent to which the shift in the skills required of the generic workplace is relevant to landscape architecture, and
- To develop a more specific list of non-technical skills which contribute to the success of a landscape architect.

To shed light on the relationship between landscape architecture and non-technical skills the state of the profession is investigated with specific reference to its breadth and future.

2.3.1 The nature of the profession

The nature of the profession is investigated to give clues as to the skills landscape architects would require to function successfully in the practice environment. Two frequently raised concerns regarding the profession, namely its breadth and future, point to the kinds of skills landscape architects require.

2.3.1 a) The breadth of the profession

Landscape architecture is by nature a profession dealing with a wide range off issues. A comparison of various definitions of landscape architecture is alone testimony to this.

The Institute of Landscape Architects of South Africa has a short but broad definition, "The science, technique and art of ecological, functional and aesthetic planning and design of exterior and open spaces for human use and enjoyment, for environmental conservation and rehabilitation" (Institute of Landscape Architects of South Africa). Motloch has an even broader definition, "a profession whose primary societal role is the synergism of art and science for the management, planning, and design of the entire physical and cultural landscape" (1991:2). The "entire" physical and cultural landscape implies a wide range of projects and activities the landscape architect would be involved with.

Laurie divides the activities of a landscape architect up into three categories, presumably due to the wide range of activities. Firstly, landscape planning and assessment, "This has a strong ecological and natural science base and is concerned

with the evaluation of ... the land's suitability or capability for any likely future use." Secondly, site planning or landscape design, "...the analysis of the site and the requirements of the programme for the use of the site are brought together in creative synthesis." Thirdly, detailed landscape design, "... the selection of components, materials and plants ... as solutions to ... problems" (1975:10). Booth, on the other hand brings into the definition of landscape architecture an emphasis on people within the landscape. "Landscape architecture as a professional design discipline that, in the broadest sense, deals with integrating people and the outdoor environment in a manner beneficial to both" (1983:ix).

From these definitions, it is apparent that landscape architecture is a profession dealing with a broad range of issues and landscape architects find themselves involved in a wide rang of activities. Certain landscape architects find themselves employed in government departments dealing with policy and legislation, where as others in private practice may be designing and implementing house gardens. Although these are all activities of a landscape architect they require vastly different skills to perform.

When referring to professional practice advertisements, aspects, skills and services as various as tourism planning, landscape design, impact assessment, environmental database design, wine estate planning, urban design, environmental management planning, plant material procurement, contract documentation, site supervision, resort development, visual impact analysis, landscape rehabilitation and end-use planning of landfills are mentioned. Schools of landscape architecture themselves also differ dramatically in their training bias depending on the specific attributes of their teaching staff. The sub-title of an article in the Landscape Architecture Magazine reflects this; "profiles of six educators testify to the range of skills and specialisations among landscape architecture faculties" (Thompson 1990:58).

The range of skills needed to successfully practice in each of the professions diverse fields is tremendous. Many of the specialisations that were traditionally the domain of landscape architects, such as environmental impact assessment, visual impact assessment and geographical information systems are now in some cases offered as stand alone degrees or diploma's. Because of this diversity most schools of landscape architecture still equip students with a variety of skills. This would explain why many landscape architecture students end up in careers only partially related to landscape architecture. Commenting on the diversification of the career of an architect, Mitgang (1997:127) expresses similar sentiments: "Many students will never design buildings, and so faculty have to be equipped to educate for a variety of careers".

The abovementioned serves to illustrate that the field of landscape architecture is too broad to be successfully dealt with by simply imparting graduates with a plethora of discipline specific knowledge (even in a five-year degree). There have been proposals to shift the education of landscape architects to a generalist – specialist model (following the medical profession) (Miller 1997:86). The intention is that the generalist undergraduate degree undergoes a refining and consolidation of what the core skills actually are that are needed by landscape architects. The accreditation of degrees in landscape architecture in the United States of America has, as a result of the breadth of the profession, become such a problem that the American body, The Landscape Architectural Accreditation Board, is undertaking an extensive study to

determine the core "body of knowledge" for landscape architecture. It is estimated that the study will take three years and be completed during 2004. The intention is to identify the critical components of a sound professional education. Although this begins to address the breadth of the profession, in light of the changing nature of knowledge and society, the period of time for which the findings of the study will be valid remains questionable.

2.3.1 b) The future of the profession

Not only is the content broad, the future of landscape architecture is becoming more and more unpredictable. Meehan (1995) states that this unpredictability is the reason for the inappropriateness of education's bias toward the focus on the transfer of knowledge; "And that focus [on the transfer of knowledge] is the source of much of the present crisis within education as a whole, for at best, it is extremely difficult to say what kinds of information are needed for a speeific job at the present time, and utterly impossible to project information needs a decade or two into the future" Meehan (1995:17).

Bringing this into the context of landscape architecture, Robert Melnick (Dean of Architecture, Planning and Design at University of Oregon) comments on the future; "More and more we [landscape architects] are unsure of what we are getting ourselves into, ..." (Gillette 1997:50). Two other landscape architecture educators also refer to the unpredictability of the future of the profession; "Young professionals will fill markets that do not yet exist." (Miller 1997:66) and "Today's students will be practicing their entire professional careers in another century, dealing with problems that we simply can't conceive of" (Thompson 1990:69). In a dissertation on landscape architecture in South Africa, Murphy (1999:184) states that his most significant finding is that landscape architecture is in an unpredictable state of growth and change.

2.3.1 c) The implications of the nature and future of the profession on skills requirements

The wide breadth and the unpredictable future of the profession presents landscape architectural education with the dilemma of knowing what knowledge, skills and abilities need to be incorporated into the curriculum. Referring back to the generic contemporary workplace (see section 2.4), it seems as though the unpredictability of the work environment is being dealt with by a shift towards non-technical skills. This however gives rise to the question of whether non-technical skills would in fact better equip a landscape architecture graduate to deal with the unpredietability and the broad nature of the profession of landscape architecture.

2.3.2 The value of non-technical skills to the landscape architectural graduate

This section presents the findings from a survey of a range of articles on the training of landscape architects that point to the specific non-technical skills that would be advantageous to a graduate entering the profession. The articles are all chosen from the American publication "Landscape Architecture Magazine", and the British publication "Landscape Design". All references to non-technical skills were recorded.

There is a clear indication that thinking skills are the most highly valued as these quotes demonstrate:
"If we develop students critical thinking abilities they will be able to appraise and resolve, with little initial guidance, many of the issues prevailing in practice" (George Hargreaves in Landscape Architecture Magazine 1998:121).
"Strong analytical thinking and good communication skills continue to be important practical skills of landscape architects" (Patrick Miller in Landscape Architecture Magazine 1998:122).
"They should be able to think, talk and draw, ...- Robert Riley" (Thompson 1990: 65).
"Students need the ability to think, ..." (Kenneth Nakaba in Landscape Architecture Magazine 1998:102).
Even an article from a 1960 conference on instruction in landscape architecture concludes the same; "This is the requisite – to teach a student to think. Encouragement beyond this point is necessary, but developing the students ability to think is paramount." and, "The overriding goal at the intermediate and advanced levels of undergraduate instruction must be to define a way of thinking – a why-to-do-it approach instead of a how-to-do-it approach" (Frasier 1960).

Other non-technical skills mentioned with regularity, are communication, resourcefulness, initiative, entrepreneurial skills and research abilities. The following are all non-technical skills mentioned in the articles investigated:

TABLE 2.1 Non-technical skills sourced from articles

Ability to think and respond on feet	Self-motivate
Critical thinking	Negotiation
Attitude and communication skills	Dispute resolution
Problem solving	Initiative
Communication	Creativity
Listening	Dependability,
Self-starter	Adaptability and flexibility
Independence and lifelong learning capacity	Time management
Resourcefulness	Positive attitude
Entrepreneurial skills	Working as a team member
Be able to anticipate	

Acknowledging the fact that the above are all non-technical skills, it seems as though a shift in the skills acquired by the graduates of a landscape architectural curriculum from subject specific knowledge to non-technical competencies would be to their advantage, according to the educators who contributed to the articles. "Undergraduate programs of landscape architecture are charged with the responsibility of preparing students to enter the profession as well as helping them become educated citizens. To this end an undergraduate landscape architecture program should offer its students an education that effectively balances confidence in professional KSA's (knowledge, skills and abilities) with intellectual challenges that foster inquisitiveness, creativity, and breadth of perspective" (Landscape Architecture Magazine 1998:103).

Many of the abovementioned non-technical skills are referred to within the context of frustrations rising from the breadth and unpredictable future of the profession, thus the numerous references to adaptability, flexibility and entrepreneurial skills.

2.3.3 Conclusion

The investigation into the nature of the profession indicated that the future of the profession is becoming increasingly unpredictable and its scope is exceptionally wide. Non-technical skills are clearly valued skills of a landscape architect.

It is important to recognize that subject specific knowledge will always be necessary to practice as a landscape architect. This is also because non-technical skills cannot be taught in isolation. Landscape architecture curriculum should define the subject specific content as succinctly as they can, but non-technical skills need to be tangibly integrated giving the students the flexibility and adaptability to deal with the breadth and unpredictability of the profession.

The acquisition of non-technical skills will however assist graduates in dealing with the broad spectrum of landscape architecture, as these skills embody the attributes necessary not only for flexibility and adaptability, but also for acquiring new skills (lifelong learning). Educational emphasis, to achieve this, should then be on the skills and attributes that allow graduates entering the profession to successfully explore differing areas of work.

It is important to remember that just as the nature of the profession changes so too may the skills that are considered to be generic or non-technical. The range of skills, attributes and attitudes that are listed in Appendix 1 should be seen only as a contemporary definition of what constitutes non-technical skills. These will no doubt change. What is important to remember as a minimum guideline is that the specific kinds of tasks the landscape architect is or will perform are not so important, it is rather the thinking and attitudinal skills necessary for resolving generic problems that are.

As was stated earlier, the field of landscape architecture is very broad and its future is becoming increasingly unpredictable, thus rendering a curriculum emphasis on subject specific knowledge questionable. This, together with the very real shift in the skills required of graduates entering the general work place, indicate the validity of placing importance on the presence of non-technical skills in a landscape architectural curriculum.

2.4 SKILLS AND THE NEW EDUCATION SYSTEM IN SOUTH AFRICA

South Africa's new education and training framework, The National Qualifications Framework (NQF), deployed under the auspices of the South African Qualifications Authority (SAQA), strongly influences the development and nature of all curricula. "Never before in the history of South African education have academics, students and administrators been challenged to make so many changes in such a short space of time" (Fourie & Hay 2000:196). It is important to understand how the incorporation of non-technical skills is influenced by the NQF.

2.4.1 SAQA and the NQF: The new educational framework for South Africa

The world is continually changing and requires active response from those who wish to remain competitive. "Indeed, the rapid technological advances of the 20th century have placed education systems under extreme pressure as they try to adapt and incorporate these changes in an effort to produce more creative, effective and adaptable people" (SAQA 2000). South Africa's new democratic government, established in 1994, acknowledged that educating for such people demands that South Africa has an education and training system that provides quality learning, is responsive to the ever-changing influences of the external environment and promotes the development of a nation that is committed to lifelong learning (SAQA 2000). The NQF was born out of this need and after nearly two years of planning and development the NQF Bill was passed into law as the South African Qualifications Authority Act (No. 58 of 1995) on 4 October 1995.

In short, the NQF is the set of principles and guidelines by which records of learner achievement are registered to enable national recognition of acquired skills and knowledge, thereby insuring an integrated system that encourages lifelong learning (SAQA 2000).

The reference to lifelong learning is important to this dissertation as it begins to indicate part of the focus required in education. Many of non-technical skills are skills required for lifelong learning.

In order to oversee the development and implementation of the NQF, the South African Qualifications Authority (SAQA) was established. SAQA is a body who's members are appointed by the Ministers of Education and Labour.

Together, SAQA and the NQF have a major influence on curriculum design as, "In addition to the systemic constraints that existed previously, curriculum designers in higher education must now take cognisance of the guidelines and directives issued by the SAQA and the policies embedded in the NQF" (Killen & Spady 1999:201). This is the reason why an understanding of this new education system is vitally important for this dissertation.

2.4.2 SAQA and the NQF use outcomes-based education as the pedagogical system

Education systems all over the world have, as a result of certain changes in society, been experiencing pressure regarding their accountability. In Western society there have been increasing calls for more attention to be paid to the outcomes of education. The rapid spread of outcomes-based education (OBE) is a reaction to these calls (Killen 1999:1). OBE is changing the character of tertiary education internationally and has a major influence on curriculum planning.

A South African document entitled "The National Qualifications Framework (NQF): An Overview", states the following regarding the changes in education and how OBE has become central to these changes: "If South Africa is to take up its place in the global village, it needs to embrace the new vocabulary of which Barnett (1994:71)

speaks: competence and outcomes. Countries in Europe, the Pacific Rim, Australasia, and North America have either adopted or moved in the direction of a national qualifications framework, underwritten by a commitment to outcomes-based education. South Africa cannot afford to ignore these developments." OBE has thus become the focus of major recent changes in the South African education system. Higher education has by no means escaped this transformation process. Acknowledging the extent of the influence of OBE on higher education, De Bruin & de Bruin (1999:129) list OBE as one of the co-determinants of the transformation of higher education in South Africa.

The following reasons are sited by SAQA as to why OBE has formed the foundation of the NQF:

- The qualifications and standards registered on the NQF have to be described in terms of the learning outcomes that the qualifying learner is expected to have demonstrated.
- By focusing on outcomes, the emphasis is on what the learner knows and can do rather than where the learner did his or her studying.
- Global trends and discussions indicate a clear move toward competence and outcomes in education.
- Integration and coherence need to be achieved in the new education system so that access and portability can become a reality. To achieve this it is necessary to clearly articulate the outcomes of the learning achievements.
- The global trend is moving towards describing qualifications in terms of achieved learning outcomes, and the articulation of South African qualifications with their international counterparts is facilitated if our qualifications are described in terms of the learning outcomes.

2.4.3 A definition of outcomes-based education

Because the NQF is so thoroughly entrenched in the principles of OBE, it is important to understand the principles and philosophy behind it as the curriculum development processes formulated in Chapters 4 and 5 should adhere to these principles.

"OBE means clearly focusing and organising everything in an education system around what is essential for all learners to do at the end of the learning experience (Geyser 1999:26)" (Van Wyk 1999:77). Van Wyk (1999) clarifies the implication of this to be:

- Outcomes must drive learning programmes, not the other way round.
- Outcomes must be defined and developed first. Nothing inherently belongs in the programme/curriculum unless it supports the demonstration of a complex outcome.
- Outcomes are about student learning, and student learning comes in at least four categories: content learning (knowledge), competence learning (complex skills), moral learning (values and attitudes), and psychological learning (motivation and relationships).

Within the framework of the above premises, Van Wyk (1999) identifies eight principles that guide design, delivery, documentation and decision-making, around which outcomes-based education can be developed:

- The outcomes-based programme must have a clear focus on significant learning outcomes that are stated clearly and unambiguously.
- These outcomes should be practical, useful, and morally and ethically defensible.
- Curriculum and instructional design are derived from these significant outcomes.
- The outcomes should be challenging, and all students should be expected to achieve them at high performance levels.
- Time should be used as a flexible resource that allows teachers to accommodate differences in student learning rates and aptitudes.
- Students should be given more than one uniform, routine chance to receive instruction and demonstrate their learning.
- Assessment should be an integral component of instruction and should, as far as possible, be authentic (i.e. use real-world situations in which to test applications of knowledge and skills).
- Students should be expected to take some responsibility for their learning

OBE is the educational system utilised by the majority of the educational institutions in this country. This is why the curriculum development proposals in this dissertation are based upon an outcomes based approach. OBE is however inherently advantageous to the incorporation of non-technical skills and satisfies the need landscape architecture graduates have for the skills of adaptability and flexibility (See 2.3.2). "In the outcomes based learning approach there is strong focus on conceptual thinking, problem solving and insight abilities, which is coupled with a strong ability to change and develop" (Olivier 1998:39).

2.4.4 SAQA, the NQF and non-technical skills

With relation to the type of workforce the NQF supports, the characteristic of adaptability seems to be of high priority. The NQF Overview (SAQA 2000) refers to the kind of learner suited to the 21st century as the "flexible generalist". "Flexible generalists are people equipped with the necessary knowledge, skills and values to adjust readily to multiple career changes and make, through their own personal development, a significant contribution to the life of this country and the world." (SAQA 2000) The implication for education is that its focus should not be on developing the ability to do a certain job (i.e. subject/content specific), but on the ability to be employable (i.e. to adapt acquired skills to new working environments).

Curricula designed in accordance with OBE principles have their major focus on outcomes, where the intended student learning outcomes guide all other aspects of the curriculum. The OBE system identifies three kinds of university qualification outcomes; specific outcomes, exit level outcomes and critical outcomes (Van Wyk 1999:78). Specific outcomes are course/module specific, exit level outcomes are program/degree specific, and critical outcomes are broad and generic, and are applicable to all kinds of qualifications. The critical outcomes, or sometimes referred to as developmental outcomes or key competencies, describe the generic

competencies that should give young people the knowledge and practical skills they need for work and their day-to-day lives, that is, the competencies they should possess before entering the labour market.

The SAQA, especially in the light of the ideal of a flexible generalist, have identified the critical outcomes. SAQA defines critical outcomes as follows: "The Critical Cross-field Education and Training Outcomes, commonly known as the Critical Outcomes, are an additional mechanism through which coherence is achieved in the framework. These critical outcomes describe the qualities which the NQF identifies for development in students within the education and training system, regardless of the specific area or content of learning (i.e. those outcomes that are deemed critical for the development of the capacity for lifelong learning). These outcomes are identified to direct the thinking of policy makers, curriculum designers, facilitators of learning as well as the learners themselves" (SAQA 2000). Killen *et al.* stress the importance of critical outcomes: "We also emphasize that what matters in a professional program is that learners achieve the broad, significant outcomes, not just that they master specific bits of isolated knowledge or skills" Killen *et al.* (1999:208). The ideas embedded in these statements (critical outcomes) are meant to provide a focus for all qualifications, and hence need to be addressed in all learning programmes" (Killen *et al.* 1999:202). In South Africa the SAQA has identified a set of seven critical outcomes, as well as five developmental outcomes, which are meant to provide the focus for all qualifications. The critical outcomes are:

- Identify and solve problems in which responses display that responsible decisions using critical and creative thinking have been made.
- Work effectively with others as a member of a team, group, organization, and community.
- Organize and manage oneself and one's activities responsibly and effectively.
- Collect, analyse, organize and critically evaluate information.
- Communicate effectively using visual, mathematical and/or language skills in the modes of oral and/or written presentation.
- Use science and technology effectively and critically, showing responsibility towards the environment and health of others.
- Demonstrate an understanding of the world as a set of related systems by recognizing that problem solving contexts do not exist in isolation.

The developmental outcomes (which contribute to the full personal development of the learner) are:

- Reflect on and explore a variety of strategies to learn more effectively.
- Participate as responsible citizens in the life of local, national and global communities.
- Be culturally and aesthetically sensitive across a range of social contexts.
- Explore educational and career opportunities.
- Developing entrepreneurial opportunities (Killen *et al.* 1999:202).

It is these critical and developmental outcomes that have importance for this dissertation as they embody many non-technical skills. It is important then for

curriculum planners to realise that the successful integration of these outcomes will automatically mean that many non-technical skills would have been addressed.

The degree to which SAQA's critical outcomes include the spectrum of non-technical skills, needs to be assessed in order to understand the importance of the critical outcomes in addressing the lack of non-technical skills.

For this assessment the skills, qualities or abilities mentioned in the critical cross-field and developmental outcomes were identified. The presence of these in the tables in Appendix 1 of non-technical skills is then gauged. The degree to which these are present indicates the degree to which the critical outcomes can be addressed by focussing on non-technical skills.

These are non-technical skills included in the critical and developmental outcomes:

TABLE 2.2 Non-technical skills included in the critical and developmental outcomes

Problem solving	Analysis
Critical thinking	Critical evaluation
Creative thinking	Visual communication
Work as a team member	Oral communication
Responsibility	Written communication
Self-management	Entrepreneurial qualities
Self-organisation	

This is motivation for why so much of the curriculum development process for the incorporation of non-technical skills as proposed in Chapter's 4 and 5, is based on a model for incorporating the critical and developmental outcomes.

2.5 SUMMARY

An investigation into the shift of the skills required of graduates entering the generic contemporary workplace indicates that the demand for non-technical skills is increasing to the stage where certain employers place higher emphasis on non-technical skills than on the subject specific (technical) skills. This shift requires a reaction from tertiary education institutions if they are to remain relevant.

The breadth and the future of the profession argue that a curriculum focus on subject specific knowledge will not necessarily satisfy the demands the breadth and future of the profession place on entering graduates. This is reflected in the analysis of articles on the education of landscape architects which revealed that there is a great deal of emphasis on the value of non-technical skills for landscape architects.

The new education system in South Africa is placing emphasis on the necessity for graduates who are flexible generalists and who have lifelong learning abilities. The incorporation of non-technical skills would go far in developing these qualities. The new education system, which the proposals in this dissertation accept, also requires the incorporation of the critical outcomes. These outcomes include many non-

technical skills. Curriculum design for the incorporation of non-technical skills needs to embrace the critical outcomes.

2.6 CONCLUSIONS

The presence of non-technical skills in the landscape architecture curriculum in South Africa would be of tremendous advantage to graduates entering the profession. These graduates would be better prepared to deal with the changing nature of the landscape architecture profession. Testing the hypothesis reveals that not only incorporating non-technical skills is necessary, but that shifting the skills emphasis to non-technical skills is also required as non-technical skills are important for successfully practicing landscape architecture.

The South African National Qualifications Framework requires the incorporation of the critical outcomes which include many non-technical skills. This facilitates the incorporation of non-technical skills into the landscape architecture curriculum more easily as the action would be endorsed by the education system. It also serves as confirmation that non-technical skills are indeed gaining importance in contemporary curriculum development.

CHAPTER 3 - THE CURRENT SKILLS EMPHASIS IN THE LANDSCAPE ARCHITECTURE PROGRAMMES IN SOUTH AFRICA.

Subproblem 2 - Evaluate the degree to which the landscape architecture curriculum in South Africa addresses non-technical skills.

Subhypothesis 2 - The landscape architecture curriculum in South Africa does not tangibly address the broad spectrum of non-technical skills.

3.1 INTRODUCTION

This chapter evaluates the degree to which programmes in landscape architecture in South Africa are currently addressing non-technical skills. The programmes of the University of Pretoria (UP) and The University of Cape Town (UCT) were chosen for the evaluation, as information is readily available from them. An existing doctoral dissertation which focussed on landscape architecture in South Africa is used to further elaborate on the nature of the skills required of graduates entering the profession.

3.2 METHOD FOR EVALUATING THE UCT AND UP PROGRAMMES

A method needs to be developed in order to evaluate the degree to which the UCT and UP programmes currently address non-technical skills. Such an evaluation will determine whether the demand for non-technical skills as expressed in the previous chapter is being addressed, if at all. The method used to evaluate the programmes comprises of measuring the presence of non-technical skills in the mission statements, goals, objectives and study manuals of the respective programmes.

3.2.1 Resources used to evaluate the programmes

The resources used to provide the information for the evaluation are the accreditation reports prepared by the two universities for the South African Council for the Landscape Architecture Profession (SACLAP) in 2001. These sources were used as they provide the course information in a clear, legible and concise format.

3.2.2 Evaluation approach

The resources were scanned to identify any non-technical skills in terms of the intentions of the programmes or courses thereof to facilitate the learning of non-technical skills. The list used to determine whether a skill mentioned is indeed a non-technical skill is the list of non-technical skills given in Appendix 1. If a skill is mentioned that is not a word/concept used on the reference list but still carries a meaning closely related to a word/concept on the list, then it was included.

The accreditation reports follow the format of questions posed to the universities by SACLAP. The questions are exactly the same for the two reports. The presence of

non-technical skills would most likely be found in the questions dealing with the mission statement / manifesto/ purpose of the programme, the descriptions of the capability level of the students, the course / module goals, objectives and outcomes. Refer to Table 3.1 for the questions identified in the reports as relevant for this dissertation.

3.3 EVALUATING THE PROGRAMMES

3.3.1 The evaluation of the accreditation reports

Table 3.1 on the following page shows the results of the evaluation of the accreditation reports regarding the presence of non-technical skills.

TABLE 3.1 Evaluation of landscape architecture programmes

Question	University of Pretoria	University of Cape Town
1. What is the mission statement / manifesto / purpose of the programme?	Problem solving, communication.	Creativity, imagination, insight and intuition (as capabilities the design course is intended to foster).
2. What is the capability level of the students who are produced in this programme?	Creative thinking, independent thinking.	Communication, work as a team-member, lifelong learning, learning skills, critical and creative thinking (as stated in a list of SAQA's critical cross-field outcomes)
6. Describe the aim of each academic year and content of the course.	1st yr: Critically evaluate problems (concerning design), thinking skills. 2nd yr: None 3rd yr: None	Conversion yr: Problem-solving (in relation to small-scale design projects) 1st yr: Analytical skills 2nd yr: None
7. List each course/module title in the curriculum with a brief description and explain the objective of the ability/skill the student should acquire through each module. Do they comply with the SAQA standards and NQF levels?	Only 6 out of 40 courses made mention of non-technical skills. The skills were; Receptive skills (listening and reading), productive skills (speaking and writing), interpretation, criticism, imagination, intuition and conceptual thinking, solving problems.	None
11. Describe the school's teaching methods for each module and design studio, including the use of visiting lecturers / critics etc.	None	Communication skills (oral, written and graphic).

3.3.2 Observations

- Statements such as "the skills necessary for design" are often made. There are a lot of non-technical skills used in the design process, but the extent to which they are addressed and the success of the facilitation of the learning thereof is difficult to measure.
- Although there seems to be presence of non-technical skills in some of the broader goals, they are not present in the detail descriptions of the courses.
- The design assignments would probably not have non-technical skills in if the course objectives do not.

3.4 AN INVESTIGATION OF LANDSCAPE ARCHITECTURE IN SOUTH AFRICA

Murphy's (1999) doctoral study, entitled "Investigation of a process for developing a culturally and geographically relevant curriculum for landscape architecture education in South Africa", provides a number of insights regarding the nature of the profession from which we can draw certain conclusions regarding the incorporation of non-technical skills

The study investigates the state of the profession of landscape architecture in South Africa and measures the effectiveness of the curriculum of the then only landscape architecture department in the country, the University of Pretoria.

3.4.1 General observations

The following is a series of observations (following the direct quotes) from Murphy (1999) regarding aspects that have implications for this dissertation:

- "Furthermore, the requirement to continually master expanding knowledge and technology suggests that the requirement for self learning would be one of the most valuable aspects of an improved curriculum." (Murphy 1999:183)
  "For this reason it is considered important that professional education and training become more focussed on continual systematic learning and to be more opportunistically creative than to maintain the traditional focus on education to improve competency in the practise-based procedures and methods of the past." (Murphy 1999:102)

Frequent reference is made to the value of lifelong learning and the importance thereof for providing graduates with the ability to deal with the rapidly changing practice environment of landscape architecture. Lifelong learning as an ability is enabled by many of non-technical skills because of their cross-discipline applicability. Incorporating non-technical skills will improve the student's lifelong learning capacity. The study also acknowledges the changing nature of the profession.

- "In addition to a strong systems management and science base to their education, students should receive training to develop their creative aptitudes" (Murphy 1999:103).

The creative thinking skills play an important role in non-technical skills and encapsulate many of the other non-technical skills. Through the incorporation of certain non-technical skills the graduates creative thinking skills would improve.

- "In time when the prospect of continual change appears to be the most likely constant of contemporary life, establishing learning as a perpetual discovery process would appear to be a prerequisite for both a successful profession and a successful education curriculum. This finding has important implications to the nature of the future educational programme; providing basic professional training at an undergraduate level will no longer be adequate to meet the evolving educational demands of the profession. The findings also suggest that the success in practice will be based as much on effective communication and management as on design and technical training. These are important considerations to the development of an effective curriculum in the future" (Murphy 1999:165).

It is clear that tertiary education institutions need to do a whole lot more than focussing on the basic professional training. Murphy suggests that effective communication and management are vitally important for success in practice. Communication and management are two non-technical skill clusters.

3.4.2 Observations regarding the hypotheses of the study

Murphy (1999) concludes with four major areas of weakness regarding the effectiveness and appropriateness of professional education and training in landscape architecture at the University of Pretoria. Two of these weaknesses carry implications for the possible incorporation of non-technical skills and are commented upon.

- "Second, in correspondence with this rating of general programme effectiveness, respondents [to a survey sent to practitioners] also expressed the belief that a number of emerging areas of educational content are receiving insufficient priority in the current programme" (Murphy 1999:182).

The emerging areas referred to are areas of technology and knowledge that only recently have been either available or actively employed in practice. The list identifies 35 emerging areas. Two thirds of the respondents indicated that their practices included one or more areas of speciality.

Murphy (1999:183) states that the main conclusion from the findings regarding emerging areas is that landscape architecture is becoming a highly diversified and dynamic service profession, moving into a wide range of practice areas. He further indicates (Murphy 1999:156) that the university would more than likely not consider it appropriate to devote the resources or the time to develop comprehensive expertise in all or even most of these emerging knowledge areas in an undergraduate

programme of study. This is the same conclusion drawn earlier in the dissertation. The question that again arises is, what does a tertiary institution do with such a wide professional spectrum and unpredictable future?

By incorporating non-technical skills into a landscape architecture curriculum, the potential is created for facilitating the development of the qualities of flexibility and adaptability. The non-technical skills that would support the development of adaptability and flexibility would be creative thinking, problem solving, willingness to learn, take risks and to be open-minded. These are the qualities graduates require to deal with a broad and changing professional environment.

- "Third, the tasks practitioners are most likely to perform are not those for which graduates are best prepared by the current programme. Training in the traditional practice-orientated areas alone does not prepare graduates for the dynamic and highly diversified nature of contemporary professional practice"(Murphy 1999:183).

Meeting with clients was cited as the single most frequent activity practitioners engage in. Communication and management activities were sited as the most frequent tasks engaged in and included, client meetings, site supervision, co-ordinating consultants, estimating work requirements, production drawing, proposal writing, managing office staff and managing office finances.

Communication and management aspects as stated above rely heavily on the non-technical skills for their successful completion. Communication and information management are themselves two of the functional skills clusters (See Appendix 1). Many of the skills under the communication cluster are skills that would be beneficial to performing the tasks mentioned, such as listening, negotiation, demonstration, instruction, explanation and meeting procedure. Under the information management cluster, skills such as organisation, scheduling, prioritising and research and reporting would also be beneficial.

3.5 SUMMARY

The investigation into the landscape architecture curriculum in South Africa revealed that very little attention is currently being paid to the tangible incorporation of non-technical skills into landscape architecture curricula on the level of course goals, mission statements and objectives.

The study into the profession of landscape architecture in South Africa revealed that the programme at the University of Pretoria is not adequately preparing the graduates for the world of professional practice (Murphy 1999:183). The diverse (broad) nature of the services rendered by a landscape architect is cited as one of the reasons for this. The study mentions lifelong learning, communication, management and creativity skills as being important skills required of the graduate entering the profession.

3.6 CONCLUSIONS

The landscape architecture curriculum in South Africa does not presently address non-technical skills in a tangible way on the level of course goals, mission statements and objectives. This does not however indicate that non-technical skills are not being addressed at all. The studio culture in landscape architecture is of such a nature that certain of the non-technical skills are required to successfully complete the assignments. However, because of the poor presence of the non-technical skills in course goals, mission statements and objectives, it can be concluded that those that are addressed are done so serendipitously. The broad spectrum of non-technical skills important for landscape architects would not be successfully covered in this manner.

The absence of non-technical skills in course goals, mission statements and objectives also indicates that the process of deconstructing non-technical skills into their supportive cognitive skills for the purposes of learning facilitation is more than likely not taking place. This is significant as investigating the nature of a non-technical skill is often a requirement for facilitating the learning thereof.

The study on landscape architecture in South Africa undertaken by Murphy (1999) concludes that the incorporation of certain non-technical skills needs to be a priority in curriculum design.

Professional bodies such as the South African Council for the Landscape Architectural Professions should provide continual development courses to private practitioners which address certain of the skills not addressed in the university curricula.

CHAPTER 4 - CURRICULUM DESIGN IN LANDSCAPE ARCHITECTURE FOR INCORPORATING NON-TECHNICAL SKILLS

Subproblem 3 - Develop a curriculum design process which ensures that non-technical skills are tangibly incorporated into a landscape architecture curriculum.

Subhypothesis 3 - A curriculum design process can be developed to ensure that non-technical skills are tangibly incorporated into a landscape architecture curriculum.

4.1 INTRODUCTION

This chapter proposes a curriculum design process which ensures that non-technical skills are tangibly incorporated into a landscape architecture curriculum.

The importance of tangibly incorporating non-technical skills across all curriculum levels is first discussed, followed by an elaboration upon some of the negative perceptions associated with their incorporation. A curriculum development process is then developed in accordance with the principles of outcomes based education (OBE). Three sources on the subject of developing an OBE curriculum are combined to form a process which specifically facilitates the incorporation non-technical skills. Critical thinking is then used as an example of a non-technical skill and how the application of the process to landscape architecture would work. This illustrates the way in which non-technical skills are tangibly incorporated into a landscape architectural curriculum design.

4.2 DEPARTURE POINT

4.2.1 The importance of tangibly incorporating non-technical skills

In order to ensure that the facilitation of the learning of non-technical skills is indeed achieved, these skills need to be incorporated in a very tangible manner across all curriculum phases and levels. This implies that they need to form part of all the stages of the curriculum design and delivery process. Non-technical skills need to be present at all outcome levels; degree, course, and study unit level, as well as assignment, activity and task level.

4.2.2 Problems associated with the incorporation of non-technical skills

The following is a list of concerns and difficulties typically associated with the incorporation of non-technical skills. These are mostly concerns that would be voiced by lecturers facing the task of incorporating these skills. If the incorporation of non-technical skills is not approached in the correct manner, many of these concerns may in fact realise. All can be avoided if the correct approach is followed. Each concern or difficulty is followed by a comment regarding the implication thereof for developing a process for incorporating non-technical skills.

4.2.2 a) Content vs. outcomes-based curriculum design approaches

The last decade has seen a dramatic change in curricula design. Curricula design at higher education institutions has traditionally been a content-based approach. "The content based curriculum reflects the corpus of knowledge, which must be covered in a limited time span. The learning process is therefore content and time driven and not learner and achievement driven" (Olivier 1998:32). "These syllabi (content based developed curriculum) are rigidly developed and are non-negotiable and almost no room is allowed for learner creativity, problem-solving, innovation and cross-curricular enrichment in order to achieve outcomes"(Olivier 1998:32). It is precisely the flexibility of educational environments which allow for creativity, innovation and using a problem-solving approach where non-technical skills are most easily incorporated. It is thus difficult for curriculum designers who are still working in a content-based mode to easily incorporate non-technical skills. Working with OBE, specifically within the SAQA environment, forces the curriculum designer to take a broader view of the skills education needs to impart bringing about the incorporation of non-technical skills into curricula more easily.

The process for incorporating non-technical skills should then start with the subject specific content and non-technical skills as the desired outcomes and then design backwards from there.

4.2.2 b) Intangibility of non-technical skills

Non-technical skills have often been perceived as being difficult to teach due to their intangibility. Because they are primarily attitudinal or of the affective domain, lecturers feel that they have little influence over a students development of these skills. Lecturers are often of the opinion that a student either "has" the ability to perform the majority of non-technical skills or does not. The critical outcomes as specified by SAQA are themselves the embodiment of a wide number of non-technical skills. SAQA however does not provide guidelines as to the facilitation of the learning thereof, which leaves lecturers without guidance.

The approach followed in this dissertation for the facilitation of the learning of critical thinking (see Chapter 4, section 4.4) is a proposal for how to deal with what is essentially the perceived intangibility of non-technical skills. This approach requires the deconstruction of a non-technical skill into its building blocks or supportive cognitive skills. This can be done for most non-technical skills. Once this is done the lecturer, equipped with a better understanding of the skill, can more easily facilitate the learning thereof. The process for the incorporation of non-technical skills thus needs to facilitate the identification of the enabling abilities (building blocks) of non-technical skills.

4.2.2 c) Broad nature of non-technical skills

Non-technical skills encompass an extremely wide range of issues. This may "paralyse" certain lecturers as they see the task of facilitating the learning thereof as being too comprehensive.

The process for incorporating non-technical skills must accommodate the wide range of these skills without compromising the quantity or quality of the subject specific content.

4.2.2 d) The perceived unimportance of non-technical skills

The degree to which non-technical skills are perceived as being important varies, after all, most curricula have existed without the tangible presence of non-technical skills. There is bound to be resistance to the idea of the incorporation of non-technical skills. This resistance would mostly find its nexus in the perception that certain traditional course content will have to be removed to make way for non-technical skills.

4.2.2 e) The perceived increase in course content that results from including non-technical skills

It is important to take note that the critical outcomes should not be seen as an addition to the existing curriculum content which is taught in isolation thereof. The learning of non-technical skills cannot be facilitated in an absence of subject specific content, but is incorporated into the curriculum by managing and presenting the existing content in a specific manner.

The process for incorporating non-technical skills must be of such a nature that it does not unnecessarily increase the course content.

4.3 GENERATING A CURRICULUM DEVELOPMENT PROCESS FOR INCORPORATING NON-TECHNICAL SKILLS

A curriculum development process is generated and then applied as an example of how to incorporate the skill of critical thinking into a landscape architectural curriculum. Outcomes based education is the instructional planning approach which the NQF and most tertiary education institutions have embraced and will thus form the basis for the process generated. In this study the method followed in generating a curriculum development process was to refer to various sources addressing aspects on OBE curriculum development and to consolidate them into a process which specifically addresses the incorporation of non-technical skills.

Three specific sources were referred to in developing the process. These were specifically chosen as they either deal with developing a curriculum according to OBE principles in a practical manner or are specifically suited to the incorporation of non-technical skills. The sources chosen are:

1. Engelbrecht, du Preez, Rheeder and Van Wyk's (2001) practical implementation of the OBE process to change an existing curriculum into an OBE curriculum,
2. The attributes of a OBE curriculum development process as in Olivier (1998:54), and
3. Killen *et al.*'s (1999:204) model for incorporating the critical outcomes into curricula.

A curriculum development process specifically suitable to the incorporation of non-technical skills is constructed by firstly referring to the practical application of the OBE curriculum development process. Certain principles are then identified, and used to refine the process, that need to be adhered to in order to remain true to the essence of an outcomes based approach. Finally, a model proposed by Killen *et al.* (1999:204) to incorporate the critical outcomes in curriculum design, ensures that the wide scope of non-technical skills is acknowledged and their enabling abilities are identified.

The OBE curriculum development process starts from the intended outcomes of a learning programme. These outcomes are to be achieved by a learner at the point at which he or she leaves the programme and are known as exit level outcomes. "The outcomes based approach implies designing back from where you want to end or what you want to achieve" (Olivier 1998:31).

4.3.1 Engelbrecht's (2001) practical implementation of the OBE curriculum development process

Engelbrecht *et a.l* (2001:109) proposed a process for changing a knowledge based qualification into an outcomes-based qualification and then practically applied it to a Bachelor of Technology Policing qualification. This provides a very practical step-by-step process for developing a curriculum.

Step 1: Formulate activities/tasks

Step 2: Cluster the activities into broad learning areas

Step 3: Formulate an exit level outcome for each cluster of activities/tasks

Step 4: Formulate a purpose statement for the qualification

Step 5: Formulate 4-6 specific outcomes for each exit level outcome

Step 6: Formulate assessment criteria for each specific outcome

These steps can be used as the basis for generating a curriculum development process for incorporating non-technical skills.

4.3.2 Olivier's theory of the OBE curriculum development process

According to Olivier (1998:54) the OBE curriculum development process should adhere to the following overarching attributes. Certain of these attributes will be used to supplement our understanding of the steps in Engelbrecht *et a.l*'s (2001:109) process.

1. **Execute a job/learnership/unit standard analysis;**
2. Formulate and align course titles to NQF levels and to overall career paths and outcomes;
3. **Formulate the overall outcome of a course and align it with the course title and outcomes;**

4. **Establish comparable sized outcomes at the same pitching level aligned with the course title and pitching level of the outcomes;**
5. **Establish supportive tasks (sub-outcomes) at equal pitching levels;**
6. Sequence tasks, if necessary;
7. **List knowledge, skills and processes at various pitching levels which are needed to achieve the outcomes;**
8. Establish entry level requirements;
9. Develop assessment criteria;
10. Develop performance indicators;
11. Develop methods to assess performances, e.g., tests, observing;
12. **Develop training and learning strategies;**
13. **Develop tuition guidelines;**
14. **Develop learning guidelines**
15. Provide the training;
16. Evaluate the outcomes of students according to outcomes and accompanying assessment criteria;
17. Evaluate overarching process as well as the individual steps;
18. Rectify according to assessment outcome.

The above attributes which are highlighted, are of direct relevance to this curriculum development process. These are identified as they are attributes critical for successfully incorporating non-technical skills into a curriculum. This is the case as it is here where when the curriculum developers are identifying the outcomes of the course and non-technical skills must be tangibly present here. Only certain of these attributes are identified from Olivier's (1998:54) list as this dissertation deals with the incorporation of non-technical skills and, for example, not the assessment thereof (which is why i, j and k from above are not included). The reader is reminded that this portion of the dissertation is not about implementing the full OBE curriculum development process but about incorporating non-technical skills and the attributes identified are those applicable to this process.

4.3.3 A model for incorporating the SAQA critical outcomes

A model for curriculum design as proposed by Killen *et al.* (1999:204) is used to further enrich the process of incorporating non-technical skills. The model is specifically developed to incorporate the critical outcomes in curriculum design. It provides a framework that allows the critical outcomes to guide curriculum development. As was concluded in earlier, it is important to note that, although the model centres around the critical outcomes and not non-technical skills as such, the critical outcomes satisfactorily embrace non-technical skills.

TABLE 4.1 OBE curriculum design matrix (Killen *et al.* 1999:204)

ENABLING ABILITIES		LIFE ROLES				
		Career	**Entrepreneurial (12)**	**Civic (6&9)**	**Personal (3)**	**Learner (11)**
Essential Knowledge	Specific					
	General					
Technical Skills	Specific (8)					
	General (1,4)					
Interpersonal Skills	Relations (2)					
	Communications (5)					
Management Skills	Self (3)					
	People (6)					
	Things (9)					
Professionalism	Core Values					
	Principles of Professionalism					
Life Orientation	Systems Thinking (7)					
	Cultural Sensitivity (10)					
Exit Level Outcomes		**Total career performance**	**Total career performance**	**Total career performance**	**Total career performance**	**Total career performance**

The above matrix is structured around the critical and developmental outcomes, but also includes some necessary elements that are not embedded directly in the critical outcome framework, such as the career life role. Refer to the numbers given to the critical and developmental outcomes in Chapter 2, as these correlate with those in Table 4.1. The Life Roles describe the fundamental life responsibilities of a learner. The spaces in the table describe the skills, knowledge and values essential to successfully perform the life roles. Collectively the skills, knowledge and values of a particular column in the matrix describe the exit level outcomes for a particular life role, and those for all the roles form the Exit Level Outcomes for the whole programme.

It is important to note that the term 'Technical Skills', as used under the enabling abilities column, has a different definition in this context as opposed to the context of this dissertation. Under technical skills Killen *et al.* (1999:204) have included general and specific skills. The critical outcomes of problem / information based decision-making and effective learning strategies / metacognition are included here. The non-technical skill of critical thinking will also be accommodated under this column. This table guides curriculum planners to include non-technical skills appropriate to their programme.

4.3.4 Identifying the enabling abilities

The exit level outcomes defined above describe the final outcomes of the programme. The enabling abilities need now be identified so as to facilitate structuring the learning experiences for each of the skills, knowledge and values identified in Table 4.1. "There is little use in defining the outcomes of a programme, if you cannot design a structured set of learning experiences to help the students achieve those outcomes. This cannot be done unless you describe the ways in which students typically construct the understanding and develop the skills that will ultimately enable them to

achieve the programme outcomes" (Killen *et al.* 1999:206). These "ways" become the enabling abilities. They are identified from entry-level abilities (entry into the programme) through to the penultimate enabling abilities (penultimate to the Exit Level Outcomes). The following framework sets out the process for identifying the enabling abilities (See 4.4.3 a and 4.4.3 b for examples of enabling abilities).

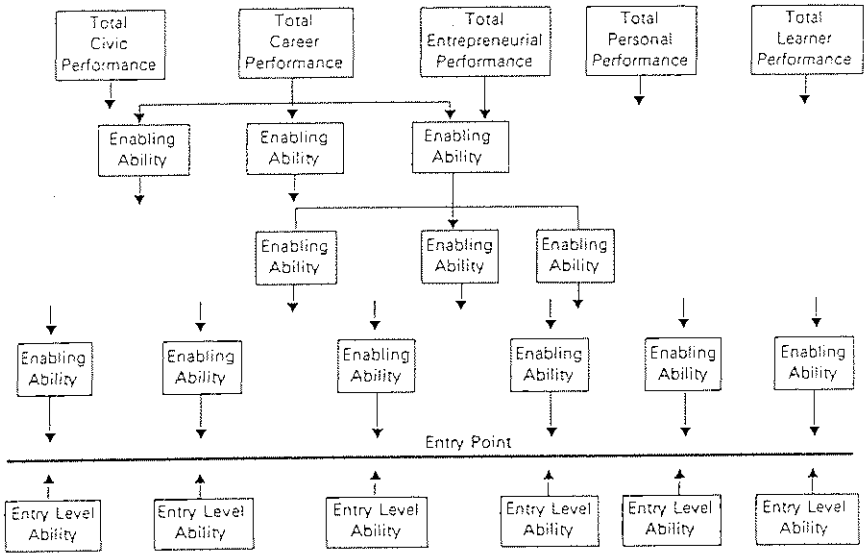

FIGURE 4.1 A framework for identifying the enabling abilities (Killen *et al.* 1999:207)

4.3.5 A curriculum development process for incorporating non-technical skills

Engelbrecht *et al.* (2001), Olivier (1998) and Killen *et al.* (1999) guidelines for developing an OBE curriculum are now combined to generate the following process for developing a curriculum to specifically incorporate non-technical skills.

Step 1: Formulate activities/tasks (Execute a job / unit standard analysis)

Step 2: Apply the model for incorporating the critical outcomes (List knowledge, skills and processes at various pitching levels which are needed to achieve the outcomes)

Step 3: Cluster the activities / tasks into broad learning areas

Step 4: Formulate an exit level outcome for each cluster of activities/tasks (Establish comparable sized outcomes at the same pitching level aligned with the course title and pitching level of the outcomes)

Step 5: Formulate a purpose statement for the qualification (Formulate the overall outcome of a course and align it with the course title and outcomes)

Step 6: Formulate 4-6 specific outcomes for each exit level outcome (Establish supportive tasks (sub-outcomes) at equal pitching levels)

Step 7: Identify courses and modules to facilitate the specific outcomes

Step 8: Develop learning experiences (assignments/tasks) to achieve the specific outcomes (Develop training and learning strategies, tuition and learning guidelines)

Observations and comments on the above:

- Olivier's (1998) overarching attributes to which an OBE curriculum should adhere, are written in brackets and are used to enrich the meaning of the activity the step should embrace. All those identified as being important for the incorporation of non-technical skills have been added to a particular step.
- Killen *et al.*'s (1999:204) model has been added as step 2. This is done to ensure that all non-technical skills and their associated enabling abilities are incorporated from the start of the curriculum development process.
- Step 6 of Engelbrecht *et al.*'s (2001:109) original process has been left out as this dissertation does not address assessment criteria.
- Step 8 is added as this is where the facilitation of the learning of non-technical skills takes place and is the important final step in tangibly and completely integrating non-technical skills.

4.4 APPLYING THE PROCESS TO A LANDSCAPE ARCHITECTURE CURRICULUM

4.4.1 Approach

It is not the intention of this dissertation to identify all the exit level outcomes, enabling abilities and learning experiences needed to complete the landscape architecture programme. The focus of this dissertation is on non-technical skills and how they are incorporated into the curriculum. The non-technical skill of critical thinking has been identified to serve as the example for how to apply the above process. This skill has been identified in Chapter 2 as being vitally important to landscape architecture as well as the generic work place.

4.4.2 Step 1: Formulate activities and the required non-technical skills (Execute a job / unit standard analysis)

The question "What should a person who has completed this level of qualification be doing when observed during the execution of his/her tasks?", is addressed in this phase: Using critical thinking to resolve site design and site planning issues.

These activities are sourced from Murphy (1999:116) as part of a list of routine office tasks for all landscape architectural public practitioners. It is important to note that technical (subject specific) and non-technical skills are used as the departure point.

4.4.3 Step 2: Apply the model for incorporating the critical outcomes to define necessary skills and their enabling abilities (List knowledge, skills and processes at various pitching levels which are needed to achieve the outcomes)

The skill of critical thinking is now filled in at the appropriate place on Table 4.2. As illustrated in section 4.3.4, the enabling abilities now need to be identified for critical thinking.

The enabling abilities are derived from an inquiry into what constitutes critical thinking. Once the skill of critical thinking can be deconstructed into a range of building blocks or supportive cognitive and affective skills, the enabling abilities can be identified. Two processes were followed to identify these enabling abilities.

- Analysing a range of definitions of critical thinking and deducing the enabling abilities from those;
- Identifying the enabling abilities from a taxonomy of critical thinking dispositions and abilities.

4.4.3 a) Definitions of critical thinking:

"Some educators (Beyer 1988; Halpern 1989; Freeley 1993; Paul 1993) who follow a cognitive skill approach maintain that there are general cognitive skills learners can acquire which would equip them with the necessary traits to become critical thinkers" (Van Den Berg 2000:97). The following definitions of critical thinking begin to lead us to these traits / skills which then become the building blocks for critical thinking.

Diane Halpern describes critical thinking as: "the use of those cognitive skills or strategies that increase the probability of a desirable outcome. It is used to describe thinking that is purposeful, reasoned and goal directed – the kind of thinking involved in solving problems, formulating inferences, calculating likelihood's, and making decisions when the thinker is using skills that are thoughtful and effective for the particular context and type of thinking task" (cited in Van Den Berg 2000:97).

According to John Chaffee critical thinking involves: "a variety of interacting cognitive activities which include solving problems and making informed decisions, discussing subjects in an organised way, developing evidence and arguments to support views, critically evaluating the logic and validity of information, applying knowledge to various contexts and new circumstances and exploring issues from multiple perspectives" (cited in Van Den Berg 2000:97).

Austin Freeley defines critical thinking as involving the ability to: "analyse, criticize and advocate ideas, to reason inductively and deductively, and to reach factual or judgemental conclusions based on sound inferences drawn from unambiguous statements of knowledge or belief" (cited in Van Den Berg 2000:97).

Richard Paul, feels that critical thinking is: "the intellectually disciplined process of actively and skilfully conceptualising, applying, analysing, synthesising and for evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action" (cited in Van Den Berg 2000:97).

These definitions bring us to the following list of enabling abilities or supportive cognitive skills. The list is arranged successively from entry-level abilities to penultimate enabling abilities according to Figure 4.1.

Observation
Questioning
Interpretation
Problem analysis
Precise, persistent, objective analysis
Making decisions
Purposeful thinking
Reasoned thinking
Brainstorming
Goal directed thinking
Inductive reasoning
Deductive reasoning
Integration
Formulation
Innovation
Conceptualisation
Forecasting
Calculating likelihood's
Anticipate
Facilitative

These enabling abilities then need to be incorporated across the curriculum and will facilitate the development of the non-technical skill of critical thinking.

4.4.3 b) A taxonomy of critical thinking dispositions and abilities

According to Ennis (1987:9), the process of critical thinking can be broken down into a set of critical thinking dispositions, three basic areas of critical thinking ability, and an area of strategic and tactical ability in employing critical thinking.

The dispositions

- Seek a clear statement of the thesis or question
- Seek reasons
- Try to be well informed
- Use and mention credible sources
- Take into account the total situation
- Try to remain relevant to the main point
- Keep in mind the original and / or basic concern
- Look for alternatives
- Be open-minded
    - Consider seriously other points of view than one's own
    - Reason from premises with which one disagrees – without letting the disagreement interfere with ones reasoning
    - Withhold judgement when the evidence and reasons are insufficient

- Take a position (and change a position) when the evidence and reasons are sufficient to do so
- Seek as much precision as the subject permits
- Deal in an orderly manner with the parts of a complex whole
- Use one's critical thinking abilities
- Be sensitive to the feelings, level of knowledge, and degree of sophistication of others

The abilities

- Clarity ("We want to be clear about what is going on.")
  - Focusing on a question - Questions, hypotheses or theses are identified.
  - Analysing arguments
  - Asking questions
- Basis ("We want to have a reasonable basis for a judgement.")
  - Judging credibility
  - Observing
- Inference (We want the resultant inferring to be reasonable.")
  - Deducing – Whether something follows necessarily from something else.
  - Inducing – Generalizing and inferring to hypotheses that are supposed to explain the facts.
  - Making value judgements
- Interacting with others

These enabling abilities are then included in the assignment and task design in step 8 which is dealt with in detail in 4.4.9.

4.4.4 Step 3: Cluster the activities and or non-technical skills into broad learning areas

The non-technical skill of critical thinking can be grouped into a learning area identified as thinking skills. Other thinking skills such as problem solving can also be grouped into this cluster. If the non-technical skill is seen as being extremely important to the programme and is broad in nature, it can remain isolated and not clustered with other skills. Taking the importance of critical thinking in landscape architecture into account as was discovered in Chapter 2, critical thinking in this dissertation will not be clustered with other skills.

4.4.5 Step 4: Formulate an exit level outcome for each cluster of activities or non-technical skill

The exit level outcome for critical thinking would be (which is added to Table 4.2):

The graduate is competent to:

Identify, assess, formulate and resolve landscape architectural problems by using critical thinking.

TABLE 4.2 Critical thinking added to the matrix

ENABLING ABILITIES (Skills, knowledge, values)		LIFE ROLES				
		Career	**Entrepreneurial (12)**	**Civic (6&9)**	**Personal (3)**	**Learner (11)**
Essential Knowledge	Specific					
	General					
Technical Skills	Specific (5)					
	General (1,5,4,8)	Critical thinking:				
Interpersonal Skills	Relations (2,5)					
	Communications (2,5)					
Management Skills	Self					
	People (2,5)					
	Things					
Professionalism	Core Values					
	Principles of Professionalism					
Life Orientation	Systems Thinking (7)					
	Cultural Sensitivity (10)					
Exit Level Outcomes		**Total career performance** 1. Identify, assess, formulate and resolve landscape architectural problems by using critical thinking	**Total career performance**	**Total career performance**	**Total career performance**	**Total career performance**

Upon completing the matrix, the technical and non-technical skills required to achieve all the exit level outcomes for a programme in landscape architecture would have been identified. Because the critical and developmental outcomes are so well represented in the matrix, the exit level outcomes identified should automatically embody these outcomes. "Exit level outcomes should strive for the fulfilment of most, if not all, the twelve critical outcomes." (Van Wyk 1999:79). Because the critical outcomes embody so many non-technical skills, the majority of them would be present on completing the table.

4.4.6 Step 5: Formulate a purpose statement for the qualification

The purpose statement is the overall competence that must be demonstrated by the learner and must include the context in which the demonstration will take place:

To provide an academic programme that integrates environmental, social, technical and legal knowledge and skill in landscape planning, design and construction and to prepare each student for entry level (landscape technician) into the profession of landscape architecture.

4.4.7 Step 6: Formulate 4-6 specific outcomes for each exit level outcome

The specific outcomes for critical thinking are derived from the definitions and taxonomy of critical thinking discussed earlier.

Exit level outcome: Using critical thinking to identify, assess, formulate and resolve landscape architectural problems.

Specific outcome 1: To be able to observe, question and interpret aspects and information as supportive cognitive skills in the early stages of critical thinking.

Specific outcome 2: To be able to strive for a clear statement of the thesis or question, be well informed and use and mention credible sources as supportive dispositions in the early stages of critical thinking.

Specific outcome 3: To be able to brainstorm, innovate and conceptualise as supportive cognitive skills in the advanced stages of critical thinking.

Specific outcome 4: To be able to deal in an orderly manner with the parts of a complex whole as supportive dispositions in the advanced stages of critical thinking.

4.4.8 Step 7: Identify courses and modules to facilitate the specific outcomes

Once all the information is filled in on Table 4.2 and the exit level and specific outcomes have been identified, courses and modules need to be identified within which these outcomes can be suitably addressed. The discipline-specific content must be matched with non-technical skills according to how successfully the discipline specific content can function as a vehicle to facilitate the learning experiences. Matching the subject specific with non-technical skills is important to avoid unnecessary increase in the course content.

The following is an example of an extract from a landscape design study manual within which specific outcomes dealing with critical thinking have been incorporated. The specific outcome of critical thinking forms one of the syllabus themes and is thus a tangible part of the course.

SUBJECT COURSE STRUCTURE

INTRODUCTION TO LANDSCAPE DESIGN

Syllabus Theme 1 – LANDSCAPE DESIGN PROCESS

Objective: To comprehend and apply the components of the landscape design process (LPS) to each project as is appropriate.

Specific Outcomes:

- Be able to apply the LPS to a project in order to achieve a well thought through, logical and creative product
- To comprehend and be able to apply each of the different activities and actions within the LPS to design projects

Study Units:

1.1 Pre-design activity
1.2 Core design activity
1.3 Design development and presentation

Syllabus Theme 2 – LANDSCAPE DESIGN PRINCIPLES

Objective: To comprehend and apply principles, purpose and vision to design projects.

Specific Outcome:

- Be able to apply principles, purpose and vision to achieve quality, justifiable landscape designs

Study Units:

2.1 Landscape design purpose / intention / vision
2.2 Spatial definition
2.3 Relating to architecture
2.4 Spaces to elicit specific responses
2.5 Design elements and principles

Syllabus Theme 3 – CRITICAL THINKING

Objective: An introduction to critical thinking

Specific Outcome:

- To be able to observe, question and interprate aspects and information as supportive cognitive skills in the early stages of critical thinking.

2.1 Landscape observation
2.2 Take a new look at landscape

FIGURE 4.2 Extract from study guide (Hindes 2002)

Step 7 concludes the curriculum development phase of incorporating non-technical skills. If these above steps are adhered to then the non-technical skills will have been tangibly integrated into the curriculum.

4.4.9 Step 8: Develop learning experiences (assignments/tasks) to achieve the specific outcomes

This step deals with curriculum delivery in the form of appropriate learning facilitation. This is the subject of Chapter 5.

4.5 SUMMARY

A process for incorporating non-technical skills into a curriculum has been developed using various sources on the development of curricula according to OBE principles. The process is sensitive to the concerns frequently raised regarding the incorporation of non-technical skills. The process allows non-technical skills to be tangibly incorporated into a curriculum across all outcomes levels. The identification of the enabling abilities of non-technical skills is achieved with the application of a model for incorporating critical outcomes into curricula. The process was then applied by way of example to achieve the incorporation of critical thinking into a landscape architectural curriculum. The process is concluded with an example study guide, illustrating the tangible presence of non-technical skills on the study guide.

4.6 CONCLUSIONS

A process can be followed which facilitates the tangible incorporation of required non-technical skills into a curriculum without unnecessarily increasing the content load. One important requirement for the process to be successful is the development of enabling abilities or supportive cognitive skills of non-technical skills. These abilities give the lecturer a deeper understanding of the skill and assist the lecturer in the facilitation of the learning thereof.

CHAPTER 5 - FACILITATING THE LEARNING OF NON-TECHNICAL SKILLS IN LANDSCAPE ARCHITECTURE

Subproblem 4 - Develop a framework for facilitating the learning of non-technical skills suitable for a landscape architecture curriculum.

Subhypothesis 4 - A framework for facilitating the learning of non-technical skills suitable for a landscape architecture curriculum can be developed.

5.1 INTRODUCTION

Chapter 4 identified a curriculum design process that specifically facilitates the tangible incorporation of non-technical skills. This is however only part of what ultimately determines the success of the facilitation of the learning of non-technical skills. The creation of the framework for the facilitation of learning and the presentation of the learning tasks is also vitally important and is the goal of this chapter. "An excellent learning task in theory might fail dismally in practice because of its presentation" (Slabbert 1990:123).

This chapter first investigates the learning environment of a typical landscape architecture programme as the departure point for identifying a suitable framework. A framework for generally facilitating the learning of non-technical skills in landscape architecture is identified and explained. Facilitating the learning of a specific non-technical skill is then elaborated upon. The chapter concludes with a discussion of the implications systems thinking has on the facilitation of the learning of non-technical skills.

5.2 THE LEARNING ENVIRONMENT OF LANDSCAPE ARCHITECTURE

In order to identify an appropriate framework for facilitating the learning of non-technical skills in landscape architecture the typical learning environment in landscape architecture programmes needs to be investigated.

5.2.1 The typical learning environment of landscape architecture schools

Programmes in landscape architecture are characterised by a variety of courses which support the ideal of what the particular department believes a student of landscape architecture needs to learn. These courses are usually grouped into categories such as history, design, construction, computers and practice. The subject course landscape design/planning usually forms the major subject. In this course the students are required to resolve landscape architectural site planning and design problems. The remaining courses, mostly academic in nature (as opposed to the practicality of the design major) are all intended to support the design course. It is the design course that offers a learning environment which is most suited to the facilitation of the learning of non-technical skills within a typical landscape architectural programme.

5.2.2 The characteristics of the design course and the design studio learning environment

A range of landscape architectural design and planning problems are presented to the students who are required to resolve them within the environment of the design studio. The problems usually revolve around a particular design theme which each of the design projects supports. "Design education is organised around manageable projects of design, individual or collective, which are more or less closely patterned on projects drawn from actual practice" (Schon 1985:31). The design process loosely follows the creative problem solving process which requires of the students to define the problem, gather information, develop proposals and refine and present the optimal solution.

The design studio is usually a large indoor environment with few fixed structures. Drawing boards and the associated chairs and flat top desks primarily occupy the space. There are usually a few shared commodities such as light tables, large flat top working tables, a range of loose chairs (even a few couches) and a few computer terminals. Schon (1985:32) states that the design studio is the space in which students spend most of their working time, sometimes talking together, but mostly engaged in private, parallel pursuit of the common design task.

5.2.3 How the design studio environment has the potential to effectively facilitate the learning of non-technical skills

The flexibility of the design course and the studio environment in terms of the potential for a variety of learning activities and styles is what makes it well suited to the facilitation of learning of non-technical skills. This is due to the fact that non-technical skills are numerous and vary in nature and thus require a variety of learning environments to facilitate their learning. The flexibility of the design environment is attributable to the long design sessions (up to three hours, as much as five times a week), the open plan studio area and the fact that the creative problem solving process is utilised for resolving the design problems. The following are specific observations regarding how the design course and studio environment facilitate the learning of non-technical skills:

- Because the design assignments are primarily resolved by utilising the creative problem solving process, non-technical skills are further easily incorporated as this process makes use of a wide range of cognitive skills (See 5.4.3).
- The students begin to form close working relationships which facilitates a deeper level of application of certain non-technical skills such as conflict resolution.
- Theoretical and practical work can be oscillated, for example between giving the theory of certain non-technical skills and then applying them practically.
- The physical space allows for a variety of spatial arrangements in which to facilitate various learning opportunities such as; group activities, crit sessions and model building.

The design course and the studio approach in landscape architecture programmes thus provide a very suitable approach for facilitating the learning of non-technical skills. A flexible framework should then be chosen which will utilise the possibilities offered by the course and studio. In this dissertation the examples that are cited will be within the context of this environment.

5.3 THE FRAMEWORK FOR FACILITING THE LEARNING OF NON-TECHNICAL SKILLS

5.3.1 Criteria for identifying a suitable framework

A framework that provides direction and guidance for the facilitation of learning of non-technical skills needs to be developed. The following aspects should be taken into consideration when identifying the framework. These aspects become the criteria with which to evaluate the appropriateness of the framework.

- The framework needs to acknowledge the wide variety and inter-relatedness of non-technical skills. A degree of adaptability and flexibility is thus desired.
- There is no simple instructional solution as to how the students should acquire non-technical skills (Horak, Steyn & de Boer 2001:204), therefore the framework again needs to be flexible in allowing the lecturer to personalise the specific way in which the learning of non-technical skills are facilitated.
- Non-technical skills cannot be taught in isolation of a particular subject as they need subject matter to be applied to. This means that the non-technical skills need to be thoroughly integrated into the technical (subject specific) course content. The framework has to accommodate the subject specific content. This also ensures that the course content does not expand unnecessarily with the inclusion of non-technical skills.

The above mentioned necessitates a framework that creates a broad and flexible environment in which the learning facilitator can incorporate non-technical skills into the existing subject specific content.

5.3.2 The identification of a framework for facilitating learning

Herrmann's (1995) Four Quadrant Whole Brain Model is identified as an appropriate framework for facilitating the learning of non-technical skills. The choice of model is motivated in 5.3.3.

The following description of the model is a summary from Lumsdaine and Lumsdaine (1995:75). Many of the following tables describing certain aspects of the Whole Brain Model are compiled from Lumsdaine *et al.*'s (1995) work, *"Creative Problem Solving"*.

According to Herrmann (1995), the brain has four distinct specialised modes in the way that it functions which all people utilise. There is however clear dominance in

each persons preferred way of thinking, referred to as the cognitive thinking preference. We utilise our dominant mode of thinking when we want to solve a problem or learn something new. Each mode of thinking is better suited to the certain types of tasks it was designed to perform. Through a typical schooling career the focus is on the sequential learning skills and the creative are often ignored. For people to reach their potential regarding their thinking abilities they need to balance and integrate the different modes of thinking.

The different modes of thinking are related to the physical structure of the brain and are divided into four quadrants. Each quadrant has very distinct clusters of thinking abilities or ways of learning and knowing.

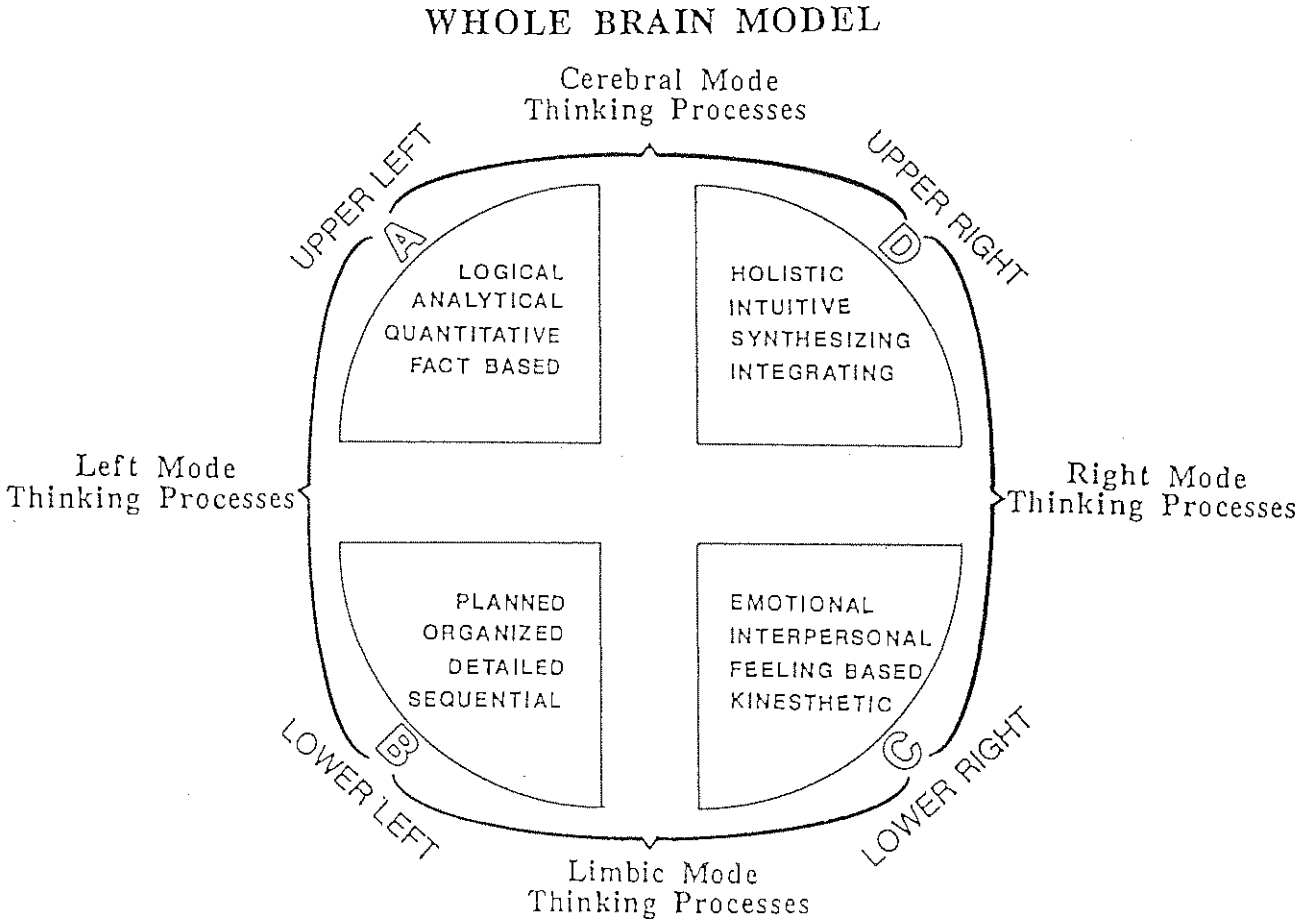

FIGURE 5.1 Whole Brain Model (Herrmann 1995: Appendix E)

The following tables illustrate the nature of the four thinking preferences. It is important to notice how non-technical skills, as listed in Appendix 1, can begin to be identified or associated with the last two columns, namely; "The activities for practicing this quadrant's thinking", and "When to use this quadrant's thinking".

TABLE 5.1 Characteristics of the thinking preferences (Lumsdaine *et al.* 1995:75-95)

Quadrant	Types of thinking and associated activities	Culture	People who think like this and what they talk about	Subject areas / Careers	Preferred learning activities	Behaviour	Activities for practicing this quadrant's thinking	When to use this Quadrant's thinking
A	Factual, analytical, quantitative, technical, logical, rational, critical. Deals with data analysis, risk assessment, statistics, financial budgets, computation, technical hardware, analytical problem-solving, making decisions based on logic and reasoning.	Authoritarian Materialistic Academic	Mr Spok George Gallup "The bottom line is..." "Get the facts" "Critically analyse..."	Arithmetic, calculus, algebra, accounting. Lawyers, engineers, computer scientists, analysts, technicians, bankers, physicians.	Collecting data and information Organising information logically in a framework Listening to informational lectures Reading textbooks Studying example problems and solutions Doing research using the scientific method Judging ideas based on facts, criteria and logical reasoning	Preoccupied with facts Not concerned with the details	Collect data and information about a particular problem or subject Organise information into categories Find out how a frequently used machine works by reading about it Take a current problem and analyse it into its main parts Write a critical review using logic reasoning Play chess Join an investment club	Determining the real problem Determining the best solutions Solving routine problems
B	Organised, sequential, controlled, planned, conservative, structured, detailed, disciplined, persistent. Deals with administration, tactical planning, organisational form, safekeeping, solution implementation, maintaining the status quo, "tried-and-true".	Traditional Bureaucratic Reliable	Edgar Hoover Prince Otto von Bismark "We have always done it this way" "Law and order" Play-it-safe"	Planners, bureaucrats, administrators, bookkeepers.	Following directions instead of trying to do something in a different way Testing theories and procedures to find problems Doing lab work, step by step Writing a sequential report on the results of experiments Finding practical uses for knowledge learned Listening to detailed lectures Taking detailed notes Practicing new skills with frequent repetition	Stick to schedules Inflexible Disciplined	Learn a new habit through planning and self-discipline Cook a new dish by following instructions in a complicated recipe Plan a project by writing down each step in detail and then do it Assemble a model kit by construction Set up a filing system for your paper work and correspondence Organise your desk drawer Prepare a family tree Find mistakes in your bank statements Learn time management skills	Planning how to put an idea into action Judging ahead of implementation in order to prevent errors If you want a balanced life!
C	Sensory, kinaesthetic, emotional, interpersonal, symbolic. Deals with awareness of feelings, body sensations, values, music, communications.	Humanistic Cooperative Spiritual Value driven- and feelings-orientated	Mahatma Ghandi "The family..." "Let's work together" "Personal; growth" "Values"	Social science, music, arts, drama, highly skilled sports. Teachers, nurses, social workers, musicians.	Listening to and sharing ideas Motivating yourself by asking "why"-looking for personal meaning Using group study opportunities and group discussions Keeping a journal to record feelings and spiritual values, not details Doing dramatics-acting out is important, not imagination Learning by teaching others Using people oriented case studies Respecting others rights and views; people are important, not things	Nurturing, reach out to others Teamwork Sharing ideas Cooperation Faith, values and religious beliefs have can have a string influence on this thinking.	Study in a group or do a group project Become a volunteer in your community Get involved in a programme that teaches adults to read Explore your spirituality Use artwork, colours and accessories to create a specific mood in a room Find a pen pal from another country Make time for family meals Play a musical instrument playfully	For teamwork Meeting the needs of the customer Building support for your ideas Good communication is needed
D	Visual, holistic, innovative, metaphorical, creative, imaginative, conceptual, spatial, flexible, intuitive.	Explorative Entrepreneurial Intuitive Inventive Future-orientated Playful Risk-driven Independent	Pablo Picasso Leonardo da Vinci "Playing with an idea" "The big picture" "Cutting edge" "Innovation"	Arts, geometry, poetry, design, architecture. Entrepreneurs, explorers, artists and playwrights. Medicine, physics, engineering	Looking for the big picture and the context, not the details, of a new topic Taking initiative - getting involved Doing simulations - asking what if questions Doing problems with many possible answers Leading a brainstorming session – wild ideas, not the team are important Experimenting, playing with ideas Exploring hidden possibilities Thinking about trends Relying on intuition, not facts or logic Synthesising ideas and information to come up with something new	Self-motivated March to a different drummer	Make a study of a trend, then predict at least three different future developments Make sketches to help you memorise material that you are learning When solving problems, find two or three different ways to solve them Do problems that require brainstorming Learn to paint, sketch, draw, play with modelling clay Attend a story-telling session Invent a gourmet dish and prepare it Imagine yourself in the year 2020, 2040? Investigate how a particular subject can be connected to other thins you know	Brainstorming (wishful imaginative) Exploratory, holistic, contextual thinking is needed

5.3.3 Motivation for the identification of the Herrmann Four-Quadrant Whole Brain Model

The following reasons are cited for identifying The Herrmann Four Quadrant Whole Brain Model as an appropriate framework for facilitating the learning of the non-technical skills:

- The way the model divides the brain into four quadrants and then associates thinking types to those quadrants has resulted in the model incorporating a wide variety of non-technical skills. It then goes on associate specific activities for practicing the thinking types which more easily facilitates the development of learning tasks.
- It addresses all the different types of thinking styles which a typical group of students will have, which in turn accommodates all the different non-technical skills (See Table 5.3).
- Different types of thinkers benefit from knowing how to use the whole brain for learning, working, solving problems and communicating with each other. This would in turn facilitate the learning of a wider variety of non-technical skills than they would if were left to approach problems in their own way.
- The inter-relatedness of non-technical skills is addressed well, as it deals with the whole spectrum of thinking styles.
- The characteristics of the four quadrants positively correlate with the stages of the creative problem solving process utilised in the design studio.
- It is a detailed framework but does not restrict the creativity of the design of learning tasks.
- The four brain quadrant divisions and their associated thinking types are easily accommodated in the process of creative problem solving. Creative problem solving in turn is the basis for the facilitation of learning in the major activity of landscape architecture education, namely design.

5.3.4 The four-quadrant brain model of thinking preferences and non-technical skills

In order to most effectively utilise the four-quadrant brain model of thinking preferences for increasing the presence of non-technical skills in learning facilitation we need to understand how they are accommodated in the model.

Referring to the complete list of non-technical skills in Appendix 1, we can begin to relate the skills clusters to the four thinking preferences. This implies that if a student is involved in the activities and exercises for practicing the thinking of a particular quadrant, he/she will be exercising non-technical skills related to that quadrant as they need to be utilised in order to effectively engage in these activities.

A shortcoming of relating the skills clusters directly to the four thinking preferences is that the self-management and personal style cluster and a large number of the work related dispositions and attitudes do not directly correlate with the four brain model. This shortcoming is easily addressed as this model is intended to be the departure

point for the development of learning activities. It is flexible enough to allow the lecturer to add these skills in where appropriate. Section 5.5 focuses on the facilitation of the learning of specific non-technical skills which is a process which can be applied to skills not addressed in the four quadrant model.

The following table associates non-technical skills with the four thinking preference quadrants. This has been achieved by adding the last two columns, namely; "Dominant non-technical skills cluster" 'and "Typical non-technical skills". The information under these two columns was sourced from Appendix 1.

TABLE 5.2 Non-technical skills associated with the thinking preferences

Quadrant	Types of thinking activities	Activities for practicing this quadrant's thinking	When to use this Quadrant's thinking	Dominant non-technical skills cluster	Typical non-technical skills
A	Factual, analytical, quanitative, technical, logical, rational, critical. Deals with data analysis, risk assessment, statistics, financial budgets, computation, technical hardware, analytical problem-solving, making decisions based on logic and reasoning.	Collect data and information about a particular problem or subject Organise information into categories Find out how a frequently used machine works by reading about it Take a current problem and analyse it into its main parts Write a critical review using logic reasoning Play chess Join an investment club	Determining the real problem Determining the best solutions Solving routine problems	Information management Organisational effectiveness and leadership	Analysing, collection, retrieve, computer application, research, logical thinking, valuation, reporting, recommend, questioning, formulation, observation, problem analysis, investigation, interpretation, summarise, goal directed
B	Organised, sequential, controlled, planned, conservative, structured, detailed, disciplined, persistent. Deals with administration, tactical planning, organisational form, safekeeping, solution implementation, maintaining the status quo, "tried-and-true".	Learn a new habit through planning and self-discipline Cook a new dish by following instructions in a complicated recipe Plan a project by writing down each step in detail and then do it Assemble a model kit by construction Set up a filing system for your paper work and correspondence Organise your desk drawer Prepare a family tree Find mistakes in your bank statements Learn time management skills	Planning how to put an idea into action Judging ahead of implementation in order to prevent errors If you want a balanced life!	Information management	Organisation, scheduling, synthesising, sorting, recording, logical thinking, prioritise, goal directed, have vision, work to schedule, prioritise, follow procedures, co-ordinate, put theory into practice, set objectives, manage, time management, apply policies, formulation, anticipation, predictive, task orientated, precise, lead and manage, meet deadlines, work to schedule, direct, administration, supervise, time management, apply policies
C	Sensory, kinaesthetic, emotional, interpersonal, symbolic. Deals with awareness of feelings, body sensations, values, music, communications.	Study in a group or do a group project Become a volunteer in your community Get involved in a programme that teaches adults to read Explore your spirituality Use artwork, colours and accessories to create a specific mood in a room Find a pen pal from another country Make time for family meals Play a musical instrument playfully	For teamwork Meeting the needs of the customer Building support for your ideas Good communication is needed	Communication Work related dispositions Group effectiveness and teamwork Organisational effectiveness and leadership	Delegate, lead, direct, make suggestions, supervise, instruct, verbal communication, teaching, listening, conversational, negotiation, demonstration, conflict management, visual & graphic presentation, technical report writing, meeting procedure, interviewing, presentation, selling, reading, persuasion, instruction, explanation, team member, understand teamwork, put people at ease, sensitive to cultural diversity, negotiation, solicitation, social commitment, helpful, responsive, hospitable, lead and manage, even tempered, coordinate, supervise, co-operate, praise, counselling, empathy, persuasive, group process skills, delegate, motivate
D	Visual, holistic, innovative, metaphorical, creative, imaginative, conceptual, spatial, flexible, intuitive.	Make a study of a trend, then predict at least three different future developments Make sketches to help you memorise material that you are learning When solving problems, find two or three different ways to solve them Do problems that require brainstorming Learn to paint, sketch, draw; play with modelling clay Attend a story-telling session Invent a gourmet dish and prepare it Imagine yourself in the year 2020, 2040? Investigate how a particular subject can be connected to other thins you know	Brainstorming (wishful imaginative) Exploratory, holistic, contextual thinking is needed	Creative thinking and problem-solving	Innovation, creativity, imagination, intuitive explorative, entrepreneurial, inventive, playfulness, independence, conceptualisation, risk-taking, recruit ideas, brainstorming, investigative

5.3.5 Facilitating the learning of the non-technical skills with the four-quadrant brain model of thinking preferences

The different thinking preferences result in a particular preference of learning environment (Horak *et al.* 2001:207). In other words, certain students learn more effectively under a specific set of circumstances. Structuring the learning activities to recognise these learning environment preferences gives the learning facilitator the ability to make sure that all four thinking preference quadrants are exercised, making learning effective and utilising the associated non-technical skills in the process.

The following table relates each thinking preference quadrant to learning environment preferences and then finally to the associated non-technical skills. This implies that if a learning task is being designed to facilitate the learning of specific non-technical skills, then the correct environment for the most effective learning of those skills is provided by utilising the corresponding characteristics in the adjacent column. Hermann's (1995: Appendix E) whole brain learning and design considerations are included as learning environment preferences. Horak *et al.'s* (2001:207) learner expectations, are also included.

TABLE 5.3 Relationship between thinking preferences, learning styles and non-technical skills

	Learning Theory			
Quadrant	**Four Quadrant Brain Model**	**Hermann's (1995) Whole Brain Learning and Design Considerations**	**Horak *et al.'s* (2001) Learner Expectations**	**Non-technical Skills**
A	External Learning Through: Lectures and text books.	**Learns by:** Acquiring and quantifying facts Applying analysis and logic Forming theories **Learners respond to:** Formalized lecture Text books and bibliographies Data based content	Precise, to the point information Theory and logical rationales Proof of validity Research references Textbook readings Numbers, data	Analysing, collection, retrieve, computer application, research, logical thinking, valuation, reporting, recommend, questioning, formulation, observation, problem analysis, investigation, interpretation, summarise, goal directed
B	Procedural Learning Through: Methodical, step-by-step-testing of what is being taught and practiced and repetition to improve skills.	**Learns by:** Organising and structuring content Evaluating and testing theories Acquiring skills through practice Implementing course content **Learners respond to:** Thorough planning Sequential order Text books Lectures Structure	Organised, consistent approach Staying on track, on time Complete subject chunks A beginning, middle and end Practice and evaluate Examples, clear instruction	Organisation, scheduling, synthesising, sorting, recording, logical thinking, prioritise, goal directed, have vision, work to schedule, prioritise, follow procedures, co-ordinate, put theory into practice, set objectives, manage, time management, apply policies, formulation, anticipation, predictive, task orientated, precise, lead and manage, meet deadlines, work to schedule, direct, administration, supervise, time management, apply policies
C	Interactive learning Through: Discussions, hands-on sensory-based experiments where we try, fail, try again with an opportunity for verbal feedback and encouragement.	**Learns by:** Listening and sharing ideas Integrating experiences with self Moving and feeling Emotional involvement **Learners respond to:** Experiential opportunities Sensory movement Music People orientated case Discussions Group interaction	Group discussion Sharing, expressing ideas Feeling based Hands on learning Personal connection Emotional involvement User-friendly learning Use of all senses	Delegate, lead, direct, make suggestions, supervise, instruct, verbal communication, teaching, listening, conversational, negotiation, demonstration, conflict management, visual & graphic presentation, technical report writing, meeting procedure, interviewing, presentation, selling, reading, persuasion, instruction, explanation, team member, understand teamwork, put people at ease, sensitive to cultural diversity, negotiation, solicitation, social commitment, helpful, responsive, hospitable, lead and manage, even tempered, coordinate, supervise, co-operate, praise, counselling, empathy, persuasive, group process skills, delegate, motivate
D	Internal Learning (Creative thinking) Through: A flash, an insight, a visualisation, an idea synthesis and a sudden understanding of a concept holistically and intuitively.	**Learns by:** Taking initiative Exploring hidden possibilities Relying on intuition **Learners respond to:** Spontaneity Playfulness Visual displays Individuality	Fun and spontaneity Playful approaches Pictures, metaphors, overviews Discovering and exploration Quick pace and variety in format Opportunity to experiment	Innovation, creativity, imagination, intuitive explorative, entrepreneurial, inventive, playfulness, independence, conceptualisation, risk-taking, recruit ideas, brainstorming, investigative

5.4 THE FOUR-QUADRANT BRAIN MODEL OF THINKING PREFERENCES AND LANDSCAPE ARCHITECTURE

The creative problem solving process is the main vehicle in landscape architecture used to facilitate learning in the design course. The general creative problem solving process is adapted to be of specific relevance to landscape architecture. The characteristics of the four quadrants of the brain model can be easily related to the creative problem solving process. This allows for easy transfer of the model into landscape architectural education.

5.4.1 The creative problem-solving process

There are a wide variety of problem solving and design processes. In essence, they all have the same major stages in the process. "They all identify some issue to be resolved, or a problem to be solved. They all involve the generation of an idea or ideas for resolving the issue or solving the problem. They involve some vehicle for implementing the idea(s). They include evaluation of the implemented idea, which usually leads to a greater understanding of the problem." (Motloch 1991:238). For the purposes of this dissertation, a typical creative problem solving process, as proposed by Lumsdaine *et al.* (1995:98), will be used. In landscape architecture, this creative problem solving process is adapted in the following ways to suite the specific subject matter of landscape design.

TABLE 5.4 The stages of the creative problem solving process and the corresponding stages of the landscape design process

Creative problem solving process (Lumsdaine *et al.* 1995:98)	Landscape design process (Motloch 1991:238)
Problem definition	Identification of human needs, Site opportunities and constraints
Idea Generation	Conceptual design, Big idea
Creative Idea Evaluation	Creative Idea Evaluation
Idea Judgement	Schematic design
Solution implementation	Construction

These adaptions however do not change the fundamental nature of the thinking processes involved. They just accommodate the subject matter of landscape architecture. For the purposes of this dissertation the generic process as described by Lumsdaine *et al.* (1995:98) will be utilised..

5.4.2 *The creative problem-solving process and the four quadrant brain model*

In order to bridge from the creative problem solving process to the four quadrant brain model we need to understand the mindsets involved in the stages of the creative problem-solving process. Lumsdaine *et al.* (1995:98) use metaphors to describe the processes which allow the stages to be easily related to the four quadrant brain model and to non-technical skills. The following table is a short description of the mindsets.

TABLE 5.5 Mindsets required for creative problem solving (Lumsdaine *et al.* 1995:98)

Creative Problem-solving Stage	Metaphor for Mindset Required	Description
Problem Definition	Explorer and Detective	Looking for opportunities, thinking like an explorer. Keeping a sharp eye out for ideas armed with a notebook, field glasses and a compass. Walking around in the dark with a flashlight and matches. Finding out as much as possible about the problem. Searching for opportunities and information, analysing data and coming up with a positive problem statement.
Idea generation	Artist	Brainstorming to come up with a multitude of creative ideas. Thinking like an artist, the wilder and crazier the better! Imagining standing in front of a large sketch pad, furiously drawing a slew of sketches, noting down all kinds of ideas.
Creative idea evaluation	Engineer	A tinkerer. Sitting in front of a computer screen examining and playing around with all kinds of ideas with the view to combining them to develop more complete and practical ideas. Improving on ideas with a second around of brainstorming. Idea synthesis.
Idea judgement	Judge	Enter into a courtroom! In front of you sits the judge, ready to render a judgement as to which ideas and solutions are the best. Setting up criteria for deciding which solutions will be implemented. Looking for flaws and overcoming them with additional creative thinking.
Solution implementation	Producer	Jack-of-all-trades. Maker, creator, nurturer, mover, parent, organiser, inventor, builder, executer, entrepreneur, director, practitioner, actor, planter-grower-harvester, seller, coach, quarter-back, general, leader, manager. Putting out a quality product, budgeting, financing. Need courage, good communication and must take risks. Teamwork must be managed.

Relating these mindsets to the four quadrant brain model of thinking preferences is illustrated by the following figure from Lumsdaine *et al.* (1995:101).

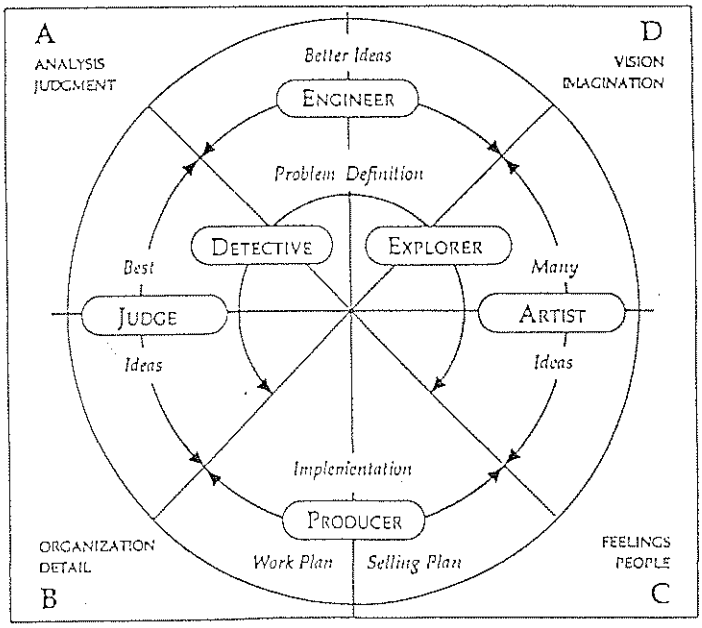

FIGURE 5.2 The Hermann model and the creative problem-solving mindsets (Lumsdaine *et al.* 1995:10)

5.4.3 *The creative problem-solving process and non-technical skills*

Using Table 5.5 and Figure 5.2 the following table (Table 5.6) is created to finally relate non-technical skills to the stages in the creative problem solving process.

TABLE 5.6 Creative problem solving, thinking preferences and non-technical skills

Creative problem-solving stage	Mindset	Associated Brain Model Quadrants	Primary activities	Non-technical skills
Problem definition	Detective and analyser	A, B	Asking questions (A), evaluating clues. Looking for opportunities and ideas, finding out as much information as possible about the problem (B). Analysing data.	Analysing, collection, retrieve, research, logical thinking, valuation, reporting, questioning, observation, problem analysis, investigation, interpretation, summarise, synthesising, sorting, recording, prioritise, anticipation, predictive, precise.
	Investigative explorers	C, D	Investigating larger possibilities	Verbal communication, conversational, negotiation, visual & graphic presentation, technical report writing, reading, sensitive to cultural diversity, social commitment, responsive, innovation, creativity, imagination, intuitive explorative, playfulness, independence, conceptualisation, risk-taking, recruit ideas, brainstorming, investigative.
Idea generation	Artist	C, D	Visual and sensory thinking. Employing feelings and intuition (C). Brainstorming for multitude of creative ideas (D).	Verbal communication, teaching, listening, conversational, demonstration, visual & graphic presentation, technical report writing, explanation, innovation, creativity, imagination, intuitive explorative, entrepreneurial, inventive, playfulness, conceptualisation, risk-taking, recruit ideas, brainstorming, investigative.
Creative idea evaluation	Engineer	A, D	Refining ideas (A) (making them more practical) through creative evaluation (D)	Analysing, computer application, logical thinking, valuation, reporting, recommend, questioning, formulation, observation, problem analysis, investigation, interpretation, summarise, goal directed, innovation, creativity, imagination, intuitive explorative, inventive, playfulness, conceptualisation, risk-taking, recruit ideas brainstorming, investigative.
Idea judgement	Judge	A, B, D	Begin with reasoning based on criteria and logic (A). Follow with further evaluation of the ideas and their associated risks (B). Overcoming any flaws if necessary (D). making final decisions (A).	Analysing, computer application, research, logical thinking, valuation, reporting, recommend, questioning, formulation, observation, problem analysis, investigation, interpretation, summarise, goal directed, synthesising, sorting, recording, logical thinking, prioritise, have vision, work to schedule, prioritise, follow procedures, co-ordinate, put theory into practice, set objectives, manage, apply policies, anticipation, predictive, task orientated, innovation, creativity, imagination, intuitive explorative, entrepreneurial, inventive, playfulness, independence, conceptualisation, risk-taking, recruit ideas, brainstorming, investigative.
Solution implementation	Producer	B, C	Tactical planning for solution implementation (B). Communicating the solutions (C). Preparing a detailed work plan (B).	Organisation, scheduling, synthesising, recording, logical thinking, prioritise, goal directed, have vision, work to schedule, prioritise, follow procedures, co-ordinate, put theory into practice, set objectives, manage, time management, apply policies, formulation, anticipation, predictive, task orientated, precise, lead and manage, meet deadlines, work to schedule, direct, administration, supervise, time management, apply policy, delegate, lead, direct, make suggestions, supervise, instruct, verbal communication, teaching, listening, conversational, negotiation, demonstration, conflict management, visual & graphic presentation, technical report writing, meeting procedure, interviewing, presentation, selling, reading, persuasion, instruction, explanation, team member, understand teamwork, put people at ease, sensitive to cultural diversity, negotiation, solicitation, social commitment, helpful, responsive, hospitable, lead and manage, even tempered, coordinate, supervise, co-operate, praise, counselling, empathy, persuasive, group process skills, delegate, motivates.

5.4.4 Developing learning tasks

As the assignments in the design course usually revolve around the creative problem solving process the above series of tables gives the lecturer a rich understanding of how non-technical skills, thinking styles, learning preferences and stages in the creative problem solving process relate. The lecturer can thus develop learning tasks that address particular non-technical skills. It is important to note that this process needs to be supplemented by the identification of the enabling abilities of non-technical skills as discussed in the following section and in Chapter 4.

5.5 FACILITATING THE LEARNING OF A SPECIFIC NON-TECHNICAL SKILL

To supplement the above process the more detailed understanding of a non-technical skill, as obtained by identifying its enabling abilities, can now be incorporated into the above series of tables.

The following table illustrates how the learning facilitator would develop a learning task. This table is applied to the assignment in Appendix 2. The subject specific content, practical product, techniques for learning facilitation, thinking preference quadrant (including the kinds of thinking exercised), the enabling abilities of the major non-technical skill critical thinking (see Chapter 4) and other non-technical skills addressed, are all related back to the stages of the creative problem-solving process.

TABLE 5.7 Developing a learning task

	Problem Identification (1)	**Idea generation (2)**	**Creative idea evaluation and development (3)**	**Idea Judgement and final development (4)**	**Idea implementation (5)**
Subject specific content	Various literature on the principles guiding the creation of an outdoor public space ID principles guiding design ID criteria to evaluate and judge design	Various literature on generating ideas and brainstorming	Various literature on the principles guiding the creation of an outdoor public space Precedent studies		
Practical product	Group and individual Mind maps Analog drawings	Rough work on paper	Paper and conceptual design development in model form Combining models together in one big model	Drawing of the final sketches Presentation satisfying all requirements for reasoned argument	Building final individual models and combining to form one big model
Techniques for learning facilitation	Jig-saw group work to get to know and summarise info "Sing a song" Think-pair-share Betty Edwards analog drawing		Discuss the validity of argument supporting idea with deductive and deducing arguments Evaluation against criteria set up in problem definition (ie.: inducing argument) Debate one approach ion the class against the other	Debate different approaches Crit each others work Limited time presentations	Reflect
Thinking preference quadrant and the kinds of thinking exercised.	**A, B**, C, D – factual, critical, rational, logical, organized, structured, sequential, interpersonal , visual, holistic	D – Visual, holistic, innovative, metaphorical, imaginative, conceptual, special, flexible, intuitive	**A, D** – Analytical, factual, logical, rational, critical, visual, holistic, innovative, creative, conceptual, special, flexible, intuitive	A, B , D – Analytical, factual, logical, technical, logical, rational, critical, organised, sequential, controlled, conservative, detailed, persistent, disciplined, visual, innovative	**B, C**, D – Organised, planned, detailed, disciplined, persistent, sensory, kinesthetic, visual,
Major non-technical skill Critical thinking (Source 1: A consolidation of definitions. See chapter 4)	Observation Questioning Interpretation Problem analysis Precise, persistent, objective analysis **Integration**	Brainstorming Innovation Making decisions Conceptualisation	Purposeful thinking Inductive reasoning Deductive reasoning Forecasting Formulation Anticipate	Reasoned thinking Inductive reasoning Deductive reasoning	Interacting with others
(Source 2: Ennis. See chapter 4) Dispositions	Seek a clear statement of the thesis or question Seek reasons Try to be well informed Use and mention credible sources Take into account the total situation Try to remain relevant to the main point Keep in mind the original and/or basic concern Be open-minded Seek as much precision as the subject permits Deal in an orderly manner with the parts of a complex whole Be sensitive to others	Look for alternatives Be open-minded	Seek a clear statement of the thesis or question Seek reasons Try to be well informed Use and mention credible sources Take into account the total situation Try to remain relevant to the main point Keep in mind the original and/or basic concern Be open-minded Deal in an orderly manner with the parts of a complex whole Be sensitive to others Take a position (and change a position) when the evidence and reasons are sufficient to do so	Seek a clear statement of the thesis or question Seek reasons Try to be well informed Use and mention credible sources Take into account the total situation Try to remain relevant to the main point Keep in mind the original and/or basic concern Be open-minded Deal in an orderly manner with the parts of a complex whole	Visual presentation, creative, conceptualisation, logical thinking, prioritise, persistent, disciplined, flexible, patient, precise,
Abilities	Focusing on a question Analysing arguments (of the theory) Asking and answering questions of clarification and/or challenge Judging the credibility of a source Observing Identifying assumptions (of the theory) Interacting with others	Interacting with others Observing	Analysing arguments (of the ideas) Asking and answering questions of clarification and/or challenge Observing Deducing and judging deductions Inducing and judging deductions Making value judgements Identifying assumptions (of the ideas) Deciding on an action Interacting with others	Be sensitive to others Take a position (and change a position) when the evidence and reasons are sufficient to do so Analysing arguments Asking and answering questions of clarification and/or challenge Observing Deducing and judging deductions Inducing and judging deductions Making value judgements Identifying assumptions (of the ideas) Deciding on an action Interacting with others	
Other non-technical skills addressed	Verbal communication, teaching, listening, conversational, visual presentation, self-confidence, reading, explanation, questioning, observation, problem analysis, investigation, analysing, collecting, research, sorting, team member, co-ordination, co-operate, group process skills, summarise, make suggestions, instruct, set objectives	Visual presentation, innovation, creative, conceptualisation, self-confidence, open-minded, take risks, have vision	Listening, visual presentation, questioning, forecasting, innovation, observation, creative, integration, interpretation, conceptualisation, analysing, synthesising, logical thinking, valuation, have vision, flexible, objective	Listening, visual presentation, questioning, forecasting, observation, creative, integration, predictive, analysing, logical thinking	

The table on the previous page thus illustrates how non-technical skills and their respective enabling abilities can be incorporated in to the learning tasks in a landscape architectural learning tasks.

5.6 SYSTEMS THINKING AND FACILITATING THE LEARNING OF NON-TECHNICAL SKILLS

It is vitally important to acknowledge the influence that systems theory (Capra 1997:29) has on the creation of the appropriate framework for facilitating the learning of non-technical skills. Systems theory suggests that the supportive cognitive skills cannot be approached as being the building blocks which when simply added together create the ability to think critically. Stated differently, the essential nature of critical thinking is not the sum of what is perceived to be their parts (the supportive cognitive skills). Systems theory states that the whole is greater than the sum of the parts. "According to the systems view, the essential properties of an organism, or living system, are properties of the whole, which none of the parts have. They arise from the interactions and relationships between the parts. These properties are destroyed when the system is dissected, either physically or theoretically, into isolated elements" (Capra 1997:29). Applied to critical thinking we realise that by adding the characteristics of each of the supportive cognitive skills together, we do not necessarily achieve the essential nature of critical thinking. What constitutes critical thinking according to system theory, is the interaction between the supportive cognitive skills and how each influences the cognitive activities of the next. It is only partially beneficial to the learning process to learn the skills in isolation of each other.

Following the systems view, the learning of critical thinking can only take place when all of the supportive cognitive skills are being exercised simultaneously thus allowing the essential nature of critical thinking to be defined by the properties that emerge from the interactions between the supportive cognitive skills. "The properties of the parts are not intrinsic properties, but can be understood only within the context of the larger whole" (Capra 1997:29). This explains why the specific type of observation or reasoning used in critical thinking can only be identified within the context of the essential nature and purpose of critical thinking.

In conclusion, the facilitation of the learning of non-technical skills should then take place by moving from the practice of the skill as a whole to the appropriate cognitive skill when the need arises (needs generated from the process the students are engaged in). By way of example, if the students begin their specific session with observation and then want to proceed to exploring the issue they are dealing with from multiple perspectives, but experience difficulty in generating various perspectives, they can at that point be introduced to the cognitive skill of brainstorming. Emphasis should then be placed on how brainstorming contributes to the subsequent cognitive activities and that the subject around which the brainstorming takes place is defined by the broader context of the critical thinking activity. This way critical thinking is practised as a whole and the cognitive processes that assist critical thinking are seen as supports to the process and not the building blocks.

This process closely resembles the process of learning facilitation referred to by Slabbert (1990:17) in a report entitled; "Maximising Human Potential Through

Lifelong Learning." Slabbert argues that learning is the construction of meaning by the learner and does not involve the lecturer; "Since the relationship for constructing meaning is essentially one during which the learning takes place through a personal experience or enquiry, and since the teacher / lecturer does not participate in it, it can at most be facilitated by the teacher / lecturer" (Slabbert 1990:15). The process of learning facilitation Slabbert (1990) refers to, provides a model for constructing meaning by the learner. It involves the lecturer setting a problem for the learners, in this case it would be a problem requiring the use of critical thinking, and then intervening with questions at the appropriate times, leading them through a series of fruitful moments culminating in the completion of the learning task. This way, the skill of critical thinking (or any deconstructed non-technical skill) can be exercised as a whole. The process thus recognises the importance of holistic thinking which is what systems theory contributes to our understanding of the facilitation of the learning of non-technical skills.

5.7 THE FLEXIBILITY OF THE FRAMEWORK FOR FACILIATING THE LEARNING OF NON-TECHNICAL SKILLS

Over time the needs a curriculum addresses change. Presently, the trend in curriculum development regarding skills development is toward non-technical skills. With changing demands and the evolution of pedagogical thinking regarding the skills required of graduates, the framework as proposed here, can be adapted and be used to facilitate the learning of those skills.

The essential nature of the curriculum development process as described in Chapter 4 is to break down a skill into its building blocks (supportive cognitive skills). This action deconstructs skills that are seemingly difficult to facilitate the learning of by reduces them to components that are more tangible regarding facilitating learning. This characteristic is generically applicable and can therefore be applied to any skill, technical or non-technical.

5.8 SUMMARY

The flexibility of the design course and studio environment of landscape architecture programmes was found to provide a very suitable environment for the learning of relevant non-technical skills. The Hermann Four Quadrant Brain Model (Herrmann 1995: Appendix E) was found to provide the basis for a framework for the facilitation of the learning of non-technical skills. Non-technical skills are related to the four brain quadrants and then to landscape architecture through the creative problem solving process. The framework allows the lecturer to easily oscillate flexibly between the different aspects contributing to the learning task development. The flexibility of the framework is demonstrated by the fact that, when developing a learning task, the lecturer can begin with either the creative problem solving process, the four quadrant brain model, learning style preferences or non-technical skills. From there the lecturer can move in any order to any of the other aspects, until it is felt that the assignment will be rich in the facilitation of the technical and non-technical skills.

The facilitation of a specific non-technical skill was addressed and critical thinking was used as an example thereof. This shows how the learning of a non-technical skill can be facilitated in detail by deconstructing the skill into its building blocks or supportive cognitive skills. The chapter concludes with an identification of an important principle from systems theory regarding the deconstruction of non-technical skills. In systems thinking, learning of non-technical skills needs to be facilitated as a whole and not the collection of a series of separate parts.

5.9 CONCLUSION

A framework can be developed for the appropriate facilitation of the learning of non-technical skills in a landscape architecture curriculum. If the guidelines and principles of the framework are acknowledged, non-technical skills can be incorporated in a tangible manner down to the leaning task design.

CHAPTER 6 - CONCLUSIONS AND RECOMMENDATIONS

Dissertation hypothesis as stated in Chapter 1:

The landscape architecture curriculum in South Africa needs to shift the skills emphasis from technical to non-technical skills if it is to remain relevant to the educational and workplace environments.

The shift in the skills required of graduates entering the generic workplace from technical (subject specific) to non-technical skills is indicative of the changing work environment. The work environment of landscape architecture has also recently faced many changes, specifically due to the changes in the environmental planning professions resulting from the development of ecological thinking and the use of computers. These changes render the future unpredictable. These factors, together with the broad nature of the profession, indicate that curriculum design in landscape architecture needs to look beyond subject specific content to the more generic skills, namely non-technical skills. A survey of writing on education in landscape architecture supports this conclusion.

Incorporating non-technical skills into a curriculum requires thorough curriculum planning, as these skills need to be tangibly integrated across all outcome levels. One of the most important requirements for the successful integration into a curriculum is the deconstruction or analysis of non-technical skills into their building blocks or supportive cognitive skills. For this a curriculum design process should be followed, which easily facilitates the incorporation of these skills into a curriculum. It is as important to consciously and tangibly facilitate the learning of non-technical skills in learning tasks and activities, and to follow this up in the appropriate evaluation and/or assessment processes. For this a framework is necessary which guides the development and evaluation of tasks and activities.

6.1 CONCLUSIONS

1. There is a strong shift in the emphasis of the skills required of graduates entering the contemporary workplace from technical (subject specific) to non-technical skills.
2. The non-technical skills have an important role to play in preparing landscape architecture graduates for the specific nature of the profession, namely, the breadth of the activities of landscape architects and the unpredictability of it's future. It is therefore necessary to emphasise the non-technical skills in a landscape architecture curriculum.
3. The inclusion of non-technical skills in curriculum development is strongly endorsed by the new South African education system. This facilitates the easy incorporation of the skills into landscape architecture curriculum, as bodies controlling standards in education will endorse changes to the curriculum.
4. Due to the very poor presence of non-technical skills in the mission statements, goals, objectives and outcomes of the current programmes in landscape architecture in South Africa, it is concluded that the facilitation of the learning

thereof is at best taking place serendipitously. This more than likely leads to many non-technical skills not being successfully addressed.

5. A process, such as the curriculum development process illustrated in Chapter 4, needs to be developed and followed for incorporating non-technical skills into the curriculum in order to ensure that the tangible integration of these skills takes place.
6. A framework for the facilitation of the learning of non-technical skills, such as the framework proposed in Chapter 5, needs to be developed and implemented to ensure that the tangible learning of non-technical skills takes place.

6.2 RECOMMENDATIONS

1. Programmes in landscape architecture in South Africa need to shift their skills emphasis from technical (subject specific) to non-technical skills if they are to adequately equip their students for the contemporary and future workplace.
2. In order to achieve this, curriculum development processes and frameworks for the facilitation of the learning of non-technical skills, such as those proposed in this dissertation, need to be set in place for the inclusion of non-technical skills to be successful.
3. The landscape architecture curriculum should have, as one of its core goals, the development of the continual systematic learning (lifelong learning) ability of its graduates.
4. Continual Professional Development courses can be used to further enhance the lifelong learning capacity of landscape architecture graduates.
5. Any institution that may offer courses in landscape architecture, should more actively engage with the South African Qualifications Authority as their curriculum development guidelines and requirements endorse the incorporation of non-technical skills.
6. Learning task design needs to take place within a framework for facilitating the learning of non-technical skills, as this will ensure that non-technical skills are tangibly included in learning tasks.
7. This dissertation leads to further possibilities regarding research. Areas where further study is required are:

    - The more effective way in which complex, higher order skills (technical and non-technical) can be broken down into building blocks (supportive cognitive and affective skills) in order to facilitate the learning thereof, especially considering the lessons learnt from systems thinking.
    - Research ways for facilitating the learning of skills critical for landscape architects other than those dealt with in this dissertation, such as critical thinking, creativity, communication, adaptability and flexibility.
    - Action research should be utilised to test these conclusions and recommendations in the design studio.

- The training of learning facilitators to facilitate the learning of non-technical skills most effectively.
- Changing negative perceptions in tertiary education environments regarding the degree to which the learning of non-technical skills can be implemented.
- Investigating structures within a tertiary education institution beyond the academic curriculum which could also effectively facilitate the learning of non-technical skills.

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APPENDIX 1 - A DEFINITION AND IDENTIFICATION OF NON-TECHNICAL SKILLS

The definition of non-technical skills and the range of specific skills which make up the group broadly referred to as the non-technical skills is drawn from an article by Kemp (1999) entitled; "The identification of the most important non-technical skills required by entry-level engineering students when they assume employment."

Technical and Non-technical skills

According to Straub (1990:45), technical skills comprise the productive part of a job; for example, the typing skills of a seeretary that are measurable, whereas non-technical skills represent the aspects common to all jobs, such as following instructions, communicating effectively and cooperating with others in teamwork. Neal (1983:25-27) states that there are two broad categories of non-technical employment qualities or skills. The first category consists of behaviours such as arriving for work on time, following instructions, displaying social skills and conduct acceptable to others and effective communication. The second category consists of attitude related characteristics such as adaptability, self-confidence, persistence, ambition and helpfulness. Bryce (1993:84-89) writes that non-technical skills include communication, inter-personal and problem solving skills.

Munce (1981:76) divides non-technical skills into two categories:

- Functional skills
- Adaptive skills

Functional skills

Functional skills are the basic skills applied to tasks and are used to solve new problems and to go beyond one's training and past experience. Examples of functional skills are questioning, analysing, communicating, organising, listening, decision-making and forecasting (Murphy & Jenks 1982:5-10).

Adaptive skills

Adaptive skills describe the manner in which employees conduct themselves and interact with the working environment, including relations with people, organisations and physical conditions (Murphy et al 1982:5-10). These skills are closely related to personality traits and when used in the appropriate environment, help the worker to adapt to that environment. Adaptive skills are essential to become effective in any work or learning situation. Examples of adaptive skills are flexibility, tactfulness, positive work attitudes, creativity and assertiveness (Breen 1981:2).

In summary, the following are the definitions used for non-technical skills:

The skills that are required to compliment job content skills to effectively perform tasks in a workplace environment, and include:

Functional skills which are the basic skills applied to tasks such as speaking, reading and writing, and form part of larger actions such as instructing and leading a team of workers; and

Adaptive skills which are required to "fit in" and contribute as a valuable member in the workplace.

A model of non-technical skills clusters

Kemp went on to synthesise the findings of the literature survey to provide a non-technical skills cluster model. De Lange (1998:57) identified three functional skills clusters and four adaptive skills clusters. Table A-1 contains the functional skills clusters, namely communication, creative thinking and problem-solving, and information management. Each skills cluster is defined and beside the respective skill clusters appear the skills components that fall within the respective clusters.

Table A-2 shows the four adaptive skills clusters, namely self-management and personal style, work-related dispositions and attitudes, group effectiveness and teamwork, and finally organisational effectiveness and leadership. Each is defined and the various skills components making up the respective clusters are provided.

TABLE A-1 Non-technical skills cluster model: Functional skills cluster (Kemp 1999:181)

FUNCTIONAL SKILLS CLUSTER	NON-TECHNICAL SKILLS COMPONENTS		
Communication	The ability to exchange, transmit and express knowledge and ideas to achieve set objectives		
	· verbal communication · teaching · grievance handling · listening · conversational · negotiation · demonstration	· conflict management · visual presentation · technical report writing · meeting procedure · interviewing · presentation	· selling · reading · persuasion · instruction · explanation · graphic presentation
Creative thinking and problem-solving	The ability to solve existing and anticipated problems through creative innovative and analytical means		
	· questioning · forecasting · innovation · formulation · observation	· anticipate · creative · problem analysis · integration · investigation	· interpretation · conceptualisation · predictive · facilitative
Information management	The ability to arrange, sort and retrieve data, knowledge and ideas		
	· analysing · collecting · retrieval · computer application · research	· organisation · scheduling · synthesising · sorting · recording	· logical thinking · valuation · reporting · prioritise

TABLE A-2 Non-technical skills cluster model: Adaptive skills cluster (Kemp 1999:181)

ADAPTIVE SKILLS CLUSTER	NON-TECHNICAL SKILLS COMPONENTS		
Self-management and personal style	Indicators of general outlook, personal appearance, values, goals and motivation		
	· self-confidence · honest · motivated · assertive · stable · responsible · ethical · persistent	· disciplined · detremined · flexible · positive self-esteem · integrity · sincere · adaptable	· patient · dependable · mature · enthusiastic · conscientious · good appearance · objective
Work related dispositions and attitudes	Indicators of personal work orientation, work values, attitudes and understanding of the work environment		
	· willing to learn · team member · understand teamwork · task oriented · take initiative · punctual · thoroughness · precise · handle pressure	· good work habits · willing to be trained · commited to the job · respect for property · make extra effort · accept criticism · give credit · open-minded	· pride in work · respectful · self-control · handle stress · take risks · understanding of the work environmnet · interest in work
Group effectiveness and teamwork	The ability to use the correct combination of interpersonal skills to direct and guide a team to complete tasks and attain goals		
	· put people at ease · sensitive to cultural diversity · negotiate · solicitation · social commitment · helpful · responsive	· hospitable · lead and manage · even tempered · co-ordination · outgoing · supervise · co-operate · praise	· tactful · counselling · empathy · persuasive · compatible · recruit ideas · group process skills · summarise
Organisational effectiveness and leadership	The ability to effectively contribute towards the successful completion of set organisational goals		
	· goal directed · handle stress · meet deadlines · have vision · work to shcedule · delegate · lead · prioritise	· direct · administration · follow procedures · co-ordinate · put theory into practice · work under pressure · set objectives · assume responsibility	· make suggestions · manage · supervise · instruct · time management · motivate · apply policies · recommend

Appendix 1

Reference list

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APPENDIX 2 - EXAMPLE LANDSCAPE ARCHITECTURE ASSIGNMENT

UNIVERSITY OF PRETORIA
DEPARTMENT OF ARCHITECTURE

LANDSCAPE ARCHITECTURE
INTERIOR ARCHITECTURE

ARGITEKTUUR

UNIVERSITEIT VAN PRETORIA
DEPARTEMENT VAN ARGITEKTUUR

LANDSKAP ARGITEKTUUR EN
BINNE

- ONT 100 -

2002-07-15 2002-07-15

Project / Projek 3 – "Identity Crisis"

Design an outdoor environment with a specific "personality". Build a model thereof and combine the 15 models of your group together to form a schizophrenic city. / Ontwerp 'n buitelug omgewing met 'n spesifieke "persoonlikheid". Bou 'n model daarvan en kombineer die 15 modelle van jou groep saam om 'n schizofreniese stad te skep.

What can you expect to learn from this project? / Wat kan jy verwag om te leer van hierdie projek?

- How to control the character of a design. / Hoe om die karakter van 'n ontwerp te beheer.
- How to approach the activity of design. Where to start, how to come up with ideas and how to refine the good ones. We will use the creative problem solving process to guide the design. / Hoe om die aktiwiteit van ontwerp te banader. Waar om te begin, hoe om idees te ontwikkel en hoe om die goeies uit te bou.
- There is a specific way in which people react to the character of the environment from a psychological point of view. You will be exposed to some of the theory relating to this and will begin to understand why you enjoy certain spaces more than others! / Vannaf 'n sielkundige standpunt is daar 'n spesifieke manier hoe mense op die karakter van die omgewing reageer. Jy sal blootgestel word aan van die teorie wat verband hou hiermee en sal begin om te verstaan hoekom jy sekere ruimtes bo ander verkies!
- By now you have heard about principles in design. We will study some relating to our project and then apply them so that you can get to know how to use these principles in your designs. / Teen hierdie tyd het jy al van beginsels in ontwerp gehoor. Ons sal sekere beginels van toepasing op ons projek bestudeer en dan toepas om jou beter te laat verstaan hoe jy ontwerpbeginsels in jou projekte kan toepas.
- 3-D! We will mostly work with models which will develop your ability to see the 3-dimensionality of the outdoor environment. / Ons sal meestal met modelle werk wat jou waarnemingsvermoee van die 3-dimensionaliteit van die buitelugomgewing waar sal ontwikkel.
- How to work together with your classmates. / Hoe om met jou klasmaats saam te werk.
- To see how your design influences and is influenced by it's context. / Om te sien hoe jou ontwerp die konteks beinvloed sowel as hoe dit deur die konteks beinvloed word.

How to approach the design: / Hoe om die ontwerp te benader:

Just follow the program provided and everything will fall into place at the right time!
In short, you will spend the first week developing your own design and the second week building it and combining it with your classmate's models to create the whole city. / Volg die program en alles sal in plek val op die regte tyd. Kortliks sal jy die eerste week spandeer op die ontwikkeling van jou eie idees en die tweede op die bou en kombineering daarvan met jou klasmaats se modelle om die hele stad te vorm.

General requirements and comments: / Algemene vereistes en kommentaar:

- The following buildings must be incorporated in order to give the design scale. / Die volgende geboue moet ingelyf word om skaal aan die ontwerp te verleen (60m x 24m x 12m, 20m x 8m x 4m, 40m x 16m x 8m. Scale 1:250). Black solids which may stand in any manner. / Swart soliede wat op enige manier mag staan.
- Five white rectangles to represent people. / Vyf wit reghoeke om mense voor te stel.
- The following materials may be used; wire, coloured paper / cardboard and wooden dowels (any thickness and length). / Die volgende materiale mag gebruik word; draad, gekleurde papier of karton en hout "dowels".
- Do not complete your design before your group has discussed the design of the whole city. / Moet nie jou model klaar maak nie voordat jou groep die ontwerp van die hele stad bespreek het.
- The design language is to be developed on A2 white paper. / Die ontwerptaal moet op A2 papier ontwikkel word.
- Choose one of the following personalities on which to base your design: / Kies een van die volgende om jou ontwerp op te baser: Hercule Poirot, Charlie Chaplain, Mahatma Ghandi, Liberatsje,
- No functional detail is necessary! / Geen funksionele detail word benodig nie!
- Your design is an expression of the personality you have chosen by using lines, planes, forms, colours and textures. No recognisable images or symbols may be used. / Jou ontwerp is 'n uitbeelding van die persoonlikheid wat jy gekies deur om gebruik te maak van lyne, vlakke, vorms, kleure en teksture. Geen herkenbare beelde of simbole mag gebruik word nie.

What makes a good project? / Wat behels 'n goeie projek?

- Extensive exploration of the character of the design. / Deeglike ondersoek na die karakter van die ontwerp.
- A response to the principles and criteria identified by your group. / 'n Reaksie op die beginsels en kriterium wat deur jou groep geidentifiseer is.
- Good integration into the city. / Goeie integrasie met die stad.
- A well built model which expresses the personality successfully. / 'n Goed geboude model wat die persoonlikheid suksesvol uitbeeld.

Each person must collect the following references for Wednesday (and the 5 sheets of A2 paper, 2 sheets of A1 bumph and thick coloured pens / pencils): / Elke persoon moet die volgende bronne vir Woensdag versamel (en 5 velle A2 papier, 2 velle A1 bumph en dik gekleurde penne / potlode):

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