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THE TRANSFORMATION OF ARCHITECTURAL PEDAGOGY TOWARDS A NEW MODEL FOR ARCHITECTURAL EDUCATION AT UNIVERSITIES OF TECHNOLOGY IN SOUTH AFRICA

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ABSTRACT

Architectural education and practice in democratic South Africa have been challenged to respond to broad national imperatives which have completely transformed the educational and professional legislative frameworks that govern the architectural profession. Two key objectives emerged out of the transformation agenda: Spatial transformation and socio-economic redress. This posed challenges to architectural education, while at the same time presented many new opportunities for universities of technology to develop their unique and distinctive identities. However, the main criticism of architectural education at universities of technology is that its historic strengths of technology transfer and widened access, have been surrendered in favour of adopting curricula and pedagogic approaches of the traditional universities. Industry and the traditional universities are of the opinion that universities of technology should continue with a technology focused curriculum. The universities of technology have generally reacted to this criticism by spending time and energy on conceptualising curricula with a science and technology focus. The main argument of the thesis, however, is that architectural education at universities of technology has to build on its historic strengths while enhancing knowledge transfer to the benefit of society; this cannot be confined in any narrow definition of a science and technology curriculum. The definition of technology is asserted as a cultural construct and therefore cannot exist as distinctly separate to the artistic creativity required of architecture. Artistic creation, however, cannot be isolated in the 'silo' of studio production, but must emanate from socially engaged processes. The thesis explores the historic influences on architectural education to understand the reasons for the current state of architectural education at universities of technology in South Africa. Various theoretical positions and ideologies on education, architectural pedagogy and learning space development are critically analysed in the form of an extensive literature review. This is supported by empirical research and case studies in order to determine the unique and distinctive characteristics of architectural education at universities of technology, and their value to context and society. The synthesis of the critical research culminates in a new conceptual model for architectural education in South Africa, which is based on the principles of neo-humanism, defined by contextual responsiveness through the constant engagement of unit-subjective realities with the collective- society realities in a transformative, participatory pedagogic paradigm.

DECLARATION

I declare that this thesis is my own, unaided work and carried out exclusively by me under the supervision of Professor Lesley Lokko. It is being submitted for the degree of Doctor of Philosophy in Architecture in the University of KwaZulu-Natal. It has not been submitted before for any degree or examination in any other University.

…………………………………………………………………………………………………

Signed by Y Luckan

On this……17th………………day of……MARCH………………………………….,2017

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CHAPTER 1: INTRODUCTION

1.1. Background and Outline of Research

1.1.1. Motivation for the research

My experience as a professional architect, academic and active participant on the architectural and higher education regulatory / quality bodies has shaped a critical attitude towards architectural education, especially in the context of post-apartheid South Africa. I studied architecture over a period of twenty years defined by intermittent formal studies and work experience, due to socio-economic circumstances. My studies began at a technical institution, formerly known as technikon, which focused on draughtsmanship; I then progressed to a university of technology curriculum and eventually to architecture school at a traditional university. Correspondingly my job designations in practice included draughtsman, technologist and, eventually, architect. I had the privilege of heading the Department of Architecture at the Durban University of Technology, which opened up avenues for my engagement with quality and regulatory bodies such as the Council on Higher Education, where I serve as evaluator of new qualifications and the South African Council for the Architectural Profession of which I am the current President. More recently I have been engaging with the South African Qualifications Authority on the recognition of foreign qualifications and the recognition of prior learning. Accreditation of qualifications and international benchmarking feature high on my agenda. Currently, I am a full time academic at the University of KwaZulu Natal while I run an architectural firm in partnership. All of this experience has developed a critical attitude to education and practice which catalysed my research. In essence, this experience has raised questions around the various disconnections or “silos” that define architectural education and practice in the broader South African context as well as within the global knowledge society.

1.1.2. Context of the research

While it is undoubtedly true that universities of technology (former Technikons) in South Africa face many challenges, it is also possible to realise a number of opportunities with regard to the current crisis within architectural education and tertiary education at large: namely, the unique opportunity to address their purpose and focus within a ‘transformed’ societal and professional context. These universities are relatively new institutions in the landscape of South African higher education. Since 1979, they have evolved from technical colleges and institutions of higher learning to the status of universities. As a consequence of this change, they now face the challenge of defining and carving out a unique identity, different to that of traditional universities, and not inferior, as has historically been assumed. Over the past decade, there has been much debate on what this identity should be, resulting in a strong emphasis on the value of their science and technology focus, as well as industry partnerships.

Although the science and technology focus has historically defined their curricula, the unique identity of universities of technology is due to two broader social factors. Firstly, under apartheid, these institutions offered access to marginalised communities, who, for political and financial reasons could not access education at universities. These communities were expected to provide the skilled labour force within a racially segregated economy. The second factor relates somewhat to the first, in that universities of technology have continued to maintain strong links with industry. In this regard, however, their focus is changing from training skilled labour for industry, to encompassing a much broader view of society at large.

While the former technikons provided technically skilled workers (in the form of architectural technologists) for employment in professional firms, the changed context of the architectural professional landscape now requires high-level professional education and training, which includes the training of professional architects. This thesis posits that universities of technology must respond to this new ‘industrial context’ by freeing themselves of hegemonic restrictions in their historic identities as technical institutions for skills training.

The thesis argues that the dilemma between technology and liberal arts, as diametrically opposed, at many universities of technology is unnecessary and, in fact, self-inflicted. It is affirmed that technology is actually a cultural construct, benefitting society as much as industry. However, there is a very significant historic characteristic of universities of technology which distinguishes them from the traditional universities: the vital link with industry and society, albeit in an entirely different educational paradigm and social context. As these institutions evolved from technical colleges to institutions of higher learning, technology transfer and knowledge transfer emerged as strong defining characteristics, which have far reaching implications for their prevalent pedagogies, curricula and missions. A strong proposition of this thesis is for architectural education at universities of technology to break out of disciplinary silos, driven by industrial skills demand, towards contextualised learning that actively engages society and industry, within a broader humanistic paradigm.

I would argue that universities of technology are best positioned to offer responsive architectural education due to these historically strong ties with industry and society, and their current foci on 'knowledge transfer' through applied research. Although, historically, knowledge transfer was the key differentiator between universities of technology and traditional universities, given the current context of a new democracy facing many social and economic challenges, it seems fitting for universities of technology to carve out new spaces of research and applied research that better serve the wider society, in all its complexity. With reference to the built environment professions, changes in legislation within the democratic era have provided interesting opportunities for knowledge transfer in infrastructural development and spatial transformation. However, it may be argued that traditional universities are equally privileged with such opportunities. While this may be so, the second key area of historic strength of universities of technology has been the offering of widened access to historically disadvantaged communities, which could position them much closer to addressing the realities of diverse, complex and difficult socio-economic contexts. The South African socio-economic context has rapidly changed since 1994 within a new democratic political dispensation.

Rapid changes in legislative frameworks governing higher education in the post-apartheid era have afforded universities of technology many opportunities to establish themselves as equal to the traditional universities. One of their primary concerns is to establish a distinct identity which is different to that of the traditional academic universities. The greatest challenge, however, was the result of the rapid rate of change in higher education legislation, whereby learning spaces and curricula have been hurriedly adapted to respond to the opportunities offered by such legislation. This rapid shift unfortunately did not allocate the necessary time and resources in order to capitalise on the distinct identity of architectural education at the universities of technology as a place for knowledge transfer nor the enhancement of social and industrial engagement in more nuanced and meaningful ways.

Although curricula and pedagogic approaches may easily be reconceptualised, the historic character of the learning spaces at universities of technology are generally inadequate for an interdisciplinary learning paradigm. Generally speaking, learning spaces at these institutions which evolved from technical colleges were designed for technical skills training and not the research and theory-based design environment. These spaces, at technical colleges, were in the form of separate teaching classrooms, drawing rooms and workshop spaces.

Architectural education at traditional universities, on the other hand, was generally modelled around Vasari's *Accademia delle Arti del Disegno*, formerly established as the *Accademia e' Compagnia delle Arti del Disegno* at Florence, Italy, in the year 1563, which importantly brought together the arts and the sciences (http://brunelleschi.imss.fi.it). This is commonly referred to as the first academy of arts that focussed on the disciplines of painting, sculpture and architecture. The mode of learning was centred on a studio model which integrated theoretical knowledge in exploratory work. The model would later be widely promulgated by the *Beaux Arts* Academies, which had a profound effect on architectural education since the 17th century. In the South African context, schools of architecture at traditional universities were generally characterised by similar studio-centred pedagogies; this was starkly different to the departments of architecture situated within the former technikons.

To better understand the historic influences that shaped universities of technology, it is first necessary to outline the major geo-political and administrative regimes that have shaped South African history and settlement over the past three hundred years. South Africa's past is generally divided into four distinct periods: the pre-colonial, colonial, apartheid and post-apartheid eras. Much of this history, particularly of the colonial and post-colonial eras, is characterized by clashes of culture, violent territorial disputes between European settlers and indigenous people, dispossession and repression, and other racial and political tensions.

The discoveries of diamonds and gold in the 19th century had a profound effect on the fortunes of the region, propelling it onto the world stage and introducing a shift away from an exclusively agrarian-based economy towards industrialisation and the development of urban infrastructure. The discoveries also led to new conflicts culminating in open warfare between the Boer settlers and imperial Britain, who fought for control over the nascent South African mining industry. Following the defeat of the Boers in the Anglo-Boer War (1899 – 1902), the Union of South Africa was created as a dominion of the British Empire in terms of the South Africa Act 1909, which unified into one entity the four previously separate British colonies: Cape Colony, Natal Colony, Transvaal Colony and Orange River Colony. The country became a self-governing nation state within the British Empire in 1934 following enactment of the Status of the Union Act. The dominion came to an end on 31 May 1961, in consequence of a 1960 referendum, which legitimised the country becoming a sovereign state named Republic of South Africa. A republican constitution was adopted. From 1948 to 1994, South African politics were dominated by Afrikaner nationalism centred around racial segregation and white minority rule known officially as *apartheid*, an extension of segregationist legislation enacted prior to the 1934 Union Act. On 27 April 1994, after decades of armed struggle and international opposition to apartheid, the non-racial African National Congress (ANC) achieved victory in the country's first democratic election.

It is necessary to briefly outline the state of higher education and the architectural profession specifically in South Africa during the pre-democratic and post-apartheid periods.

1.1.1 The Pre-democratic Period

Post-secondary education in pre-democratic South Africa developed under two distinctly separate systems: the academic curriculum at the traditional universities and the skills-based, vocational curriculum of the technical institutes, each with its own pedagogic approach and learning environments. Training at technical institutes focused on subordinate technical skills for employment in industry and professional offices. In terms of the architectural profession, technikons primarily focused on training technicians and draughtspersons for employment as subordinates to architects in practice. An important point to note is that technikons were not quite technical colleges, as they were classified as ‘institutions of higher education’ and not Further Education and Training colleges, having evolved from Colleges of Advanced Technical Education in 1979 (Du Pre’cited in CHE 2010). The Advanced Technical Education Act of 1967 was promulgated in order to address a growing technical skills shortage in South Africa during the early twentieth century. For architects, traditional universities provided an education geared towards registering as professional architects, while the technical institutes provided subsidiary skills training for employment as technical subordinates to the ‘professional’ architects. Although one could argue that the system, which was based on the division of labour with the intention of maximising productivity, was certainly effective, the lack of integration and mobility between systems meant that technically trained personnel could not advance their professional status, which would ultimately impact on the quality of their lives.

A further challenge to professional education in post-apartheid South Africa arises from the lack of demographic representation in the professions. Technical institutes were historically more broadly accessible than the traditional universities and thereby afforded admission to historically disadvantaged people, including women. In the architectural profession, this translated to the bulk of historically disadvantaged people having been trained at technical institutions. These people occupied “non-professional” positions as technical assistants in the practices of professional architects. The dual post-secondary education system meant that the technically trained population were unable to articulate to higher levels of professional qualifications. This meant that accessibility to the traditional universities was practically impossible for people of colour throughout most of the pre-democratic era. Irrespective of the regulatory restrictions, people of colour generally could not afford the cost of education at the traditional universities, while the technical institutes were much more affordable.

In addition, regulatory frameworks only recognised professional practitioners as eligible for professional registration; there was no regulation governing the practice of architecture by non-registered persons. A significant number of technically trained persons formed their own private practices which were not required by law to be registered, as they were not defined in the Architects Act 1970 and 1977. This oversight by the regulatory authorities during the pre-post-apartheid period resulted in the proliferation of unregistered practitioners performing architectural services to the public without being bound by any code of ethics or having passed any professional practice exam. The majority of historically disadvantaged private practitioners fell within this category of unregistered architectural practitioners. These practitioners were sought by clients who could not afford the services of professional architects, which implicitly led to the bulk of architectural work in most disadvantaged communities being performed by non-registered practitioners. While the non-registered architectural practitioners applied their skills and trade within their communities, their lack of adequate high level professional training impacted negatively on the quality of architecture within their respective communities. The poor spatial and architectural quality of historically disadvantaged communities is concrete evidence of the lack of access to quality education and training.

1.1.2. The Post-apartheid Period

The post-apartheid period focused on various transformation initiatives towards redress of the inequalities created during the pre-democratic period. The transformation of higher education and the professions were vital and urgent to the transformation of society, redress and equitable distribution of wealth.

The transformation initiatives of higher education resulted in a number of papers, acts, frameworks and policies within a fairly short period of time, 1995-2000, which are discussed in detail later in this thesis. The Higher Education Act 101 of 1997 came into effect on 19 December 1997 (www.che.ac.za), subsequent to the Education White Paper 3: *A Programme for the Transformation of Higher Education*, which was published on 24 July 1997 (General Notice, Notice 1196 of 1997). The Education White Paper 3 was the ultimate outcome of the National Commission on Higher Education (NCHE), which was established by the first democratic president, Nelson Mandela, in February 1995. The Paper analysed the state of higher education in the South African context and provided a comprehensive set of initiatives for the transformation of higher education, including the development of a single co-ordinated system, governance and funding of resources.

One of the most important outcomes of the Act was the creation of the Council on Higher Education (CHE), the new statutory body for higher education. The CHE was particularly important in the alignment of qualifications, via its Higher Education Quality Committee (HEQC), which established the Higher Education Qualifications sub-Framework (HEQsF). The HEQsF is a single co-ordinated framework which allows for various routes of vertical articulation of higher education qualifications, while allowing different entry- and exit levels. This system replaced the divided dual post-secondary education system of the pre-democratic period.

A very critical outcome during the period of transformation of higher education in South Africa was the merger of institutions. The first Minister of Education, during the post-apartheid period, Professor Kader Asmal, outlined the rationale for institutional restructuring in his paper, *The Restructuring of the Higher Education System in South Africa* (Asmal 2002). This was the outcome of a process which the minister initiated by establishing a National Working Group to assess and advise on the higher education institutional landscape, as outlined in the National Plan for Higher Education (2001). The paper refers to the findings and recommendations of the process, which also looked at international precedent. Some of the key recommendations were the consolidation of higher education through the formation of new institutional and organisational forms; "fitness for purpose" of higher education; the reduction in the number of higher education institutions; universities and technikons should continue to operate with distinctly different programmes, and, in the case of comprehensive universities, recommended that the academic drift between former university programmes and those of the constituent technikons, be mitigated. The result of this initiative had positive effects while it also created a number of problems in higher education and access (discussed further in Chapter 5).

While higher education was undergoing rapid transformation, the professions were similarly changing in order to respond to the societal needs of a new democratic society. The Architectural Profession Act 44 of 2000 replaced the Architects Act of 1970. The Act provided for the establishment of a new juristic person known as the South African Council for the Architectural Profession (SACAP). There was one major transformative initiative of the Act, which was the establishment of four categories of architectural professionals, ranging from Professional Architectural Draughtsperson, Professional Architectural Technologist, Professional Senior

Architectural Technologist, and Professional Architect. Each of these categories were distinguished by levels of education / experience which limit work of a certain complexity, defined in the Identification of Work Policy. The registration of architectural professionals, under the ambit of SACAP, is located within a facilitative framework that affords mobility of registered practitioners who could, on obtaining the relevant qualifications or experience, articulate towards higher levels of professional status (www.sacapsa.com). While the registration of all architectural practitioners was deemed necessary in order to protect the public at large, it also importantly provided routes of professional articulation for the up-skilling, empowerment and equitable distribution of resources in historically disadvantaged communities. In this regard universities of technology are in the opportune position to build on their historic strength of widened access by developing programmes for the recognition of experience toward mid-career 'upskilling'.

The transformation agenda in post-apartheid South Africa, as per these Acts, frameworks and policies, placed high emphasis on representivity, access, equal opportunity and equitable wealth distribution. To date, however, the South African architectural profession has not been able to adequately reflect transformation (Table 1.1.) 24 years into a democratic political dispensation – there is an urgent need to train and register more professionals from historically disadvantaged backgrounds.

						2016
REGISTERED PROFESSIONALS						
Professional Architects	Gender	Asian	Black	Coloured	White	Total
	Male	126	248	79	2386	2839
	Female	57	64	29	886	1036
Sub-Total		183	312	108	3272	3875
Professional Senior Architectural Technologists	Gender	Asian	Black	Coloured	White	Total
	Male	163	164	114	1009	1450
	Female	22	20	7	295	344
Sub-Total		185	184	121	1304	1794
Professional Architectural Technologists	Gender	Asian	Black	Coloured	White	Total
	Male	99	152	83	477	811
	Female	16	21	12	166	215
Sub-Total		115	173	95	643	1026
Professional Architectural Draughtspersons	Gender	Asian	Black	Coloured	White	Total
	Male	83	421	215	553	1272
	Female	9	7	15	183	214
Sub-Total		92	428	230	736	1486
TOTAL PROFESSONALS	Gender	African	White	Indian	Coloured	Total
	Male	471	985	491	4425	6372
	Female	104	112	63	1530	1809

Table .1.1. Registered professionals in 2016 per race and gender (obtained from SACAP)

Table 1.1. indicates that 73% of the total number of registered professionals on the 2016 SACAP register are whites, while 27% are from historically disadvantaged communities. In the category of architect, the stats are even worse at 84% white, leaving 16% from historically disadvantaged groups. This is a gross underrepresentation of the demographics of South Africa, which has been under scrutiny by the Department of Public Works via the Council for the Built Environment (CBE). Although universities have come under pressure to admit more black students, the professional registration figures have not changed much in the past three years (Table 1.2.)

						2014
REGISTERED PROFESSIONALS						
Professional Architects	Gender	African	White	Indian	Coloured	Total
	Male	195	2068	111	41	2415
	Female	40	674	41	18	773
Sub-Total		235	2742	152	59	3188
Professional Senior Architectural Technologists	Gender	African	White	Indian	Coloured	Total
	Male	123	962	145	113	1343
	Female	10	269	16	9	304
Sub-Total		133	1231	161	122	1647
Proessional Architectural Technologists	Gender	African	White	Indian	Coloured	Total
	Male	137	484	98	92	811
	Female	14	144	13	6	177
Sub-Total		151	628	111	98	988
Professional Architectural Draughts	Gender	African	White	Indian	Coloured	Total
	Male	430	609	97	207	1343
	Female	7	176	10	11	204
Sub-Total		437	785	107	218	1547
TOTAL PROFESSONALS	Gender	African	White	Indian	Coloured	Total
	Male	885	4123	451	453	5912
	Female	71	1263	80	44	1458

Table .1.2. Registered professionals in 2014 per race and gender (obtained from SACAP)

The 2014 stats reveal that the number of white registered professionals in proportion to the total number of registered professionals in all categories, remains exactly the same at 73%, compared to 2016. Similarly, the number of registered architects indicates only a 2% improvement over a three-year period, which is far below Government's intended target of 5% per annum. What is further alarming, are the stats in Figure 1.1. which indicate a healthier position during the period 2005-2009 wherein 55% of the total number of registered professionals were white, and at least 37% comprising historically disadvantaged groups. Note that the designation, 'other', complicates the reading as this could indicate that many did not, in principle, agree to declaring their racial designation. However, the 2005-2009 stats indicate an overall figure of only 8% in the designation as 'other'.

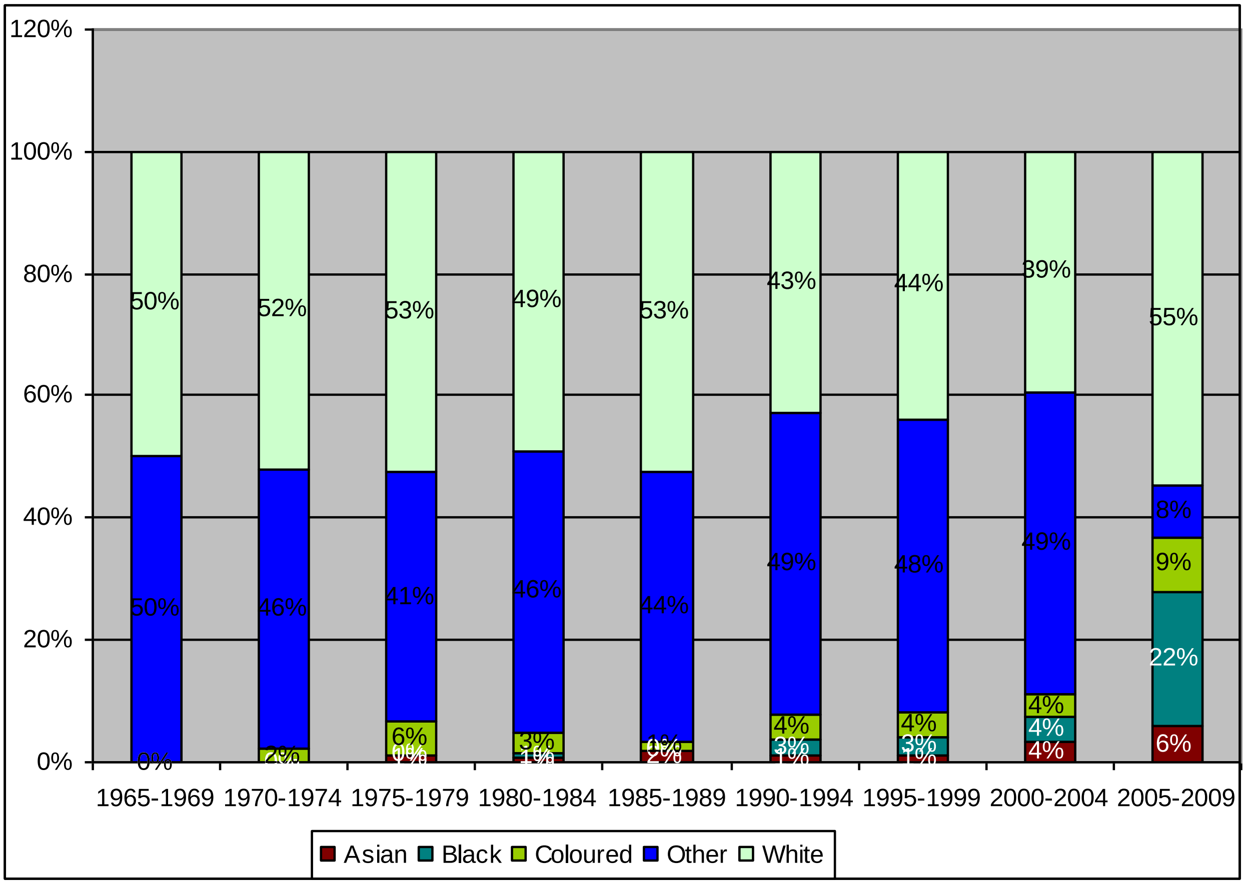


Figure .1.1. Registered professionals, 1965 – 2009, per race and gender (obtained from SACAP)

The present system, having been in effect for over twenty years into the post-apartheid dispensation has not made significant impact in transforming marginalised communities and neglected built environments, therefore the urgent need for some alternate system of education and training of architectural professionals in South Africa.

It is evident that the strategies implemented to transform the profession have not been effective. While the institutions of higher learning have increased intake of students from historically disadvantaged backgrounds, since 1994, this has made no significant impact on the state of representation on the SACAP register of professionals. It is argued that this may be due to the lack of support within these institutions for students entering from highly disparate schooling backgrounds; the details of this will be discussed in Chapter 5.

The thesis will therefore seek to develop an alternate model which may rapidly enhance transformation and complexity of learning by widening access to persons in full time employment. The requirement to provide means of articulation of the existing pool of historically disadvantaged practitioners to improve their qualifications and professional status has posed a major transformation challenge to both the tertiary education sector and the professional regulatory body like.

The preceding discussion defines the primary argument of this thesis which is that the prevalent system of architectural education at universities of technology does not respond to a changed social and professional context. The secondary argument is that universities of technology are best positioned to achieve this due to their historic identity defined by strong links to society and industry, and their current foci on knowledge transfer through applied research.

While the universities of technology in South Africa have historically been the primary centres for the training of technologists and senior technologists, the new regulatory structures have afforded them the opportunity of training architects, at a higher academic exit level / qualification. Currently, many universities of technology either offer or aspire to offer higher degrees towards the training of professional (candidate) architects. However, while the traditional universities are well established in the higher education sector, universities of technology face many challenges in developing their unique foci and directions. Professor Gerald Steyn, former Chair of the SACAP Validation and Heads of Schools Committees, emphasised in an interview (ANNEXURE I), that architectural programmes at South African universities of technology, in general, unlike their international counterparts, do not have a distinctly science and technology focus and are therefore similar to the programmes at the traditional universities. He emphasised that there was a need to define a distinct identity of these institutions by building on their historic strengths in order to transfer knowledge to the benefit of society. This lack of distinct identity, due to the rapid changes in institutional character has caused much confusion within the profession and public at large, while simultaneously resulting in missed opportunities for knowledge transfer through partnerships with industries and society in order to produce contextually relevant architecture. Du Pre' (2009) confirmed this fact that knowledge transfer through industry and societal partnerships was the vital and strong defining characteristic of the former technikons, which, he affirmed, must be maintained as a defining characteristic of universities of technology

While it is posited that universities of technology have historic strengths in science and technology, it may be counter-argued that the traditional universities are better placed to capitalise on the innovation trends in science and technology due to being better resourced to support research in scientific and technological innovation. This is certainly a current trend at the traditional universities in South Africa due to the necessary focus on environmental sustainability as well as addressing the needs of a transformed social context.

The position, however, that architectural education is better located at universities of technology stems from historic trends at traditional universities and the former technical institutions from which universities of technology emerged, as well as their current distinct focus on knowledge and technology transfer. Traditional universities, in South Africa, are defined by long established institutional cultures, where architectural education was characterised by a liberal arts focus, often disconnected from societal realities. A critical focus of this thesis therefore is the reconnection of architecture to society, which requires flexibility and adaption of the education system, which cannot be compromised by any hegemonic institutionalised culture. While both the traditional universities and universities of technology face this challenge, this thesis specifically focusses on universities of technology in South Africa as emergent, where the development of a new and distinct identity is being sought. Universities of technology are in a general state of indetermination and transition; it is therefore argued that they are better positioned to adapt to the needs of society today. It is posited that, given the required support and resources, universities of technology are in the prime position to develop new approaches to architectural education, which are flexible and adaptable to the needs of society, while serving the interest of the profession.

The South African situation, however, is not entirely unique as bifurcated and binary institutional forms exist elsewhere. Of particular relevance are the universities of technology in Europe, which emerged from either polytechnics or technical colleges. The evolution of the polytechnics in the UK, which were located in working class areas, responding to the needs of industry and society is vital to this research. Most of these institutions eventually evolved into universities, with a consequent redefinition of their institutional cultures. Many of the UK polytechnics established their relevance to society while seemingly with an artistic inclination. On the other hand, the *Technische Hochschule*, in central Europe, similarly evolved into universities of technology, which developed distinct identities characterised by a science and technology focus. Both the UK and the central European institutions evolved out of a technical background, yet remain contextually relevant despite their different foci. This raises a further discourse on the definition and purpose of technology within the socio-cultural context of humanity. The evolution of polytechnics and universities of technology in Europe will be discussed in detail in Chapter 4.

The above background raises a critical proposition of this thesis, which is that architectural education must become flexible, engaging and adaptable in order to respond to contextual complexities. Contextual relevance, responsiveness and meaning of architecture, with due regard for people, place and time are fundamental towards establishing humanistic architecture defined by engaged practice. To this end, critical analysis of ideologies, theory, precedent, curricula and pedagogic approaches forms the major part of this research, which will set the basis for developing a unique education model for architectural education at universities of technology in South Africa.

Architectural education may not, however, be effective without the necessary infrastructural support as well as adequate financing and human capital resources. This thesis therefore posits that pedagogy and learning space development are interrelated and any pedagogical change would necessarily require the development of facilitative learning spaces, which are adequately resourced. Learning spaces, in the context of this research, include formal spaces such as classrooms, interactive learning environments such as studios, informal or social learning spaces, including the virtual learning environment, as well as work-based learning spaces. Educational theories and learning styles, learning space development, support such as financial and human capital resources, will have to be analysed in order to create a holistic and relevant model for architectural education, which is based on the advancement of society and humanity.

1.2. Hypothesis

The definition of a distinct identity of architectural education at universities of technology in South Africa could be possible by building upon the historic strengths of knowledge and technology transfer, as well as widened access. An alternate model must be developed in response to the needs and aspirations of a transformed socio-economic context within the global knowledge society. This model must be based on strong humanist fundamentals and be characterised by heightened levels of engagement in order to bridge the gaps between theory, practice and society in order to responsively effect positive spatial transformation and the advancement of human potentialities.

1.3 The Research Problem and Objectives

The current state of the architectural profession in South Africa is defined by a high level of disconnection, especially from communities that most need it. This greatly compromises spatial and social transformation. It is argued that architectural education has a vital role to play in conscientising professionals to the needs of society and humanity. In order to achieve this the gaps between academia, practice and society, must be closed. The main proposition of this thesis is that an inclusive, engaging, interdisciplinary learning model must be developed for responsive architectural education within a humanistic paradigm.

The normative methods of architectural production often result in architecture that lacks relevance and contextual meaning, especially in complex multi-layered and multicultural contexts; this vastly contrasts to the traditional methods of architectural production up to the early 17th century. This problem is further exacerbated by divisions through specialisation within the built environment professions. Architectural education in South Africa has developed in “silos” and generally based on the adoption of historic architectural curricula and pedagogic approaches. The architectural studio, as the principal learning space, is generally spatially and ideologically disconnected from society; an introverted space that limits discussion and dialogue within disciplinary boundaries. Studio projects are usually similar for all students and diversity of contexts and design problems are not adequately factored in. South African cities, however, provide a rich tapestry of diverse and complex character, multi-layered and multi-cultured; an ideal context for responsive creative practice. Reference to international precedent, such as the unit system in the UK, could provide valuable lessons in addressing diversity within the architectural studio. The University of Johannesburg (UJ) has recently adopted such system in its newly formed Graduate School of Architecture (GSB), situated in the complex Johannesburg City metropolis, thereby exposing it to many different nuances and realities.

Universities of technology are particularly challenged to transform in order to be academically and practically viable within the broader South African context and the global context. International collaboration is becoming increasingly evident in universities of technology, such as the Durban University of Technology, the Nelson Mandela Metropolitan University and the University of Johannesburg. Student and academic staff exchange affords engagement with different contexts in both the developed and developing worlds in order to learn principles and methodologies for responsive design. Positioning oneself out of a known and comfortable context often allows for objective and reflective thinking about local contexts. There is an increase in funding sources such as EUROSA and ERASMUS for such engagements.

Furthermore, the recognition of the South African Council for the Architectural Profession (SACAP) architectural education validation system by the CAA and the Canberra Accord positions South African architectural education within the global context. As such, the education outcomes must be of a standard for ease of international mobility. At a professional level SACAP has forged relationships with international bodies for the mobility of professional architects. The SACAP Foreign Qualifications Policy further affords international alignment of professional competencies.

Given the context of a segregated past, a critical question to be asked is: how can architectural education become more appealing, tangible and accessible in the post-apartheid South African community – especially for the historically disadvantaged? As a profession, architecture is accessible to a relatively small group of affluent people and historically has very little positive impact on the historically disadvantaged communities. A key question here is why this situation still prevails in post-apartheid South Africa, more than twenty years into democracy. In this regard, the economic challenges faced by historically disadvantaged communities need to be interrogated and scenarios put forward to challenge or ameliorate current conditions. These challenges have ultimately resulted in a general lack of awareness of the architectural profession amongst the historically disadvantage communities, which consequently compromises the demographic transformation of the profession. There is a lack of interest in the profession by the historically disadvantaged population, which, in turn, has resulted in a shortfall of qualified architectural practitioners from these disadvantaged groups two decades into post-apartheid South Africa. This has further necessitated the urgent need for transformation within the profession as more architectural professionals from historically disadvantaged communities need to be trained or up-skilled as part of the broader national agenda of transformation and economic equity, and to effect real spatial transformation of marginalised communities

The current socio economic challenges, such as poverty, lack of access to resources, health problems, loss of cultural identity, security threats and declining economic opportunities for growing populations prevalent today have placed added pressure on developing economies. The value of architecture in building positive and vibrant communities, needs to be understood by architectural students and professionals, acknowledged by authorities and accepted by the very communities it is meant to serve. This requires that architecture starts to engage at these different levels, which requires a change in architectural education. There is an urgent need to educate and skill people in order to create more jobs and increase economic productivity. Many in the productive working class are in need of up-skilling. Severe financial burden on learners has made it difficult for capable students to complete or continue with their studies due to the duration of full-time study that most architecture programmes demand. Would part-time study or evening classes as well as technology enhanced learning provide viable alternatives to full time contact learning? Is it possible to develop an architectural education model that is flexible enough to respond to the diversity of learners as well the social context?

It is necessary to develop a new model for architectural education at universities of technology in South Africa that might respond to the need for transformation of the built environment while establishing relevance and meaning in society. Critical sub-questions emerge, which are necessary to systematically address the broader research problem.

Primary Research Questions

How can an alternate model for architectural education at universities of technology in South Africa be developed to enhance knowledge transfer in the interest of socio-economic and spatial transformation?

Would it be possible to develop a flexible model that could adapt to the changing needs of society?

How could such model offer widened access to the working class for mid-career advancement and up-skilling while acknowledging the skills gained through work experience?

Sub Questions

- What are the historical roots of architectural education and pedagogy in South Africa?
- What is unique and distinct about architectural education at universities of technology?
- How can a flexible model for architectural education be developed in order to respond to a continually changing professional, social and built environment context?
- How does architectural pedagogy impact on learning space development at universities of technology in South Africa?
- What are the possibilities for mid-career advancement towards the broader agenda of socio-economic redress?

1.4. Delimitations

This research extends across theoretical, subject and disciplinary domains. However, the focus is directed towards architectural education with specific emphasis on universities of technology in South Africa. Reference to primary theories will therefore be interpreted and translated to the context of contemporary architectural education and practice.

The research will be contextualised within the ambit of higher education and will therefore not necessarily elaborate on the basic (secondary) education and training system of South Africa, as this would require separate and intensive research. The reader should consider successful study at secondary level as a baseline entry point for the discussions that follow. This thesis does, however present a brief overview of the disparate high school system which developed out of apartheid policies on education.

Historical precedent will focus on the major international influences on the status of architectural education in South Africa. The educational models of the former European colonies in Africa, such as the British and French, will be analysed as an overview in order to determine how they have adapted during the post-colonial era; in this regard no in-depth analysis is necessary for the scope of this research.

Case studies comprise a select population of diverse institutional types in South Africa however the focus will be on universities of technology and comprehensive universities for the purpose of this research as these institutions have historically evolved from technical institutions.

While this research uses present political and development frameworks as points of reference it will not be entirely constrained by such frameworks. The research will be principally based on critical questioning of the historical and contemporary paradigms that define architectural education. Reference to broader ideologies, theories and concepts will be vital to the conceptual framework of the proposed new model.

The research focuses on critical and transformative pedagogical approaches to architectural education and learning space development at universities of technology, with a view to developing contextually relevant and responsive architecture.

1.5. Outline of chapters

Chapter 1: Introduction

Defines the research problem within the broader context of transformation in South Africa as a developing nation. The hypothesis and research problem lead to the definition of the primary research question, and key sub-questions. The scope and delimitations of the research, as well as the thesis structure are outlined.

Chapter 2: Research Methodology

The scope and limitations of the research are outlined, which then defines the appropriate research methods. This research utilises primary and secondary sources, such as case studies and literature review, respectively. Methods of sample selection and data handling are also outlined.

Chapter 3: Literature Review: Theoretical and Conceptual Frameworks

Literature review forms a large component of the thesis. This chapter focuses on critical discourse around the historic development of theories of knowledge and knowledge transfer. Educational theories and learning space development are analysed as part of the development of the theoretical and conceptual framework.

Chapter 4: History and Evolution of Architectural Education in the Developed World and its Influence on the Developing World

The theoretical discourse in Chapter 3 is applied in the understanding of the global evolution of architectural education. The British, French and German systems are discussed in order to understand their influences on the USA and the developing world, notably Africa. The chapter concludes with a discussion of adopted pedagogic approaches through colonial influence in Africa.

Chapter 5: History and Evolution of Architectural Education in South Africa

The origins and evolution of South African architectural education is determined, explaining the establishment and growth of architecture programmes at the early established institutions in the country. Similarly, the transformation of legislative frameworks governing education and the professions are explained in the context of architectural education.

Chapter 6: Historical Evolution of Architectural Education at Universities of Technology in South Africa

The development of architectural education at universities of technology is critically analysed against the context of transformation of the technical institutions of higher learning in South Africa. Regulatory frameworks and the restructuring of higher education is explained in order to understand the development of curricula and the strategic missions of the various universities of technology in South Africa. The chapter concludes with a discussion on the influence of the professional regulatory body and its position on the identity of architectural education at universities of technology.

Chapter 7: Case Study of Learning Space Development at Universities of Technology in South Africa

The transformation of learning spaces at universities of technology and their impact on pedagogy forms the large part of the case study. A comprehensive study of the learning environments is undertaken in order to understand to what extent these institutions have transformed their learning environments in response to pedagogic / curriculum transformation.

Chapter 8: Research Analysis of Student Responses to the Quality of Curriculum, Pedagogy, Learning Environment, Financing and Human Capital Resources.

Brief questionnaires administered to students at different levels is intended to get a better understanding of how the students perceive their learning environments, pedagogies, curricula and resourcing. This information is useful in determining students’ experiences and opinions against the preceding theoretical research and case analyses.

Chapter 9: Conceptual Framework for a New Model of Architectural Education at Universities of Technology in South Africa

A synthesis of theories and empirical data forms the basis of the conceptual framework of the new model. Research is further synthesised in order to develop guiding principles for the design of the new model. A new model is developed along the broad philosophy of Neo-humanism, which is itself a holistic and integrated philosophy on knowledge generation and transfer, with due regard to subjective individual realities within a collective knowledge society. This is critical to the object of spatial transformation. The model further includes a sub-model which proposes the recognition of prior learning (RPL) as a strategy for socio-economic redress in South Africa.

Chapter 10: Conclusions and Recommendations

The research findings are outlined and the effectiveness of the new model is reviewed against the primary objectives of the research, being engaged practice towards spatial transformation; and the possibility of an alternate system to afford the possibility of mid-career advancement while in full time employment – vital to socio-economic redress in South Africa. The chapter concludes with recommendations for implementation of the model and the need for further research.

CHAPTER 2: RESEARCH METHODOLOGY

The complexity of the research problem required that data had to be obtained from different sources in order to understand the broad context in which architectural education at universities of technology is situated. Historical evolution of architectural education in the international knowledge society, the critical discourses around the purpose of higher education, the actual understanding of the different learning sites in South Africa and the opinions and perspectives of students and academic staff at these institutions, defined the research design and methodology.

2.1. Research Design

Architectural education and practice have historically always been greatly influenced by broad universal philosophical paradigms and theories. The African context provides particular challenges to this 'universal' view, however, in order to posit a credible alternative, it was first necessary to conduct a thorough and in-depth review and critique of contemporary European and North American models. The colonial paradigm of architectural education across the continent generally, but in South Africa specifically, has particular resonances which have determined both the scope and nature of the research methodology. This thesis required a combination of empirical and non-empirical sources, therefore primary and secondary data collection methods had to be employed. A combination of auto-ethnographic enquiry, empirical data gathering, interviews, case studies and legislative documents/reports was used, leading to a broader and more historically situated understanding. Case studies and interviews were vital in order to obtain specific information about the nature of curricula, pedagogic approaches and learning spaces as well as the strategic objectives and development plans of schools of architecture, particularly at universities of technology.

2.2.Research Methodology

The research methodology is determined by the problem statement, hypothesis and research questions. This necessitates a blended approach of review and analysis of research, which employs both qualitative and quantitative analyses. Qualitative analysis is vital to the critical review of the historic theoretical and philosophical paradigms that have shaped the character of contemporary architectural education and practice. This is due to the nature of the research which is predominantly informed by a critical position on the status and value of architectural education and practice to society. The synthesis of various theoretical and philosophical approaches to the research problem is vital towards developing an appropriate and responsive theoretical framework for a new model of architectural education.

Quantitative analysis is also necessary in order to understand primary data obtained from the case studies of the relevant schools of architecture in South Africa. Spatial data, infrastructural evaluation, interviews and discussions are all essential to the development of a conceptual framework for the proposed new model. Interviews with the relevant academic staff, managers and students, as well as the review of *prospecti* and institutional handbooks of the case study sample, are necessary in order to find information on the strategic focus and direction of the various schools. The research data would further illustrate the educational composition and pedagogic approaches of the various architectural learning sites (ALSs).

The theoretical and conceptual framework of the dissertation begins with an outline of the broader philosophical and theoretical paradigms influencing architectural education through the critical analysis of secondary sources. This is followed by the interrogation of primary sources which looks deeper into the defining characteristics of universities of technology as well as the changes in educational and professional legislative frameworks in South Africa.

The development the new model requires a synthesis of primary and secondary data to inform its conceptual framework. Therefore, although the primary sources will produce statistical data for quantitative analysis, this will have to be further subjected to a deeper qualitative analysis.

2.2.1. <u>Secondary Sources:</u>

Secondary sources will be extensively reviewed in order to develop a better understanding of the existing body of knowledge in this area of research. Literature review, including precedent studies, will be critically analysed against the key research questions in order to position and develop a theoretical and conceptual framework for a new model of architectural education. A critical and comparative analysis of available literature will assist in contextualising architectural education and practice within broad theoretical and philosophical paradigms. This is vital in developing a deeper understanding of the intrinsic and underlying factors that influence architectural education and practice. All theoretical analyses are to be co-related to the focus area of this research. Furthermore, critical analysis is informed by general and universal theories and philosophies which are contextualised within the research problem.

In addition, literature review also focuses on the historical evolution of architectural education and learning space development in order to determine the roots of architectural education and practice. This is necessary, firstly, as the South African architectural education models have been largely inherited and adapted from influences of the pre-democratic dispensations. Secondly, the historical evolution of architectural education in South Africa, with particular focus on technical institutions of higher learning, exist mainly in literature sources.

Historical precedent with regard to teaching and learning are vital in order to test the practical application of pedagogic theories and concepts. The selection of international precedents explains the historical systems and models of architectural education that ultimately impacted on the South African architectural education system. Such historical examples, largely drawn from Northern hemisphere examples, comprise schools of architecture such as Ecole De Beaux-Arts (France), Liverpool University (UK), The Architectural Association (UK), Bauhaus (Germany), Vienna University of Technology (Austria), MIT (USA) and the Illinois University (USA). Examples from Africa comprise Kumasi University (Ghana), University of Nairobi (Kenya), Jama Kenyati University of Agriculture and Technology (Kenya) and University of Lagos (Nigeria). These examples are useful to establish how the respective institutions evolved from colonial heritage and established their regional identities and relevance in their respective social contexts. Pedagogy and learning spaces at the relevant "schools" of architecture are critically reviewed to ascertain their strengths and weaknesses in context and in their applicability to the South African architectural education system. Lessons learnt from precedent studies will be vital towards informing the conceptual framework for a new model of architectural education in South Africa. The literature review comprises critical qualitative analyses of a variety of texts as well as abstract spatial data such as maps, drawings and photographs. Sources accessed are mainly in the form of books, journals, web-based articles, videos, films and conference notes on architectural education and learning space development.

2.2.2 Primary Sources:

2.2.2.1. Auto-ethnographic enquiry

The vast and diverse academic and practice experience of the author was relevant to this research. The author is a practicing architect, an academic, a researcher and is also involved actively in the two principal legislative bodies governing higher education and the architectural profession, namely the *Council on Higher Education* (CHE) and the *South African Council for the Architectural Profession* (SACAP), respectively. Furthermore, the researcher has an education background in both the dual streams of higher education in South Africa, namely, the vocational skills training stream at a technikon as well as the academic stream at a traditional academic university. In addition, he has worked as an employee at various scales of practice, in all four professional registration categories of SACAP, namely, Draughtsperson, Technologist, Senior Technologist and Architect. This life experience is valuable in the qualitative analysis and evaluation of complex interlinked methods and processes that characterise architectural education and practice.

2.2.2.2. Documents, Policies and Blueprints

Policies, guidelines and regulations pertaining to the transformation of higher education and the architectural profession requires reference to Acts of Parliament and Government Papers and their resultant influence on professional bodies such as SACAP and the CHE. The post-apartheid transformation of higher education, on the one hand, and the architectural profession on the other, requires analysis of all legislated sources in order to understand the transformation of the respective frameworks and also to inform the conceptualisation of a new model for architectural education.

Institutional guidelines, policies and handbooks of the relevant universities provide valuable information regarding the vision, mission and strategic objective objects as well as quality control measures and the programme structures and curricula of the respective universities.

The analysis of building plans and photographic records of learning spaces at the relevant institutions, to be discussed under Case Studies, are necessary to understand the state of the respective learning spaces and also how they may have transformed with changes in institutional identity and/or pedagogic approaches.

2.2.2.3. Case studies:

Case studies of relevant Architectural Learning Sites (ALS) are undertaken in order to develop understanding of the curricula, pedagogic approaches and learning spaces of the respective architectural learning sites. The case studies are analysed to determine the key characteristics that determined the unique identity of universities of technology. Case studies also trace the evolution of the institutions from technical institutions to universities of technology and comprehensive universities - institutional change inevitably results in changes in curricula, pedagogies and learning spaces. The development of a new model will synthesise the data extracted from case studies with the information drawn from the literature review.

The interviews and discussions with respective key stakeholders at the various institutions subject of the case studies are important to determine the strategic foci, transformation of institutional identity and curriculum foci, and the respective challenges of these institutions.

Sampling Process

A purposive, targeted sampling method is used to determine the case study selection. This sampling method is deemed suitable as case studies are intended to analyse specifically predetermined criteria with which to examine certain phenomena that emerges from the literature review. The targeted samples for case study are strategic and broadly representative of the institutional types and key informants relevant to this research. The case study sample is based on the following selection criteria:

- Type of institution: at least one case from a university of technology and a comprehensive university in South Africa is analysed in order to establish the unique identity of these institutions with regard to curricula, pedagogy and learning space development. Each type of university has a unique and distinctive character derived from its historic origins and the nature of its programme offerings and research focus. While traditional universities have maintained their academic *status quo* despite the merger of some institutions of different identities to form new institutions, the universities of technology and comprehensive universities have been faced with the challenge of redefining their institutional identity, hence academic foci and goals. This has significant implications for the development of appropriate learning spaces, infrastructure and support in order to provide quality education within a revised academic and pedagogic paradigm.

- Geographic location of the institution in order to evaluate the relevance of the academic programme within its respective social, economic and environmental context. The economic and social realities of today challenge the traditional modes of education. Economic recession, job losses and poverty place urgent demands on higher education to bridge the gap between the rich and the poor, to broaden access and to stimulate the economy through job creation. The traditional higher education system, however, predominantly focuses on affording access to students who have just finished high school. The reality in South Africa is that many of the working class have no access to mid-career academic and professional advancement in order to better their lives. Any new model for architectural education cannot exist in isolation from these real societal problems.

- Academic programme diversity: the level and nomenclature of programme offerings at the various institutions determines their position within the Higher Education Qualifications Framework (HEQsF) as well as the SACAP professional registration categories. Analyses of articulation possibilities within programmes at institutions and between institutions is necessary in order to position any new model for architectural education within the broader academic and professional frameworks that guide education and professional registration. Higher level programme offerings such as postgraduate qualifications also affect the research output, hence scholarship at the institution. Analyses of research focus areas determine the relevance of institutional research within the societal and environmental context. The different institutions have their distinctive approaches to practice-based education and the recognition of prior learning (RPL). The resultant student preparedness may necessitate the consideration of multiple entrance points within an architecture programme. This may assist in expediting the education and training of professionals in order to address the skills shortage of architectural professionals in South Africa.

Interviews are contextualised within the case study areas and a stratified sampling method is utilized. Interviews focus on population groupings such as different study levels of students and different operational functions of staff, i.e. academic, administrative and support staff as well as higher executive management are relevant. Key informants provide general and broad information about the case study area, with a focus on their strategic and operational goals and characteristics.

2.2.2.4. Interviews

Interviews with the relevant key informants are based on current curricula and other relevant criteria informed by literature review and auto-ethnographic enquiry. Focus is on the strategic objectives and development plans of the relevant schools during the respective interviews.

Key informants, rationale for selection and objectives of the interview:

University of Technology: Durban University of Technology (DUT).

Key informants:

a. Professor Ahmed Bawa (Former Vice Chancellor)

Former DUT Vice Chancellor Prof Bawa has a wealth of experience at both the traditional university and the university of technology, as well as international academic experience. Professor Bawa is active on some of the key decision making bodies on higher education such as Higher Education South Africa and the South African Technology Network. The interview with Prof Bawa establishes what the broad level strategic thinking is about the foci and directions of Higher Education institutions, with particular reference to technical institutions of higher learning, in South Africa.

Key discussion areas of interview:

- Defining the distinctive identity of a university of technology
- The historic strengths of universities of technology
- Definition of 'student-centredness'.

b. Professor Deborah Whelan (Associate Professor and current HOD)

Professor Whelan has served as an academic at DUT since the pre-merger period at the former ML Sultan Technikon. She is the current head of department and is actively involved in research and community engagement projects.

Key discussion areas of interview:

- The difference in the architecture programmes between the former technikon and the present university of technology with particular reference to academic curriculum, pedagogy, staffing, resources, student profiles and student preparedness.
- The strategic direction and focus of the architecture department at DUT.

- Challenges regarding learning spaces and staffing of the transformed department and looking strategically ahead.
- Opportunities offered by the revised legislative frameworks governing architectural education and the profession.

c. Mr Kamal Orie (Alumnus, Lecturer)

Mr Orie has been a fulltime lecturer in the architecture programme since the pre-merger period at the former ML Sultan Technikon. Mr Orie is also an ex-student of the former ML Sultan Technikon. He therefore has valuable institutional knowledge of the transformed institution as an academic and former student.

Key discussion areas of interview:

- The difference in the architecture programmes between the former technikon and the present university of technology with particular reference to academic curriculum, pedagogy, staffing, resources, student profiles and student preparedness.
- The challenges and opportunities as an alumnus with regard to mid-career academic and professional advancement.

Comprehensive University: Nelson Mandela Metropolitan University (NMMU).

NMMU is the only institution in South Africa in which both the architecture programme and the architectural technology programme co-exist autonomously within one school. All the relevant academic leaders, from both streams, were interviewed in the form of a group conversation. Note, however, that specific questions are directed toward the respective persons as outlined hereunder.

Key informants:

d. Miss Nicola Darke (Head of School)

Key discussion areas of interview:

- The challenges and opportunities of offering both the architecture programme and the architectural technology programme within one school.
- The impact of the merger on resources including learning spaces.
- Access and entrance criteria to each programme.
- Possibility of articulation between the two programmes.

e. Mr Johan Pansegrouw (Academic co-ordinator): Architectural Technology and Interior Design)

Key discussion areas of interview:

- The challenges and opportunities for the architectural technology programme within a comprehensive university structure.
- The distinct and unique characteristic of the architectural technology programme.
- The impact of merger on staffing and infrastructure, including learning space, on the architectural technology programme.
- The strategic direction of the architectural technology programme in the current national curriculum renewal process.

Comprehensive University: University of Johannesburg (UJ).

UJ emerged from the merger of a traditional university, the Rand Afrikaans University (RAU) and Technikon Witwatersrand (TWR). Only TWR offered architecture programmes – technically oriented. UJ has developed its architecture programmes such that articulation is possible from the technically oriented diploma to a professional Master of Technology Degree.

Key informants:

f. Dr Finzi Saidi (Vice Dean and former Head of School)

Key discussion areas of interview:

- The impact of institutional structures on architectural education.
- The impact of merger on staffing and infrastructure, including learning space, on the architectural technology programme.
- The strategic direction of the architectural technology programme in the current national curriculum renewal process.
- Resource challenges, including staffing, in the new dispensation.
- Possibilities for interdisciplinary work with other design departments within the faculty.

2.2.2.5 . Student Questionnaires

The comments and critical opinions of students are extracted and analysed from student questionnaires of a sample of institutions. The main intention of the questionnaire is to determine the relevance and impact of curricula as well as learning space efficacy. The questionnaires are concise in order to test the perceptual opinions of students at the various ALSs. The questionnaire is designed such that it may be completed within 20 minutes; this is necessary in order to assess the students' immediate perceptual understanding on their overall learning environment.

The key objectives of the student questionnaire are to determine student perceptions of their current learning environments in order to determine the requirements for a learner-centred architectural education environment.

The key areas of focus of the questionnaire are broadly include:

- The relevance of the curriculum.
- Attitudes to the pedagogic approaches in curriculum delivery.
- The students' perceptions of design critique / jury
- Experience of learning environments including the formal, informal and virtual learning spaces.

The data obtained from the questionnaires will be statistically illustrated via tables / graphs to provide ease of reading. The statistical data will further be subjected to qualitative analysis which would tie such back to the information obtained from the other primary and secondary sources.

2.2.3. Determination of sample size

The sample size is selected to reflect the general state of education at the respective institutional types in South Africa. Of particular relevance are the institutions that focus on architectural technology.

Type of Programme	**Institution**	**% of total number of similar institutions offering architectural educational in South Africa**	**% in relevant province/region**
Architecture	NMMU	17%	100% in Eastern Cape
	UJ	17%	50% in Gauteng
Architectural Technology	DUT	20%	100% in KZN
	NMMU	20%	100% in Eastern Cape
	UJ	20%	50% in Gauteng
	CPUT	20%	100% in Western Cape

Table 2.1. Determination of the sample size of architectural learning sites in South Africa

The above table indicates a 34% sample size of traditional architecture programmes and a 60% sample size of architectural technology programmes offered in South Africa. A 100% sample size for the architectural technology programmes was obtained for both KZN and the Eastern Cape while a 50% sample size for architectural technology was selected for Gauteng.

The sample sizes above were adequate in order to obtain data that generally reflected the state of architectural education and learning spaces in South Africa.

2.2.4. Other primary sources of information:

The South African Council for the Architectural Profession (SACAP).

SACAP is the official regulatory body that governs the architectural profession in South Africa as per the Architectural Professions Act 44 of 2000. SACAP frameworks on professional articulation provide information regarding the possibilities of articulation between the various professional categories as well as the academic alignment at the relevant National Qualifications Framework (NQF) levels. Similarly, the outline of professional competencies required for the various professional registration categories is useful to determine the challenges and possibilities of academic and professional mobility and articulation. Furthermore, the relevance of SACAPs partnership with the Commonwealth Association of Architects and alignment with the Canberra Accord provides a broader international framework within which numerous possibilities of global integration of professional competencies may exist.

Key informant:

Professor Gerald Steyn:

Professor Steyn is an academic, member of SACAP and is the chair of the Validation Committee as well as the Heads of Schools Committee.

Key focus areas of interview:

- The SACAP Identification of Work (IDOW) framework which sets out the competencies required to practice within the various categories of professional registration. This in turn informs the ALSs on the minimum competencies required in order to be accredited and validated by SACAP. Such information is vital to the development of any curriculum and learning space.
- The strategic directions of the various schools of architecture regarding curriculum development within the HEQsF.
- The impact of architectural education at universities of technology of the upliftment of communities, particularly in the historically disadvantaged areas.

2.2.5. Data collection and recording

Case Studies take the form of site visits intended to extract measurements, collect data such as academic programme *prospecti*, handbooks and institutional policies, analyse learning spaces, infrastructure and resources. Case studies provide quantitative data such as statistics and measurements as well as qualitative data such as spatial experience through perceptual interpretation. The perceptual approach to case studies further aids a phenomenological interpretation of learning spaces. The physical as well as emotive and psychological implications of learning spaces are best analysed through a perceptual approach. Data will be recorded via drawings, photocopies, photographs and notes.

Semi-structured and informal interviews held with key informants and relevant stakeholders establish the strengths and weaknesses of the ALSs while identifying possible areas of opportunity for development. Both the semi-structured and unstructured interviews afford the researcher the opportunity to engage with the informants while experiencing the spatial qualities of the ALSs. Interviews are intended to provide information related to the literature review, precedent and case studies, but may reveal additional information that exists in the form of oral history. Semi-structured interviews further allow for the analysis of those factors that only become apparent at the site visit and which may not have been determined from questionnaires.

Interviews are recorded in hard copy. All data collected is used specifically for this research and will be destroyed upon completion of the thesis.

2.2.6. Data Analysis

The research methodology is based on critical analysis of data towards testing the hypothesis, theories and concepts. While the methodology is aimed at seeking solutions to the research problem and key questions, this process cannot not be linear as questions emerge and develop as the research progresses; this is largely due to the design (pedagogy and learning space development) oriented nature of this research.

Empirical data is analysed using both quantitative and qualitative methods. Measurements and statistical data such as staff to student ratios and learning space size are analysed using quantitative methods in order to define the key characteristics of and to make comparisons between institutions and levels of study. Quantitative data is thereafter subjected to further qualitative analysis in order to determine the relevant impact on quality of education and the efficacy of learning spaces/environments.

Secondary data is largely analysed using qualitative methods. The secondary data is comparatively analysed against the key research questions, theories and concepts in order to develop a theoretical and conceptual framework for the thesis. Such analysis further guides the development of selection criteria for case studies as well as the nature of the questions or discussions in the questionnaires and interviews respectively.

Summary and conclusion

The methodology outlined in this chapter is defined by a mixed mode which forms a complex blend of research methods and techniques due to the broad and complex nature of the research problem. The methodology is adapted from more established or traditional methods in order to specifically relate to the research problem of this thesis.

While empirical and non-empirical research methods are common and widely used in research of this nature, auto-ethnographic enquiry is vitally important to the nature of this research for two reasons. Firstly, the author's experience as an academic, student and practitioner through various periods and in both streams of higher education, provides invaluable insight and real-life experience to the research. Secondly, the rapidly transforming professional and higher education landscape in South Africa implies that literature and data may lag behind the academic debate and initiatives around strategic re-visioning and transformation that the author is party to, among all other stakeholders within the architectural profession and related higher education quality bodies.

CHAPTER 3:

THEORETICAL AND CONCEPTUAL FRAMEWORK

Chapter 1 outlined the state of architectural education in South Africa as a developing nation. It was noted that although the broad transformation initiatives post-1994 in South Africa pose certain challenges, at the same time opportunities have emerged for a new and relevant model of architectural education at universities of technology. Central to the transformation agenda, in the context of this research are two key objectives, namely, spatial transformation and social reform through redress. These two key objectives form the principle basis upon which the proposition for a new model of architectural education will be developed. Universities of technology, having historically enjoyed strong links with industry and society are said to be the prime position to meet national transformation imperatives. Chapter 2 outlined the research methodology which best suited the objectives of this research. While reference to primary sources, including case studies of the various architectural learning sites was deemed necessary, this chapter focuses on literature review to situate the research within a broader philosophical and theoretical paradigm.

The chapter begins with a critique of the dominant philosophical paradigms that influence contemporary education and practice in order to define the identity of architectural education at universities of technology. The core of the discussion focuses on the intrinsic position of architecture in society to determine an appropriate pedagogic approach, wherein alternatives are sought to bridge the gaps between theory, practice and society. As architectural creation requires a critical balance between the intuitive / introverted, as well as the analytical / extroverted processes, it is naturally influenced by both the sciences and the humanities in its creation. It is precisely this dynamic tension between sciences and arts in the traditional processes of making architecture that is vital in achieving a critical balance in the design process. While this tension is the vital thread that runs through the process of architecture, it is argued that the reliance on convenient universal norms and principles, compromises the responsiveness of architecture to people, place and time. Architectural education has to take cognisance of this reality in order to define its relevance to contemporary contexts, characterised by rapid and constant changes in environments, economies and societies. This background supports the main proposition of the thesis which is a new model of architectural education for universities of technology in South Africa. The intended unique identity of such model will therefore necessarily be based on a humanistic focus; which is flexible and responsive to the complex nuances of multicultural contexts, as well as to serve the needs of industry.

The definition of ‘industry’ in the architectural domain requires unpacking, as the process of architecture transcends the output focus of industrial production. While universities of technology have developed strong links with industry, it is argued that the respective pedagogic approaches historically developed along a skills training / ‘factory pedagogy’. Chapter 1 outlined the issue of the identity crisis of architectural programmes at universities of technology in South Africa, wherein, I argued that an unnecessary dilemma had developed on the premise of an artificial divide between science, technology and the liberal arts. This stemmed mainly from the historic culture of the former technikons which were institutes of skills training in order to address the technical workforce need of industry, wherein the value skill-sets for optimum production defined the quality of education. The recent institutional change to university status has, however, caused a kind of paradigm shift which has changed the context and “industry” to which architectural education must respond.

It is therefore proposed that architectural education at universities of technology must respond to a different context and industry, defined by human aspirations, life and culture, in addition to functional production. At a broader level, however, education has progressively moved away from human-centeredness to technological production. This has necessitated a critical review of the process and purpose of knowledge generation, knowledge transfer and the knowledge economy with humanism at its core – a focus on architecture as engaged, inclusive process rather than product.

This chapter focuses on the link between education and society within a broader neo-humanist framework which engages with both the objective and subjective realities, and the advancement of human potentialities.

3.1. A critique of the historic paradigms of knowledge interpretation and knowledge transfer

According to Bussey (2010: 1), education is a function of all cultures and society. However, the modern era has seen education move further away from society and culture, toward a predominant focus on industry and technological production; this is even more accentuated at universities of technology. Knowledge interpretation and the transfer of knowledge and skills, has largely been influenced by positivist ideologies, which served to perpetuate the finite objectives of knowledge to the benefit of industry – product-driven knowledge.

This paradigm also inherently ignored the subjective interpretation and application of knowledge and practice to people in context at a particular time. Within this paradigm, dominant groups benefit both from the curricula in education and the associated wealth gain from the values laden within such; other groups become disadvantaged and therefore vulnerable, both socially and economically (Hoadley & Jansen 2002 in Saidi 2005). Furthermore, Bernstein in Van Loggernberg (2000:2 in Saidi 2005), affirm that the design of curricula is a construct of the social, economic and political conditions. This confirms the argument that education within a positivist / industrial paradigm is about the control of human potential for the benefit of industry, within which human potentialities for knowledge generation in society are severely compromised.

Architecture is in fact one of the most vital disciplines in the broader developmental context, which transcends the notion of building as product, to the definition of cultural identity, society, politics, economics and the ecological environment. As such, it is argued that industry partnership within architectural learning sites cannot be limited by any product-driven approach; it has to transcend the limits of product and engage more actively with process and all the participants therein. It is therefore necessary to look at alternate theories and ideologies in order to establish whether alternate modes of may be developed to enhance architectural process and production for the holistic development of society. Architectural education, however, has largely lost its profound value as social and cultural asset and has rather become a mode of skills development and industrial production.

Bussey (2010) attributes the shift of education from the social / informal settings to an instrument of the state, to the rise in institutional modernity during the 18th century. He further attests that modernist education is essentially Western and has become a means of globalising modernity, wherein the aspirations of humanity and culture is undermined. He refers to this as a paradox at the heart of modern education, as while it achieved many great things, it simultaneously failed to prepare students for a future that asks very different and constantly changing questions of humanity. Bussey further criticises the nature of schooling during the early 19th century where education was a form of social engineering, which focused on skills advancement for the citizenry of industrialising states. This approach was inevitably based on a uniform approach towards the development of specific skills sets for industry, which consequently devalued creativity as a complex expression of intellect, intuition, culture and society. The lack of consideration of the multi-layered complexity of human potentialities has inculcated a totalitarian view of education, which inherently undermines contextual and cultural nuances – the perpetuation of a positivist paradigm in education. Positivist ideologies were generally not human-centred, but rather about the control of humans within ideological frameworks. This has had a negative impact on the quality of architectural production and the built environment, in which the socio-cultural aspirations of people in place are largely ignored. An ever-widening gap between architecture and society hence emerged.

In the attempt to bridge a widening gap between architectural practice and society, critical theory in architecture had been variously developed and transformed (Panin 2007). Ideological developments of the late 20th century began to question the relevance of positivist control in education; the period in which critical theory started to emerge. Agger (1991) related critical theory to post-structuralism and postmodernism, as strong critiques of positivism, in order to find appropriate and responsive methods of theoretical enquiry and production. Although closely linked to Marxist theory and the Frankfurt School, critical theory sought to explain why the Marxist prophecy of a socialist revolution did not occur, resulting in capitalism remaining as the dominant socio-economic ideology. Within such paradigm, people are conditioned to accept the world as it is, thereby inhibiting thinking of the possibilities of any alternatives (Agger 1991). I argue that both capitalism and Marxism were framed as imposing totalitarian ideologies to control the behaviour of human beings within the socio-economic context. With regard to capitalist ideology, such control manifested as conformity, obedience and discipline; characteristics which foreshortened the imagination of various alternative possibilities in an advanced technological society.

Jurgen Habermas' re-conceptualisation of critical theory is relevant as it integrates a range of theoretical and empirical insights that include diverse theoretical and political traditions. His human-centred critical approach intended to shift social theory from the paradigm of consciousness towards the paradigm of communication thereby enabling strategies for the critique of ideologies, community building and social movement (Agger 1991). This shift from consciousness to communication suggests a collaborative and interpersonal approach to theories, philosophies and the production of human utilities, which includes the built environment in the context of this research. Furthermore, Habermas clearly distinguishes between reflection/communication and causality/technical rationality as modes of enquiry in theory and practice. This challenges the ideological intrapersonal/intuitive approaches of thinking and production. The result of this is the emergence of a human-centred paradigm, focusing on people who rationally collaborate, discuss alternative social policies and develop consensus about them. The ultimate outcome of such process is the production of things that are of mutually derived value and meaning to society. Modes of interpretation of context, and the respective forming of meaning implies that collective and subjective interpretations are vital to the understanding of narrative, and that meaning cannot therefore be absolute, but rather relative.

While the preceding discussion revealed a general disconnection of education and production from society through positivist approaches, the post-structural concept of deconstruction as posited by Derrida is particularly significant as a counter position to positivist interpretation of texts. Derrida argues that text is un-decidable, as embedded within all texts are subtexts. According to Derrida deconstructive reading reveals unavoidable and inevitable gaps in meaning that afford readers the opportunity to construct meaning with their own interpolative senses. Reading is therefore active, personal, interpretive and not merely a passive reflection of objective text (Agger 1991) – a vital subject-object tension. Within a post-structuralist framework, therefore, the interpretation of text engages human subjectivity, which implies that meaning can never be definite, nor can it be absolute. This leads to the importance of cultural values and traditions in the interpretation of meaning and value.

While post-structuralism posits a theory of knowledge and language interpretation to understand how meaning is formed and interpreted, postmodernism, on the other hand, establishes a theory of society, culture and history (Agger 1991). This implies that meaning is contextualised beyond individual interpretation and includes the interpersonal negotiated meanings that are derived through social engagement, cultural systems and historical traditions. The creation and interpretation of meaning therefore emanates from the complex interconnections of various opinions and perspectives. Foucault's postmodernist philosophy establishes significant and vital connections with the social and cultural nuances of mainstream social science. Postmodernism, at a broader level, is therefore based on the rejection of totalising, positivist perspectives. According to Benabib and Keller (in Agger 1991), postmodernism defines social theory that interprets the world from multiple perspectives and therefore also rejects the totalising claims of Marxist grand narratives (Agger 1991). Foucault argued that knowledge be traced to the different discourse or practices that frame the knowledge within them. Like post-structuralism and critical theory, postmodernism posited that knowledge is contextualised by its historical and cultural nature thereby rejecting the notion of a universal social science. According to Agger, particular modes of knowledge are defined by the multiplicity of subject positions taken by different people (Agger 1991).

At the core of the problem of architectural education and practice, especially in the South African context, is a general lack of response to contextual diversity, which this thesis interprets as, fundamentally, an ideological problem. The inclusion of diversity and complexity, wherein the subject-object tensions of interpretation and meaning is greatly expanded, reconstructed and further developed in the critical work and discourses of P.R. Sarkar, philosopher and promulgator of holistic social development through body, mind, intellectual and spiritual balance for the expansion of human potentialities. Bussey (2008) refers to Sarkar (1978: 53) who repeatedly referred to life as an ideological flow. Sarkar's reference to such, however, was not based on the Marxist or post-structural definition of ideology as a coherent philosophical system, but alternatively regarded ideology as lived ideas that construct the sense of self, purpose and meaning in the journey of life; in this way, the definition of ideology moves away from idealism to pragmatism. Hence, while futurists ask the question: "whose future are you living?" from Sarkar's perspective, such question would be: "whose ideas are you living?" The determination of the future is therefore directly dependent upon the ideological position of person in society.

The critical position of Sarkar actively challenged hegemonic, dogmatic, power-driven or control-focused ideology by bringing together objective and subjective realities, with humanity at the core. While Sarkar's position may be related to Humanism, it is different in that he established Neo-humanism as an alternative ideology which is inclusive; builds upon local context while co-existing in the global; wherein person/unit consciousness co-exists with society/collective consciousness – consciousness is therefore not locked within individual person, but extends into the realm of the collective, a significant counterpoint to Habermas' interpretation. . This positions Neo-humanism in a critical space between East and West; in a space that rejects dualism and totalitarianism for inclusivity. In order to understand Neo-humanism, it is necessary to contextualise it against the generally understood Western ideology of Humanism.

3.2. Neo-humanism in context

Humanism was born out of a European ideological movement in 14th century, Italy. The most significant impact of Humanism was the unlocking of the human mind from dogmas and conditioned thinking, wherein a scientific mind was emerging with a view to improving humanity (Bussey 2010). Within Humanism there would be no differentiation between the developments in isolated disciplines as it sought to expand both aesthetic capacity and rationality. It would challenge the ideals of the Church, rejecting geo- and socio-sentiment, whereby humanity was viewed as one (Bussey 2010). The spread of Humanism directly related to the European Renaissance during which, Da Vinci's Vitruvian Man (Figure 3.0.a) was conceived, as a scale for a universal measure of all things.

The humanist challenge to hegemony and dogma inevitably encountered resistance within religious sectors. Bussey (2010) refers to the Reformation as the child of Humanism, which realised a period of turmoil and wars over the succeeding 150 years, largely due to religious intolerance. However, despite such resistance, the Enlightenment followed by the French revolution and the Industrial revolution led to a materialist understanding of reality which, with the Renaissance, paved the way for great intellectual achievements and developments of the past two centuries (Bussey 2010). The increased confidence in the scientific mind within the paradigm of Humanism would lead to concepts such as *utopia,* based on the single future ideals of intellectuals such as Thomas More.

The single future ideals of Humanism would be reinterpreted by Sarkar (1998), who proposed a multiple futures approach, *eupsychia*, which bound together infinite networks of interrelationships and possibilities (Bussey 2010). While Humanism was based on material reality, Sarkar's Neo-humanism reached far beyond to include the material, intellectual and spiritual realities, wherein human unity could move beyond the social level to include both animate and inanimate existence, translating into various inter-dependencies such as human-ecological existence. Within this paradigm reality may be less stable but far more creative, dynamic and responsive. Neo-humanism thereby highlights the tension between the worldviews of the West based on Judeo-Graeco-Roman-Christianity, and Asia's Tantric

Hindu-Buddhism which is much more indeterminate and open to multiple interpretations and practices.

In the context of education, Bussey (2010) refers to Gilles Deleuze and Felix Guattari's criticism of the totalitarian and hegemonic approach to learning and knowledge production in the West – referred to as geophilosophy. Neo-humanism, on the other hand is characterised by various possibilities, fluidity, responsiveness and multiple narratives. A comparison between two iconic forms of humanity in context, namely, the Vitruvian man and the Indian Nataraj, graphically illustrate these contrary interpretations between the West and the East (Figures 3.0.a & 3.0.b).

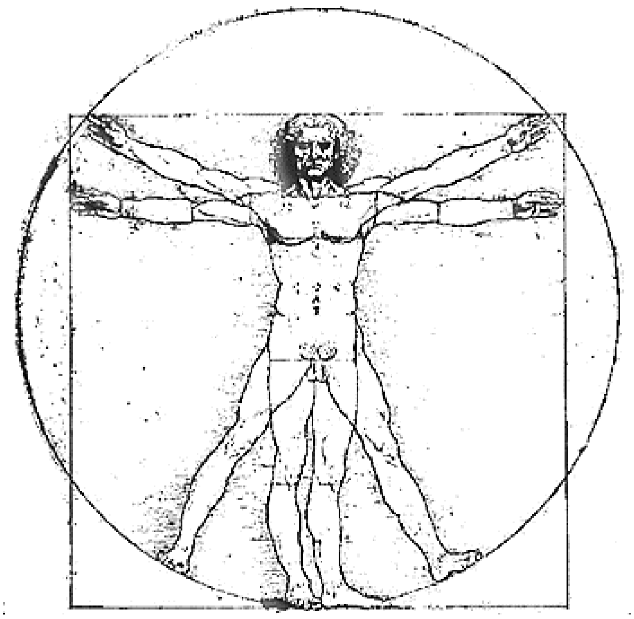


Figure 3.0.a. The Vitruvian Man

Figure 3.0.b. The Nataraj

While the former represents taxonomy and harmony in an ordered universe as evident in symmetry, balance, stability and order, the Nataraj represents a world of multiple meanings, contexts and forms, wherein order is contingent and bound by chaos and possibilities (Bussey 2010). Sarkar (1998) refers to the departure from the definitive mind-set of Humanism to the process oriented ideology of Neo-humanism as a new dawn in the evolution of consciousness brought about by a new Renaissance. This new Renaissance is interpreted by American pedagogue Sandy Grande (in Bussey 2010) in her argument that no theory can, or should be everything to all peoples and that, differences in material domains necessitate differences in discursive fields. Neo-humanism therefore assumes the position of a layered philosophy, a form of pragmatism with a distinctive epistemology and evolutionary ontology (Bussey 2010).

The new Renaissance as promulgated by Neo-humanism fundamentally differs from the European Renaissance albeit that they both evoke new modes of learning. While the European Renaissance comprised seven liberal arts: grammar, rhetoric, logic, geometry, arithmetic, music and astronomy, the new Renaissance of Neo-humanism focuses on seven liberating rationalities: service, empiricism, character development, ethics, aesthetic science, universalism and spiritual practice (Bussey 2010). Therefore, while Humanism remained an intellectual movement which sought social order through theoretic process, Neo-humanism is characterised as a pragmatic movement that focuses on construction of reality through the balance of physical, intellectual and spiritual activity. Sarkar (1998) referred to spirituality as not a utopian ideal but rather a practical philosophy. Within the process of architectural creation, spirituality takes on multiple meanings to include the intuitive / meditative to the connection of the self with the greater inclusive context of creativity - a synergy between unit consciousness of person and the collective consciousness of society. Neo-humanist education therefore situates learning firmly in local context while at the same time maintaining a higher spiritual purpose free of socio-sentiment and geo-sentiment.

Education and practice, within a neo-humanist paradigm, may become engaged with context in its multiplicity through layered modes of deep and broad thinking about existence and co-existence. Within this existential reality, many diverse and complex realities emerge, wherein hybrid responses and new possibilities for education could appear. The consideration of multiple realities through layered thinking translates into engaged practice as a rational synthesis of multiple realities – wherein disciplinary silos cannot exist. Within the Neo-humanist paradigm, education can never be limited to the service of industry. Humanity and the advancement of human potentialities and the consequent advancement of society are instead, the underlying principles.

The neo-humanist approach of inclusivity of multiple perspectives, complexity and diversity gives rise to the concepts of hybridity and ‘interdisciplinarity’ in pedagogy, which stimulates the critical enquiry of theories and the development of ideas and concepts in an “in-between” or hybrid space. Hybrid interdisciplinary space fosters collaboration beyond the dualistic interplay of disciplinary silos and binary opposites which, according to Bhabha (in Menin 2003), are often regarded as mutually exclusive in Western ideology, which tends toward positivist ideologies of control and boundary protectionism. Within such interdisciplinary paradigm, opposites may synthesise to create new meanings of greater significance with multiple narratives whereby value is established through subjective interpretation.

This leads the discussion to the relationship between the concept of ‘interdisciplinarity’ and its application to the development of multi-cultural identities. “Interdisciplinarity’ by its nature, exists in “in-between” space known as ‘hybrid’ space. Homi Bhabha refers to ‘hybridity’ as a key concept of post-colonial theory, which is a cultural phenomenon that advocates the inclusive and meaningful connections between different cultures. Bhabha suggests that this opens up a space for translation – a place of hybridity (Menin 2003). This interdisciplinary hybrid space is what Bhabha refers to as the “third space”. Hulme *et al.* (2009) refer to Bhabha’s third space theory and hybridity as a theoretical basis wherefrom professional cultural knowledge can be explored. This, according to Bhabha is vital in developing trans-professional knowledge in an attempt to make connections between dislocated experiences and practices. Bhabha (in Hulme *et al.* 2009) refers to the third space as a place for radical openness and hybridity, a critique of colonial and post-colonial discourse which focuses on surveillance and containment, also referred to as ‘silos’, which are disciplinarily disconnected.

The surveillance of disciplinary domains is resistant to the incorporation of difference in whatever form that it may present, which includes, cultural difference and professional difference. Bhabha (in Easthope 1998) implicitly refers to Derrida in relating hybridity and the concept of the third space as a space of translation, to Derridean difference. Bhabha posits that colonialism is ambivalent in that while it may appear original and authoritative; its articulation is based on repetition and difference (Bhabha in Easthope 1998). Difference, according to Derrida is enacted by the deferral of meaning in time and differentiation of meaning in space (Easthope 1998). Bhabha uses the term “interstices” to explain spatial differentiation, which defines “in-between” spaces wherein domains of difference overlap, wherefrom new hybrid spaces emerge and wherein meaning may be interpreted through various subjective interpolations of multiple cultures and professions.

Jane Rendell (2006) refers to ‘in-between’ spaces, arguing that interdisciplinary space exists as the place between art, architecture and critical theory. Such collaborative “thinking between” questions what is generally taken for granted, such as the methodologies, the way we do things and terminologies (Rendell 2006). In this context, there is no place for the habitual perpetuation of historic theories, methods and processes. Within “in-between” critical space, nothing can be taken for granted, as relevance has to be constantly interrogated and methods constantly rethought in order to be meaningful and responsive to context. This process requires constant reflection and constant revision – it is a dynamic process. Rendell notes that critical theorists offer self-reflective modes of thought that seek to change the world in which the inequalities of market capitalism, patriarchal and colonial interests continue to dominate. Rendell's argument touches on issues of transformation and challenges the positivist paradigm which dominates theory and thinking. Furthermore, her interpretation of interdisciplinary space challenges the hegemonies and traditional canons of architectural education. "Thinking between…" what is, and has been taken for granted, forms the basis of the transformation agenda in architecture. Such an agenda is informed by critical thinking and questioning why things exists the way they do, interrogating ontology and epistemologies against societal realities, within a transformative pedagogical paradigm. The intention of transformative pedagogy overlaps with the ideological aspiration of neo-humanist futures as both are pragmatic approaches to social processes, characterised by trans-, or even post-disciplinararity; the linking of local and global; self and society; inner and outer, in what is referred to as a transformative praxis (Bussey 2008). This poses a necessary challenge to the predominant pedagogic and practice approaches which are designed for the primary benefit of industry.

Architecture is by nature, however, a manifestation of a social process of intra-, and inter-personal personal engagement, combining inner and outer realities, closely related to contextual complexity and diversity within a responsive system of synthetic rationality. However, the reality of the modern world, defined by an overt focus on industry and product, has negatively affected architectural practice, which has resulted in its gradual disconnection from the complex social paradigm into the realm of objective production and "creative silos". This scenario has made it necessary to look into the historic evolution of architectural education and training to understand the reasons for such disconnection in order to find alternatives that may contribute to the development of the new model for universities of technology.

3.3. Architecture as disconnected practice

Historically, architecture evolved in response to the needs and aspirations of society and, hence, represented the culture of societies through aesthetic and technological methods by means of the acts of craft and building (Figure. 3.1.).

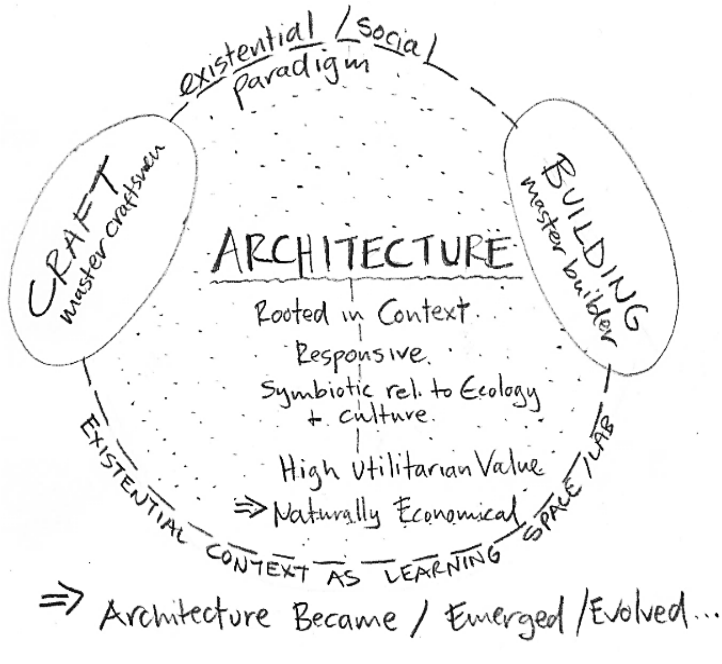


Figure. 3.1. The position of architecture up until the early17th century (Author 2014)

Figure. 3.1. illustrates the qualities of architecture and the learning of architecture that were based on responsiveness to context and as such, architecture invariably reflected the culture of place and the regional vernacular. The strong connection between the act of making and the creation of architecture generally resulted in contextually-responsive architecture that reflected both the utilitarian values of function, as well as the cultural aspirations of the given society - the 'paradigm site' for architectural education was the existential context. This existential/social paradigm defined the practice of architecture and architecture in turn would enhance the utilitarian and cultural value of the context.

It is therefore posited that architecture is culture in the built form. This implies that all of the intrinsic characteristics of the geographical context, which is also referred to as the existential context, defines the inspiration, methods and technologies of making architecture. Note, here, that the term *making* is used instead of *creating*. Making requires that the architectural “product”, be it built form or space, results from the complex synthesis of tangible resources such as materials (structural and decorative) as well as the intangible qualities of place, such as the socio-economic and cultural values and influences. This implies that the acts of building and craft-making define the forming of architecture, which expresses the values of societies in their respective contexts. This ‘making’ of architecture is what technology enables and supports, wherein technology itself is a social construct.

On the other hand, where the art of creating assumes an elite position of dominance, disregarding context, the ego and will of the architect may impose on the cultural landscape to its detriment. This disconnection between the creation of architecture and the making of architecture, and the reasons therefore, may be traced back to the early 17th century. During this period, the formalization of architecture as a profession, which required formal academic training, resulted in a drift away from the “making” of architecture through craft and building; this was the point of departure in which the discipline of architecture wholly retreated into an introverted ‘artistic paradigm’ disconnected from society (Figure. 3.2.). The term artistic paradigm” in this thesis specifically refers to an entirely introverted / silo approach to design, which does not engage with effectively with the multiple layers of context – it does not infer that art is not a valuable cultural asset, or that art is excluded from making or building.

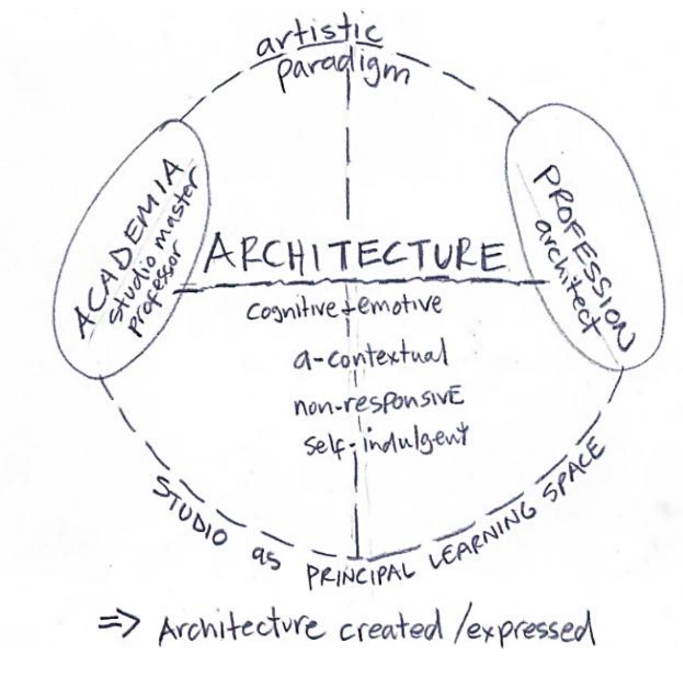


Figure. 3.2. The position of architecture since the early17th century up until the late 20th century (Author 2014)

The 'artistic paradigm', defined by the intuitive studio at the centre of this model, is an introverted space which is disengaged from society. This disconnection may be traced back to the mid-17th century when architectural practice moved out of the hands of craft and making into the academic paradigm. Cret (1941) attributes this to the Renaissance in Italy, when architecture separated from the guilds and developed as a profession following the ideals of the courts and the aristocracy. This discussion will be further elaborated upon in Chapter 8. Frampton (1992) confirms that in order to understand the origins of modernity one has to project back to the Renaissance or at least to the mid-18th century when architects started to critically question the rule-driven and classical canons of Vitruvius. This period was succeeded by the period of Enlightenment; a positivist approach to the interpretation of phenomena where it assumed that everything in the universe could be demystified through rationalisation and 'cataloguing' (http://www.history.com). The impact of this on architectural practice and education was that the subjective, personal and interpretative qualities of architecture were given up for standardisation and universal interpretation. It was precisely this disjuncture between architecture and society that led to the criticism of modernist tenets by the architects of the late 18th century.

However, subsequent ideologies and philosophies on architecture continued to remain within the positivist paradigm. This has manifested in architecture of the late 20th century still being defined by a general disregard for human aspirations and cultural relevance, moving further toward industrial production. Context has been reduced to the physical, infrastructural and climatic values, which are all quantifiable. Vickery (in Panin 2007) noted that architectural education of the early 20th century lacked critical theoretical enquiry, which at the time was based on historical precedent; on learning methods and technologies of production. Vickery criticises the Bauhaus-oriented schools, which, while open and democratic, presented architecture as a political and practical art. Emphasis was on how to do rather than understanding what was being done. Critical theoretical process was thereby underplayed wherein the "know how" of production attracted increased importance. Architectural theory thereby gradually disengaged from practice and became a historical compilation of existing theories within the discipline of architecture, instead of giving emphasis to the thinking process; critically questioning the relevance of theories and practice and generating new ideas (Panin 2007). Panin attributes this to the triumph of pragmatic application over philosophical enquiry, as evident in the first half of the 20th century, which gave much focus and prominence to technological process over theoretical analysis in architectural education. It is therefore necessary to develop an overview of the general focus of architectural studio projects during the early to mid-20th century in order to understand the focus of architectural education and the related pedagogic approaches.

Although architectural education and practice retreated from the act of making into the studios of artistic creation ever since the mid-17th century, the mid-20th century witnessed an inclination of architectural education towards social and cultural issues. This is evident as outlined by Rybcznski (in Stamps III 1994), who noted the following trends: the early sixties' projects focused on large-scale housing which reflected interest in social issues. The seventies saw a return to architectural history in which projects were characterised by large formal buildings and renderings. However, studio projects in the latter decades including the nineties tended towards unusual buildings of little functional requirement and maximum emotive potential, wherein designers were focused on self-expression and individuality, a predominantly introverted and abstract process. This period has had the most impact on contemporary architectural practice and education as most of the current practitioners and academics of middle-age were educated in the nineties. The resultant architecture was based on personal will developed through a self-indulgent process that was disconnected from the inconvenient realities and complexities of the societal context.

This thesis argues that the impact of the professionalisation of architecture and the emergence of academies of architecture since the Renaissance, still resonate today. The design jury, the discipline-specific studio, lack of project diversity and the lack of acknowledgement of contextual diversity including the multi-cultural student body continued to define curricula and pedagogic approaches of most schools of architecture in South Africa. As a consequence, design problems continue to be resolved through historic methods of enquiry and practice which have generally ignored the multi-layered nuances of complex contexts defined by contemporary socio-economic, cultural and environmental realities, and an increasingly diverse student body.

The past two decades, however, has seen a shift in architectural pedagogy and the literature review suggests that theoretical discourse is focusing more on enquiry (thinking about the process of making) than on the necessary production (making of things). The reflective nature of critical enquiry within this paradigm means that processes and methods of production are subject to constant questioning and rethinking in order to establish contextual relevance with due regard for people, place and time - a shift of focus from the understanding of how things were done in the past to what is relevant and how to understand things in the current situation (Panin 2007). It is no more about how to improve the way things have been done, but actually questioning the fundamentals and the relevance of the way things are done, that underlines critical theory applied to the context of this research.

Within the built environment disciplines, however, the perpetual trend amongst historians has been to focus their enquiries on the internal concerns and procedural practices of the profession, rather than broader theoretical and political agendas that relate to the complexities of the built environment. As a consequence, discourse around architecture has been generally understood to simply be about what the architect does (Borden & Rendell 2000). The implications of the architects' actions on the multiple layers of context do not extend beyond the awe of buildings as formal objects in "space". Borden and Rendell, however, emphasise that architecture extend beyond the studio and product of the studio, and that everyone involved in architecture, which Borden and Rendell refer to as "simply everyone", is absolutely implicated in the wider world of architecture in which we all live (Borden & Rendell 2000). This implies a necessary shift from the literature and discourse around single architects, monographs and practices, to include concerns without the historic disciplinary/hegemonic realm of specific architectural practice within a product-driven mode to a process of making through collaboration.

The making of architecture has to be realised through collaboration between a multitude of stakeholders, embracing a variety of factors and not just the architect or even built-environment professional collaborations. In this way, architecture and discourse around architecture could transcend the material and objective character of buildings and start to include the broad range of social, economic and environmental interests through interdisciplinary engagement which necessitates interdisciplinary thinking as well as interdisciplinary production. Panin reaffirms the value of critical theory as an interdisciplinary way of thinking which could thereby bridge the gaps between architectural theory and practice (Panin 2007).

The recent emergence of Neo-humanism has expanded on the integration of various modes of theoretical enquiry within a pragmatic paradigm to engage with the complexities of multi-layered contexts. This includes those layers of context that are 'soft' and 'intangible', such as the cultural layers of personal (unit) and societal (collective) consciousness. The relevance of a neo-humanist approach in the context of architectural education may greatly assist in establishing relevance and meaning of practice within the diverse and complex broader South African society. In this regard an engaged approach to architectural production could assist in bridging the divides between the profession and society as well as between academia and practice. The neo-humanist approach further extends architectural education to the broader global context wherein the complex nuances of the South African contexts may valuably contribute to critical discourses on social, economic and environmental change. Neo-humanist principles, based on connecting different contexts and paradigms, may immensely benefit the universities of technology in South Africa in determining their unique identities. It further has value to the pedagogic approaches of architectural education at universities of technology, which have historically been defined by an industrialised approach, towards one that advances human potentialities to the benefit of society.

It is therefore important to analyse various approaches in education to better understand the evolution of education in society in order to determine the key principles that may inform the alternative model that this thesis proposes. The historic approaches to architectural education, which have greatly impacted current practice, have been influenced by broader theories and philosophies that have shaped education in general. While this research focuses on architectural pedagogy and learning space development, reference has to be made to broader philosophical frameworks which influence education and learning space development, before focusing on architectural education.

3.4. The evolution of educational and learning Theories

3.4.1. From canonisation towards knowledge generation

Contemporary education has generally been interpreted and effected through two different and often interchanged pedagogic approaches, namely, the 'behaviourist' approach and the 'constructivist' approach, which have had different implications to learning space development and the level of engaged practice. These approaches have fundamentally influenced the development of pedagogic approaches in architectural education such as studio-based pedagogy, experiential learning, cooperative learning and reflective practice.

Early architectural education tended towards a behaviouristic pedagogic approach based on linear transmission in which the teacher was the transmitter and the pupil the receiver of knowledge. Within the behaviourist paradigm, learning is centred on the teacher. The pupil would take instructions and mimic the behavior of the teacher/master. In architectural education, this approach is clearly evident in the British system of articled pupilage and the French *Beaux-Arts* system, which will be discussed in the next chapter. While architectural education within the behaviourist paradigm focused on imitation and master-led instruction, behaviourist pedagogy, in general, implements teaching and learning devices such as textbooks, worksheets, linear student generated text and independent work (Bigenho 2008). Jonassen and Land (in Stauffacher *et al.* 2006) refer to traditional teaching as based on a sender-receiver model, wherein learning is confined to knowledge acquisition (Stauffacher *et al.* 2006). The implication of such model, against the framework of critical theory, suggests that there is an inherent lack of critical enquiry in learning.

Saidi (2005) referred to Perennialism as the oldest educational philosophy whereby the mind is conditioned with universally accepted notions of knowledge, including the view of knowledge being based on absolute truths. This philosophy is also based on a teacher-student linear transmission model, wherein the former is seen as the holder of wisdom and the latter the recipient / disciple. Saidi (2005), associated this passive role of the learner to the philosophy of Essentialism, wherein the learner awaits learning stimuli from the teacher.

The behaviourist, perennialist and essentialist positions on knowledge were widely prevalent in and continued to be perpetuated in architectural education through the *Beaux-Arts* model, which placed heavy reliance by the student on the master for learning and decision-making stimuli. Students focused on the finished product as an object which was considered to be of greater significance than the critical theoretical and philosophical processes of design. Historically, as evident in the *Beaux-Arts* system, the materiality and object-focused endeavours of architectural discourse, pedagogy and practice defined the scope of architectural education and practice. The *Beaux-Arts* system as such inhibited critical thinking, ultimately resulting in the decline of the general level of design (Salama in Andjomshoaa *et al.* 2011).

Education based on universal laws and norms as definitive, determinate and therefore inflexible to change, inhibit critical thinking and it is therefore necessary to look at alternate pedagogic approaches that could be more relevant in architectural education, in order to bridge the divides between theory, practice and society. The past two decades have seen a shift from these approaches to a constructivist approach in (architectural) education which places emphasis on learning and the construction of knowledge by learners.

Constructivist pedagogy connects individual learners' cognitive constructions with the influences of social and environmental factors within an engaged learning paradigm. It could, therefore, be considered as being learner-, and learning-centred. Constructivism as an educational paradigm, however, emerged much earlier – during the 1980s and 1990s as interest waned in behaviourist, information-processing paradigms (Mayer in Liu & Mathews 2005). The behaviourist mode became increasingly undesirable by learners, who preferred a more active and engaged approach to learning. Phillips (in Liu & Mathews 2005) affirmed that the mechanistic, predictable and controllable view of the universe contrived by the behaviourist approach could not capture the active and social characteristics of learners. As a consequence, the behaviourist approach was superceded by a constructivist approach which promulgated the view that learners were situated constructors of their own knowledge (Liu & Mathews 2005), wherein cultural and social nuances would be naturally factored.

Two variants of the theory of Constructivism, derived mainly from the works of Piaget and Vygotsky (Andjomshoaa *et al.* 2011) in the field of developmental psychology, had profound significance on education in the developing world (Liu &Mathews 2005). The first, known as cognitive or radical constructivism, stemmed from the work of Jean Piaget, while the second, social or realist constructivism, was most associated with Lev Vygotsky (Dahl 2003). The constructivist approaches of Piaget and Vygotsky, which were seemingly dialectically opposed, were both relevant to the pedagogic approaches of architectural education. Cognitive, radical constructivists such as Piaget argued that knowledge was not directly transmitted from person to person but rather idiosyncratically constructed or discovered. Social, realist constructivists such as Vygotsky on the other hand postulated that the role of the social environment was central to learning (Liu & Mathews 2005). The social/relativist approach affirmed that learning is a context-bound activity through interaction with the learning environment. Whereas Piaget's theory focused on fixed, chronological stages of development based on creative and intelligent construction of knowledge, Vygotsky presented a more fluid interactive approach to the construction of knowledge and meaning. Piaget promulgated the concept of equilibrium (balance) achieved by an individual's adaptation to the environment through the cognitive processes of assimilation and accommodation while Vygotsky's concept of the Zone of Proximal Development (ZPD) emphasised the outside social forces in the learning process (Blake & Pope 2008).

Liu and Mathews (2005) argue that Vygotsky's reference to the social and collective must not be viewed as a total of the sum of independent individuals, rather that the collective is always greater than the sum of individual parts. This view supports Homi Bhabha's 'third space theory' in which the integration of different individual domains results in hybrid conditions that generate unique conditions of greater significance. Liu and Mathews (2005) present Vygotsky's view differently by referring to text, wherein they posit that understanding cannot be reduced to sequence of individual words without distortion of meaning. Words have their own objective individual meaning, while simultaneously deriving meaning through their relationships to other words in the context, thereby establishing significance and meaning. This interpretation of Vygotsky, with reference to language structure, tends towards Derrida's poststructuralist philosophy of language construction while the emphasis on society, culture and history leans toward Foucault's postmodernist philosophy. According to Blake and Pope (2008), Vygotsky's work was significantly influenced by Marxist theory as well as reference to poststructuralist and postmodernist theories, which suggests that his philosophies may be interpreted within the framework of critical theory.

This thesis argues that the individual and the social approaches in constructivist pedagogies are not dialectically polarized, parallel systems but are rather complementary. Piaget's cognitive equilibrium focusing on stages of development can be related to the concept of Jungian Epistemological Balance, which will be discussed later in the chapter, while Vygotsky's 'Zone of Proximal Development (ZPD) can be reinterpreted within the broader concept of 'interdisciplinarity'. Muthivhi and Broom (2009) support this argument that Piaget's individual self-regulatory processes and Vygotsky's socio-culturally mediated processes can simultaneously affect learning and knowledge construction. In considering both, the dialectic between the approaches of Piaget and Vygotsky may then develop a dialogical relationship, complementing and enhancing learning; in which the processes of concept learning could be derived from both the individual's cognitive activity as well that of his/her collective society and culture in context (Muthivhi & Broom 2009).

3.4.2. Context and Problem-based Learning

Savery and Duffy (1995) affirm that understanding (meaning) is formed by personal interaction with the environment. Cognition thereby extends beyond the individual and is distributed as part of an entire context (Savery & Duffy 1995). The individual/environment contextual equilibrium approach of Piaget and the social proximal development concept of Vygotsky, both suggest a vital integration between environmental and social factors' and individual internalization for effective learning to occur. In relating learning problems to context, it is argued that the stimulus for learning will inevitably be enhanced, as learners may relate learning to perceivable situated problems.

Saidi (2005:23) refers to Progressivism as a philosophy that promulgates the importance of how to think, over what to think; wherein truths are relative and methods of understanding are more important than absolute truths. John Dewey, as a pioneer of the progressivists, defines contextually situated problems as stimuli for learning, which he refers to as "the problematic" which leads to, and becomes the organiser of learning. Piaget, on the other hand, refers to "puzzlement" - the need for accommodation when current experience cannot be assimilated within existing cognitive schema (Savery & Duffy 1995). Social collaboration serves as a source of "puzzlement", as alternate views challenge individual cognitive schema which according to Von Glaserfeld (in Savery & Duffy 1995) stimulates new learning. Facts, therefore, are derived from some general agreement and social negotiation of meaning and understanding based on viability rather than absolute truth (Savery & Duffy 1995). Here again it is evident that the conceptual frameworks of Piaget and Vygotsky converge into complex active and interactive learning, integrating individual cognitive schema with the broader social and environmental collective understanding. Saidi (2005) refers to Loggerenberg (2000 in Saidi 2005), who affirmed the value of the humanist curriculum, which evolved from the progressivist curriculum, in considering the personal and social constituents of pedagogy. The humanist approach promulgates the idea that knowledge is a construct of context, which draws upon real life experiences, subjectivities and collaborative learning.

The concept of subjective learning, defined by a learner's own goals, which arise from "puzzlement" through social/environmental interaction, is generally known as Problem Based Learning (PBL). PBL was developed in medical education in the early 1970s (Savery & Duffy 1995) and has since become an intrinsic part of architectural education. The teacher critiques and challenges the learners' thinking rather than being the holder of the "correct" information or the "right" answer, as per the Socratic Method (Savery & Duffy 1995). Vygotsky's concepts of the learning 'scaffold' and the Zone of Proximal Development is a more accurate representation of this teacher/student interaction based on negotiation and viability of meaning (Savery & Duffy 1995). Teachers serve to stimulate reflective thinking throughout the learning process in which learners reflect on strategies of learning in addition to learning content (Schon *et al.* in Savery & Duffy 1995). As such the responsibility for learning is that of the student who researches and gathers information in order to define appropriate theoretical and conceptual processes (frameworks) for the resolution of the problem. Life experiences and culture within the broader social/environmental context become intrinsic in establishing understanding and creating meaning within a PBL paradigm.

The inclusion of life experiences in learning, naturally evoke a multitude of cultural interpretations, nuances and attitudes. Vygotsky (in Blake & Pope 2008) uses the concept of culture to explain life experiences in which human inquiry is embedded, while John Dewey (in Glassman 2001) focuses on human enquiry as a precursor to the creation of experience/culture and eventually of social systems. Dewey's philosophy of experiential learning is a critical reaction to the dichotomous education model in which learning focused on subject content that is completely divorced from reality and context (Glassman 2001). Dewey refers to primary experience and secondary experience. The former, based on gross daily experiences, correlates with secondary experience, which clarifies the meaning of primary experience through the process of reflection. It is the reflective nature of secondary experience that affords establishing relationships between actions and consequences and to the development of hypotheses and theories (Glassman 2001).

According to Hmelo-Silver (2004), by engaging students in the experience of problem solving, they can learn both content and thinking strategies. This relates well to the approach of critical theories, which emphasise the value of thinking and enquiry. Hmelo-Silver (2004) refers to PBL as an instructional method based on facilitated learning through complex problem solving in collaborative groups. Learning is therefore self-directed and reflective. PBL has a long history that situates learning within meaningful tasks through experience and reflection, such as in case-based instruction and problem-based learning. This implies a dual emphasis on developing strategies and constructing knowledge (Hmelo-Silver 2004). PBL is intrinsically self-directed as students are presented with a problem scenario in which they are required to analyse the problem and identify relevant facts (Hmelo-Silver 2004). As students engage with the problem they understand the problem better, while hypothesising about possible solutions.

A critical advantage of PBL is that students identify knowledge deficiencies relative to the problem, which then stimulates self-directed learning (SDL) (Hmelo-Silver 2004) in order to acquire the relevant information and understanding towards developing solutions. The identification of knowledge deficiencies is vital to establishing the relevance of learning as posited by Piaget's notion of "puzzlement" and Dewey's notion of "the problematic"; SDL then allows the knowledge gained to be applied to the problem. On completion of the problem students may then reflect on the abstract knowledge gained. This process is not linear, but rather reflective, iterative and cyclic in nature (Refer to Figure 3.3).

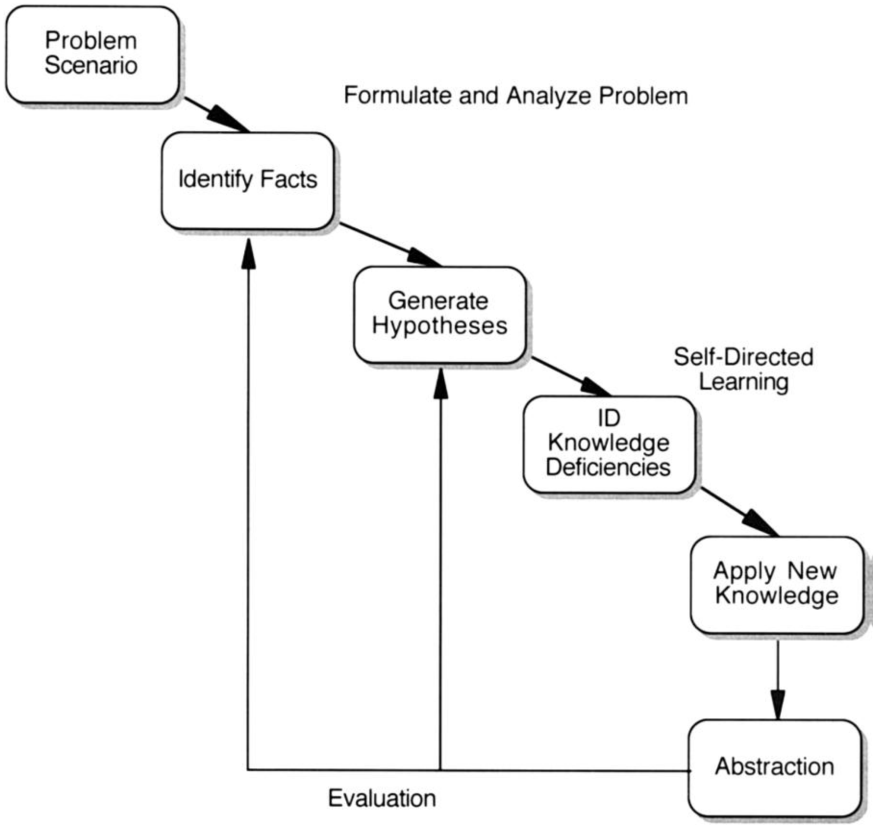


Figure 3.3. The problem-based learning cycle (from Hmelo-Silver 2004)

For effective PBL, it is necessary that problems are ill-structured and open-ended resulting in a range of potential solutions, which would require social negotiation in order to select the appropriate answer to the problem. PBL is therefore based on learners actively constructing knowledge, while the role of the teacher is transformed to that of a facilitator and the solutions are tested in context. The teacher is no longer considered a repository of knowledge; knowledge is constructed through collaboration between facilitator (teacher) and peer learners and always tested against contextual relevance as outlined by the problem. This approach contrasts, to a degree, with the general interpretation of Vygotsky's ZPD. In the PBL method the facilitator (teacher) does some direct instruction pertaining to the definition and contextualisation of the problem; even this is largely based on questions that students may raise (Hmelo-Silver 2004). The teacher, as facilitator, guides learning through critical open-ended questioning, which gets students to express and articulate their thinking through group collaboration and negotiation. This process is vital to SDL which is developed through critical and reflective thinking. Expression of thinking and ideas through collaboration exposes learning to multiple domains, as information is sourced from different subject domains, intelligences, skills and experiences. According to Hmelo-Silver (2004), problems ought to be complex enough so as to integrate and inter-relate many pieces to stimulate the need to know, or the relevance of learning. Through the process of self-directed and collaborative knowledge construction, students become intrinsically motivated, and more so when they value what they are learning and where the learning is situated in meaningful tasks. Furthermore, according to Bandura (1997 in Hmelo-Silver 2004) and Dweck (1991 in Hmelo-Silver 2004) students are more motivated when they believe that the outcome of learning is in their control. Goals become proximally tangible when related to the application of knowledge to solve concrete problems, which is more motivating than distant goals which may seem insurmountable (Bandura 1997 in Hmelo-Silver 2004). The intrinsic motivation of learners is critical to a learner-centred, self-directed, constructivist approach to learning.

Albert Bandura postulated Self-Efficacy Theory as a framework to analyse the value of intrinsic (self) motivation as a stimulus for learning. According to Bandura (1993), perceived self-efficacy is achieved and established through four processes, namely cognitive, motivational, affective and selective processes. Students' self-efficacy beliefs gear their learning activities towards accomplishment while teachers' self-efficacy beliefs affect the types of learning environments they create. This in turn influences students' academic progress (Bandura 1993). According to Bandura (1993) the discipline of educational psychology focuses largely on the way the mind retrieves, processes and organises information, hence the mind as a computational programme becomes the conceptual model to understand learning. Effective intellectual (cognitive) functioning, however, requires much more than understanding factual knowledge and reasoning in order to accomplish tasks (Bandura 1993). Bandura argues that self-regulatory, social, as well as environmental factors, in turn affect the selection and construction of environments through the mechanism of human agency. Self-efficacy is most central and persuasive in the capability of people to exercise control over events that affect their lives and their environments (Bandura 1993). In so doing, they become motivated to resolve problems rather than shy away from them. According to Bandura (1993) there is a marked difference between possessing knowledge and skills and being able to apply them under challenging situations. Learners with high self-efficacy further seek to expand their knowledge and competencies whereby they consider errors as part of the knowledge acquisition process (Bandura 1993). Learners with high self-efficacy, therefore, are able to construct learning effectively through experiential learning mechanisms within a framework of problem-based learning.

Developing problem-solving skills therefore requires confidence in one's ability to apply appropriate metacognitive and reasoning strategies such as case-based reasoning in design disciplines such as architecture (Hmelo-Silver 2004). However, case-based reasoning is not a purely technically rationalist, linear process either but rather an iterative process of action and reflection.

3.4.3. Reflective practice and active experiential learning

Reflective practice, as postulated by Donald Schon, follows on from Dewey's experiential learning theory. Schon, who was influenced by Dewey, looked to reflection in practice as an alternative to technical rationalism (Waks 2001). Schon differs significantly from Dewey in his argument that reflection is intrinsic to practice in professional disciplines such as architecture and affirms that professionals "reflect in action". He postulates the paradigm site for reflective practice as being the design studio (Waks 2001). Schon places learning within the realm of the self in that learning which significantly influences behavior is self-discovered (Schon 1983); reflective practice can be regarded as secondary experience as posited by Dewey. The studio becomes the simulated broader contextual site wherein individual experiences may be shared amongst the group, although individual reflection is necessary in order to establish the meaning of the primary experience, all of which assists in resolving the problem.

While Schon focuses on the individual's reflection in action, David Kolb's Experiential Learning theory (ELT) defines a holistic perspective which combines experience, perception, cognition and behaviour based on the application of Piaget's theories of learning preferences and learning styles. Architectural education does not directly refer to Kolb however design education promotes experiential learning (Tucker 2007). Kolb's 'four mode' learning cycle consists of two dialectical modes, namely grasping information or gathering information (concrete experience and abstract conceptualisation) and two dialectical modes for transforming experience or processing information (reflective observation and active experimentation) (Turesky & Wood 2010). Kolb's Learning Styles Inventory positions students according to their learning style preference (Refer to Figure 3.4).

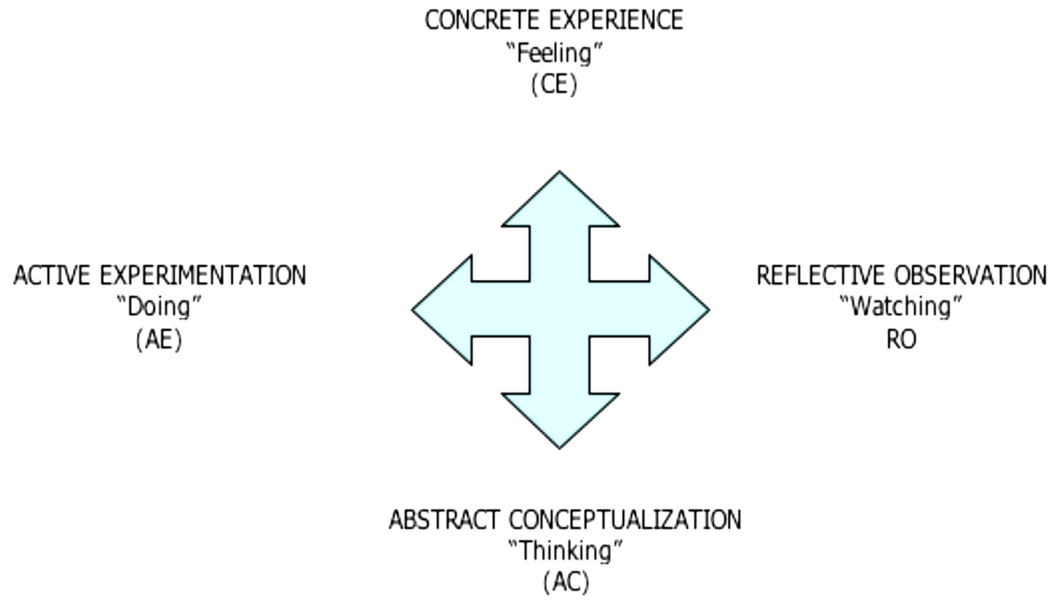


Figure 3.4. The four modes of Kolb's Learning Cycle (Turesky and Wood 2010).

The processing of information gathering and learning differs from individual to individual. Kolb and Kolb (2005 in Demirbas 2008) state that learning styles define the way in which individuals perceive and process new information. ELT postulates that learning is a cyclical process that starts with experience, continues with reflection and conceptualization that leads to action. Concrete Experience (CE) is defined as learning by experiencing; Reflective Observation (RO) refers to learning by reflecting, Abstract Conceptualisation (AC) is defined as learning by thinking, while Active Experimentation (AE) refers to learning by doing (Demirbas 2008). According to Willcoxson and Prosser (1996 in Demirbas 2008) two bipolar dimensions, the Concrete/Abstract and the Active/Reflective, are exposed within this cycle of four learning modes. The Concrete/Abstract mode refers to the perceiving of new information while the Active/Reflective mode refers to the processing of such new information in a learning activity (Demirbas 2008). Within the ELT framework an individual learning style may be determined by positioning it on each of the dimensions in a test called the Learning Styles Inventory. This positioning on each of the bipolar dimensions corresponds to one of the four learning styles within the ELT framework; namely Accommodating, Diverging, Assimilating and Converging (Demirbas 2008). According to Demirbas (2008), 'accommodating' learners generally focus on hands-on experience while 'diverging' learners prefer observation over action. They usually generate a broad range of ideas from many points of view through brainstorming, rather than relying on theories and generalizations. 'Assimilating' learners prefer abstract ideas and concepts over concrete experiences, and look for reasonable soundness in theories, rather than their practical value. At the same time they also prefer to experience concrete situations in a symbolic way in which information is transformed through thought. ‘Converging’ learners are good at finding practical application for ideas and theories and are therefore fond of technical duties rather than social interaction. Where then, in the Kolb model, could the typical architecture student be located?

Demirbas and Demirkan (2008) related student architects’ design process to Kolb’s Learning Styles Inventory and found in a study, that most students of architecture could be categorized as ‘assimilators’ and ‘convergers’ (Tucker 2007). Despite this general inclination of architectural students, Demirbas and Demirkan (2008) affirm that learning is most successful when all four modes of learning will be experienced equally. This confirms that a vital balance between the introverted intuitive cognitive processes and the extroverted social processes is necessary in order to effectively resolve architectural problems. Responsive architectural practice therefore needs to emanate from a vital epistemological balance.

Arthur E. Stamps III (1994) affirmed the value of a contextually engaged approach to architectural education with reference to Carl Jung. The Jungian functions of thinking, feeling, sensing and imagining within both the individual (introvert) and the collective (extrovert) learning contexts, were interrogated in order to explain the efficacy and value of architectural education. Stamps III (1994) took a critical stance whereby he posited that: (1) architectural education emphasises feelings and imagination thereby socialising learners to a predominantly artistic paradigm; (2) current societal conditions demand skills other than those that exist within the artistic paradigm, particularly thinking, sensing and extroversion; (3) the development of other skills requires epistemological balance between the artistic and other paradigms; and (4) implementation of epistemological balance can be achieved at all levels of design education. The major implication of epistemological balance on contemporary architectural education is that there needs to be a much stronger relationship with society and context, which requires a holistic approach to design studio pedagogy.

3.4.4. The design studio as holistic pedagogy

The architectural design studio is arguably the prime site for the integration of all of the preceding learning theories due to the complex nature of architectural design problems. Uluoglu (1990, 2000 in Demirbas 2008) suggests that the design studio can be considered the most important part of design education, as it forms the core of the curriculum to which all other courses are related. This integrated approach to the architectural curriculum focuses the design programme on problems of a tangible and real nature, around which theoretical knowledge is constructed in order to produce meaningful and relevant architectural design solutions. The design studio is thereby transformed from a place in which students are taught how to design, to a place in which understanding of the design activity is achieved through both introvert intuitive cognitive activity and extrovert social interaction. This establishes contextual relevance through experience and reflection. Uluoglu (2000 in Demirbas 2008) affirms that design activity is more than the act of doing, that it is conscious, selective and intelligent rather than impulsive, coincidental and habitual. Here again critical enquiry and engaged practice are strongly supported.

Critical enquiry and engaged practice could be much enhanced due to the ease of information flow and connectivity that has been afforded by the rapid development of information technology. Social media, the worldwide web, open source resources, CAD, Building Information Modelling (BIM) and simulation software have exposed architecture to larger participatory platforms. Such participatory platforms offer opportunities for interdisciplinary engagement that had never been available before. The rapid and advanced development of social networking technology has redefined social space that allows for social and cultural diversity on project work through virtual space and not inhibited by the physical and logistical hindrances of before. Virtual space has allowed ease of collaboration across professional, geographic and cultural domains – this, as a result, has afforded architectural design to many resources and has exposed architectural production to multiple critiques. As a consequence, architects are now required to design for values that may be entirely different from their own, which poses a serious challenge to the traditional introverted model of the 1990s. This requires that architects step out of their artistic silos and start to engage with the realities of a dynamic multicultural and globally connected world in order to remain relevant. Two critical questions emerge from the preceding discussion.

Firstly, how can architectural education prepare the new generation architectural practitioner to practice optimally within the broader socio-economic context? Secondly, given the artistic and predominantly intuitive inclination of architectural education and practice, how can epistemological balance be inculcated in architectural education?

This thesis proposes a complex integrated approach to architectural education which transcends disciplinary and cognitive boundaries in order to enhance knowledge generation and knowledge transfer within a broader contextual paradigm; this paradigm includes the local and global society. Within such paradigm socio- or geo-sentiment, boundary protectionism and disconnected consciousness cannot be allowed. Neo-humanism is therefore posited as an ideology for the development of a holistic and engaged architectural education model.

3.4.5. Neo-humanism as a strategy for transformative pedagogy within a holistic learning paradigm

The holistic approach of Sarkar's ideology of Neo-humanism begins to synthesise the various critical positions on the value of education by unpacking the idea and purpose of education as a response to the vital relationships between inner and outer realities; subjectivity and objectivity; diversity and complexity and the emphasis of process over product. At the centre of education, therefore is a combination of person, place and time, which defines a broader integrated learning context. As such, education becomes an interface between diversity and complex realities, as a transformative mechanism for the advancement of humanity and the broader existential universal context. Bussey (2008) interprets this as bridges, in the form of ideas, between subjectivities and realities, whereby ideas do things and are therefore procedural and not abstract.

Creative thinking, such as in the process of architectural design, must therefore emanate from context, as critical interstitial space' wherein ideas become active and pragmatic. Deleuze and Guattari (in Bussey 2008) support the position of ideas as action by affirming that concepts have effects and therefore cannot be truly abstract. The fact that ideas are actioned means that they have consequences in society. Foucault's biopolitics takes a critical look of the consequences of ideas by suggesting that who controls ideas actually controls people – a strong criticism of positivist ideology. Ideas must therefore be rooted in context, however not limited by, but rather enhanced by the local context with due consideration to the global society. In this regard, Sarkar's Neo-humanism seeks to bridge the east-west divide by offering new ideas through transcivilisational thinking of the past and the broader future (Giri 2006 in Bussey 2008).

This thesis therefore posits a neo-humanist approach in order to achieve responsive architectural education for the benefit of humanity through engaged practice within the global knowledge society. The neo-humanist approach, however, implicitly challenges the historic definition and quality of the learning environment – the design studio.

3.5. Learning Space Development for engaged practice

Architectural education today, shaped and structured along historically developed pedagogies such as the *Beaux Arts*, the Bauhaus and the British system have specific implications for learning space development. The central position of the studio in the *Beaux-Arts*, and the workshop in the Bauhaus tradition have maintained their relevance to this day. The British work-based learning model of the mid-18th century has been less evident since the adoption of the formal system of architectural education which started at the Architectural Association and Liverpool University in the 19th century (Howarth 1959). Each of these systems were defined by learning spaces that reflected their respective pedagogic approaches and educational philosophies.

The 21st century is very different in that learning may be facilitated in formal spaces such as the studio or workshop, or may happen in informal and coincidental spaces such as circulation spaces, social spaces, indoors or outdoors and even in virtual space; learning may even occur within the global context in instant time due to the advances in IT and social media. The technological advances and the rapid expansion and accessibility of social media and networking platforms afford even more opportunity for learning. The South African architectural education system is rather conservative and still relies heavily on traditional learning spaces such as the design studio, classroom, workshop and to a lesser extent, practice or work-based learning spaces. How then can historic traditions be transformed in order to develop learner-centred, collaborative learning environments that are inclusive of difference, while also exploiting the opportunities offered by rapid advances in information technology and software development?

This section of the research seeks to scrutinise learning space development within the broad domains of formal learning spaces such as the classroom or studio, as well as informal and social learning spaces, virtual learning spaces and work-based learning spaces. Learning from the built environment consciously, semi-consciously and even unconsciously through active and passive interaction can form part of a holistic learning paradigm. The neo-humanist notion of education as a function of culture and society (Bussey 2008) and its position on integration of disciplines and practice, the construction of knowledge and knowledge transfer for the advancement of society will be used as a basis to evaluate learning space development leading towards the understanding of holistic human-centred learning environments.

Kolb and Kolb (2009) make reference to constructivist learning spaces as inclusive of multiple learning styles which are based on synergistic transactions between person and environment. This type of learning environment is centred on the definition of relevant learning problems and scenarios in relation to the socio-spatial context, which is useful to responsive architectural pedagogy. Problems situated in real-life contexts engage many domains in order to resolve the problem, thereby encouraging collaboration and ultimately reinforcing learning. Lave and Wenger (in Kolb & Kolb 2009) refer to situated learning theory, drawing on Vygotsky's approach to learning, defining it as a transaction between person and the social environment. Here, the social context in which learning occurs is vital to the efficacy of learning.

It is therefore postulated that in order for effective and relevant learning to occur there has to be effective engagement between the learner as the individual person and his/her environment. The environmental context is not static, but rather fluid and indeterminate. While pedagogic approaches affect learning spaces, it is argued that learning spaces similarly influence pedagogy and learning. Synergistic interaction with the environment naturally generates instances of conflict, contradiction and debate, which in turn generates knowledge through negotiation and consensus. While architectural education impacts the quality of the environment, the environment in turn informs the quality of architectural education – a synergistic spatial system. Oblinger (2006) refers to spaces as agents for change and affirms that spaces will change practice. How then could learning spaces be designed in order to accommodate a much more fluid, interactive and collaborative learning paradigm?

Brown and Long (2006) refer to trends in the design of learning space that respond to a learning paradigm defined by collaboration through social interaction, while incorporating the technological advances of the twenty-first century. According to Brown and Long, three major trends inform learning space design, namely design based on learning principles that support active and social learning strategies, human-centred design and 'ownership' of diverse devices that enrich learning (Brown & Long 2006).

Learning space that is inclusive of the non-physical space such as virtual space may also serve as the new social space in contemporary society. This has significant impact on the definition of learning space and questions the structure of traditional architectural learning spaces. According to Brown and Long (2006) learning space extends beyond the classroom to the whole campus wherein learning can occur anywhere, at any time.

One example is social networking, which is a characteristic form of interaction among the current generation of young adults. Such interaction occurs in every possible form, including the physical and virtual, made possible by technological devices and applications. Educational institutions expend valuable capital and human resources on functions, such as the development and maintenance of buildings, time-tabling and student housing which could possibly be alleviated by blending formal education with active and social pedagogies. Oblinger (2006) confirms that many students today prefer active, participatory and experiential learning however, this is not generally supported by the learning spaces they inhabit. Oblinger (2006) further states that students today are much more drawn to social interaction and find great value in establishing connections with other people. However, they establish and maintain these connections or networks through non-traditional means, as students generally prefer active learning such as using social networking technology while simultaneously conversing over coffee. In this way the students of this generation are able to network simultaneously with many social connections in instant time. Technology has fundamentally transformed the way people communicate and social connection is highly valued, which has implicitly broken down the brick silos characteristic of traditional formal learning environments. This has sparked the opportunity for the development of alternate pedagogies and practice.

The engaged pedagogic approach, facilitated by advances in IT, presents a challenge to the past paradigm defined by teacher-focused learning spaces that have become increasingly incongruent to the needs and aspirations of contemporary learners. Van Note Chism's argument (in Oblinger 2006) supports that of Brown and Long (2006) in that he confirms that learning happens everywhere and, furthermore, that human beings, wherever they may be, have the capacity to learn through their experiences and reflections. He makes further reference to Torin Monahan who used the term "built pedagogy" in order to define the architectural embodiment of educational philosophy. The design and layout of class rooms define the pedagogic approaches of those rooms. A class room of rows of desks orientated to the front of the room towards a board or lecture podium suggests a teaching-oriented pedagogy (Figure 3.3.(a) while clusters of desks with students facing each other suggest a collaborative-learning oriented pedagogy (Figure 3.3.(b)).

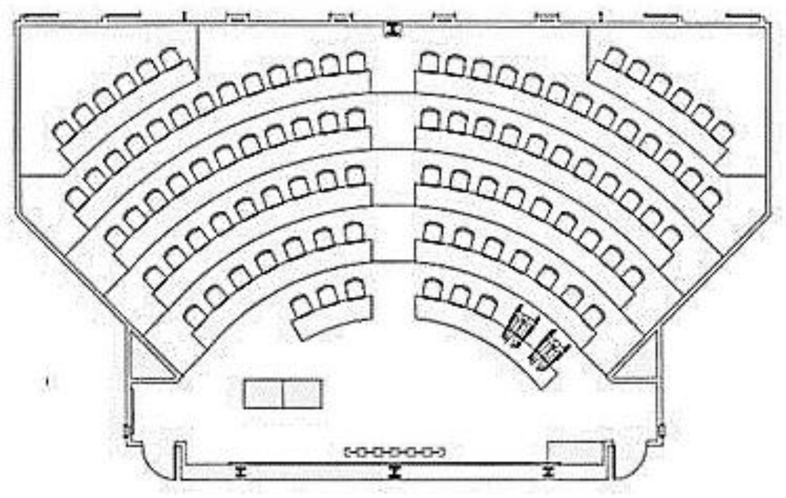


Figure 3.5. (a). Teaching-oriented learning space (www.cob.niu.edu)

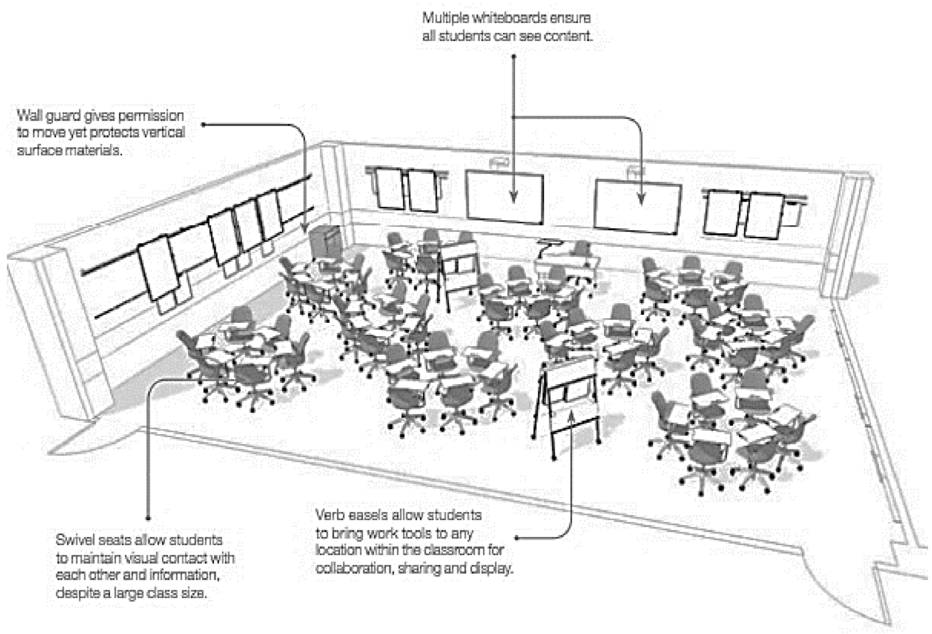


Figure 3.5.(b). Learning-oriented learning space (www.cob.tonybates.ca)

Bickford and Wright (in Oblinger 2006) refer to "community" as the "hidden context" for learning and posit that community should be a critical consideration in the design of physical and virtual learning spaces as 'community' catalyses deep learning. Bickford and Wright (in Oblinger 2006) argue that a community paradigm is necessary for the design of learning spaces in order to emphasise social interaction and student engagement in learning, just as the learning paradigm focuses on the importance of collaborative learning. Bickford and Wright (in

Oblinger 2006) have tabulated the relationship between pedagogies that foster community against the implications for learning environment design (Table 3.1.)

Pedagogical approaches that foster community	
Example	**Implications for Learning Environment Design**
Students experience a community-friendly learning environment from the beginning of the first class.	Community-centric ambience of physical and virtual spaces should be readily discerned by faculty and students, from room lighting and decoration to learning management system usability.
Faculty and students learn about each other and from each other.	Mechanism for learning each other's names available in and out of the classroom. Students and instructor(s) post interests, photos and backgrounds on course Web site.
Students participate in discussion in class.	Classroom "front" is deemphasized (removing the lectern, for example) to create open, discussion-friendly space. Choice and placement of furniture allows students to see and hear each other.
Active learning activities in class use cooperative techniques.	Students are seated in proximity to each other but with flexibility for movement and space between chairs for instructor mobility.
Team-based projects are conducted outside class and culminate in student-led presentations. .	Room technology enhancements and lighting controls should be immediately intuitive to student presenters
In-class activities are augmented by completing a significant fraction of course expectations online.	Courses use a learning management system that provides delivery of course materials online and enables exchange of messages, threaded discussions, announcements, homework assignments, quizzes, and grades.
Classroom visitors, such as civic leaders or alumni, can broaden classroom community and enrich discussion.	Rooms are easy for visitors to find and have extra seating and tables of adequate quality so as to send a positive image of the institution. Time in class can be used to make meaning out of the material rather than conduct "housekeeping" tasks.
Video or telephone conference-based technologies enable discussion with experts in the field from inaccessible locations, such as overseas.	Conferencing equipment is placed in room, with remote or on-site technical management and setup.
In-class integration of study skills and best practices nurture collaboration and improve student learning.	Space redesign should be connected to faculty development efforts that focus on learning-centered pedagogies.
Student-faculty interactions can occur immediately before and after a class.	Broad pathways (not corridors) connect classrooms, with ample

	room for discussion and whiteboard use during class changes without impeding traffic flow.
Students meet with faculty in office spaces that are easy to find and conducive to dialogue.	Building signage is clear and in keeping with universal design principles, to be accessible to all. Faculty office suites are large enough for meetings, with sufficient seating and board space.

Table 3.1.: Pedagogical approaches that foster learning community (Bickford & Wright in Oblinger 2006:4.12)

The above discussion reaffirms the value of active and social learner-centred learning environments that would deepen learning and establish contextual relevance thereof. Active and social pedagogies foster face-to-face engagement and sharing between students, while utilising space more efficiently. The ethos of constructivist learning is based on learner/human-centredness in which knowledge is more about learning principles and the application thereof in real life contexts, rather than the mere accumulation of information. Human-centred design, therefore, implies a paradigm shift from the *information commons* to the *learning commons* (Brown & Long 2006), in which 'commons' in this context refers to a range of integrated resources that affect or belong to the whole learning community. Learning spaces thus extend beyond the classroom and the teacher and become socially contextualised into a wider community of practice (Kolb & Kolb in Armstrong & Fukami 2008). Human centred commons is not just focused on finding information, but applying information in productive ways to deepen, strengthen and construct knowledge (Brown & Long 2006).

Learning space development has been interpreted in a much broader context which includes formal, informal, experiential and virtual space. The realm of cognitive space adds another layer of complexity in the definition of learning parameters by factoring in intra-personal and interpersonal learning. It has been established that engaged pedagogy requires the inculcation of balance between the individual and the collective, and the integration of local nuances within the global knowledge context. Neo-humanism is therefore proposed an approach towards the development of an alternate pedagogic model defined by engaged practice.

Chapter Summary

Universities of technology in South Africa have been grappling with an identity crisis as a consequence of a change in institutional structure form the former technikons. The chapter contextualised the challenges and opportunities facing universities of technology in South Africa against transformative legislative frameworks such as the Constitution, the Freedom Charter, the Higher Education Qualifications Sub Framework and the Architectural Professions Act. Two key transformation objectives emerged, namely, spatial transformation and social reform through redress. These objectives in conjunction with the historic strengths of these institutions – industry and community links - were determined as vital in defining the unique identity of universities of technology. However, much energy has been expended by these institutions in trying to distinguish themselves from the traditional universities by focusing on the curriculum –science and technology as preferable to humanities and art. This thesis argues that this is unnecessary and compromises the essence of architectural practice as a socially connected process. The position is that a transformation of pedagogy in line with the transformation objectives of the country would be a much more sensible approach in establishing a unique identity – an opportunity that has been missed. It is strongly argued that architectural education at universities of technology needs to look beyond the confines of an industry-focused curriculum, and rather to a holistic approach that is founded on the premise that education is a function of culture and society; this is particularly relevant to the process of architectural creation. Architecture has been acknowledged as a cultural manifestation of people, place and time; a cultural expression. Therefore, the "architectural industry" cannot not simply fit into any production line / linear approach for industrial skills development. The value of architecture is in its inclusive process rather than a focus on product as commodity.

This challenges the missions of universities of technology, which often seek to delineate technology and science from art and humanity. The thesis therefore argues for an alternative model of architectural education, building upon the historic strengths of universities of technology, being knowledge transfer and community engagement, while offering widened access to historically disadvantaged communities. For this to happen an integrated approach is required that discards hegemony and disciplinary silos; accepting complexity and diversity; that bridges the gaps between subjectivity and reality; emphasising process over product; that encourages engaged social practice to the advancement of society.

A strong proposition emerged towards a new model for architectural education at universities of technology in South Africa, which will be responsive to contextual nuances both locally and globally. Such model will also be defined by inclusivity and transdisciplinary engagement wherein multiple learning styles and modes may enhance human potential through education. Central to this objective was the neo-humanist approach to a collaborative practice and learning environment based on the activation of unit consciousness with collective consciousness; objective realities with subjective realities, within a participatory pedagogic approach. The neo-humanist approach positioned learning as a function of society and culture wherein theory may never exist in an abstract vacuum but rather as pragmatic to effect the advancement of society and human potentialities. Neo-humanism, hence emerged as the principle theory wherefrom an alternate model for architectural education at universities of technology in South Africa will be developed.

The chapter concluded with a critical discussion on learning space development. This highlighted the required transformation of learning spaces that would support an engaged pedagogic approach. The changed nature and preferences of the 21st century student highlighted the value of IT in expanding the possibilities of collaboration beyond cultural, social and geographic borders. IT presents many opportunities for participatory pedagogy and engaged practice, which will be vital to the development of the new model in Chapter 9.

While the critique of dominant philosophical paradigms provided an in-depth understanding of education at large, the historical development of architectural education is similarly important to this thesis. The discussion of the historic evolution of architectural education and practice in the developing world follows in the next chapter. Particular attention is paid to the historical systems that impact on developing nations such as South Africa.

CHAPTER 4:

THE HISTORY AND EVOLUTION OF ARCHITECTURAL EDUCATION IN THE DEVELOPED WORLD AND ITS INFLUENCE ON THE DEVELOPING WORLD

The preceding chapter analysed theoretical and philosophical frameworks that shaped higher education in general and the impact thereof on architectural pedagogy. A neo-humanist approach defined the proposition of a pedagogic approach that sought to bridge the divide between education, practice, culture and society. Intrinsic to this approach was the multiple levels of engagement which always situated the individual within the collective at the physical, intellectual and spiritual levels of consciousness. The responsibility of education towards the advancement of human potentiality, spatial transformation and socioeconomic redress challenge the premise of architectural creation, questioning its relevance and meaning in society. The architectural profession hence faces a major ethical challenge, which is to become accountable to society through the development of responsive architecture through engaged practice; which has serious implications on architectural education.

The developing world in general has implemented the pedagogic and practice models of the developed world, largely due to the influence of European colonialism. The subsequent perpetuation of references to the West and the Global North resulted in a modernist outlook on architectural practice and education. In South Africa, the British, French and German architectural traditions have had the most influence on pedagogic practice. The three systems, however, are fundamentally different and have been adapted, transformed and hybridised to define the predominant model of contemporary architectural education.

Thomas Howarth (1959) outlined the evolution of architectural education chronologically from the informal learning space (pupillage within the practice of an architect) to the formal learning spaces at schools of architecture such as the Architectural Association (AA) and the Liverpool School of Architecture; these were located under architectural societies such as The Royal Institute of British Architects (RIBA), amongst others, that emerged during the early 19th century. Reference to the significant influence of the French *Beaux-Arts* and the German

Bauhaus, based on the modernist approach and which promulgated the international style, on architectural education in Britain and abroad, could suggest the reasons for their strong influence on architectural education in the developing world to this day.

4.1. The Beaux-Arts System (France)

Cret (1941) outlines the establishment and historical development of the *Ecole des Beaux-Arts* during the 17th century at which time the national government of France considered architecture as part of the fine arts disciplines, leading to architecture being accommodated in the schools that the French government supported for the advancement of art education. During this period the ‘arts’ shared the workshops for the training and apprenticeship of other trades that were provided by the corporations or guilds, under the supervision of master craftsmen (Cret 1941). Cret (1941) also confirms that there were private institutions such as schools and studios for the training of painters as well as an Academy of Architecture in Milan during the Renaissance in Italy. It is noted that the Italian Renaissance had a major influence on the *Beaux-Arts*. The academisation of architectural education during this period led to a disconnection of the art of architectural practice from society and culture.

(Cret 1941) attributes the disconnection of art (and architecture) from society primarily to the Renaissance, which separated art from craft. The consequence of Renaissance ideologies was that the guilds and architectural practise henceforth developed as a single profession following the ideals of the court and the aristocracy. The close relation of architectural practise to construction and the master-builder was lost. The guilds were powerful, having the support of government and strongly resisted the shift from apprenticeship to the formal academies. The painters on the other hand united, under high patronage, against the monopoly held by the guilds and hence realised the recognition of the French government. In 1648 the secretary of state, Colbert, formed an Act which established the *Academie Royale de Pointuroet de Sculpture*. The academy was formed along the structure of the academies in Rome. The academy eventually took over one of the guilds’ principle functions – educating the artists of the future (Cret 1941). In 1671, Colbert further authorised the founding of the Royal Academy of Architecture. Academicians of the Academy met weekly in order to establish the rules of their art. They were granted the privileged status of *Architectes du Roi* enabling them to advise government on national projects (Cret 1941). The academicians would appoint one of their own members as a professor for life in order to lecture subjects comprising construction, geometry, mechanics and military architecture amongst others. The curriculum spanned three years; members administered admissions and assessed students' drawings and designs.

During this period, the French Academy was established in Rome, where the most accomplished students spent a further five years studying the art of antiquity. These students were selected for admission to competition, the famous *Prix de Rome*, which was established in 1720 (Cret 1941). The second half of the 17th century saw the growth in academies, each independent, however under the strict control of the king of France (Cret 1941:5). The academies were accommodated at the Louvre and remained fairly resolute in their methods of operation. In 1793, however, the National Convention reorganised the academies, on the ground of their monarchical tendencies, and established its National Institute, the *Institu de France*, with five classes. The fourth class of the *Institu de France* was the fine arts class of forty members consisting of painters, sculptors, music composers and architects, which evolved and developed into the *Academie des Beaux-Arts* (Cret 1941). Fricker (2010) confirms that the *Academie des Beaux-Arts* was founded by Cardinal Mazarin under the patronage of Louis XIV, in 1648. The *Academie des Beaux-Arts* promoted scholarly debate on theory of architecture and thereby raised the status of architects from master artisans to that of philosophers (Fricker 2010). The *Academie* remained under the administration of the French government through the period of the French Revolution and beyond. In 1863 Emperor Napoleon III ordered that the *Academie des Beaux-Arts* become independent of the French government, hence the birth of the *Ecole des Beaux-Arts.*

While apprenticeship as training continued to exist, the formal system of the academies grew at a significant rate, which prompted a demand for a formal schooling system. However, it was not until the mid-18th century that the *Ecole des Beaux-Arts* started to flourish and grow; a progress that was accompanied by a corresponding decline in the apprentice system. The *Ecole des Beaux-Arts* separated from the *Instituto* in 1807 and continued to appoint academicians and winners of the Prix de Rome as its teachers (Cret 1941). This period of growth of the *Ecole des Beaux-Arts* was soon followed by an era of critical reaction against the ideologies and methods of the academies and academism.

The growing criticism of academism and the academy stemmed, firstly, from the dissatisfaction towards the protection of *Architectes du Roi* who enjoyed court patronage and the perceived monopolisation of government work commissions, thereby placing themselves in a position of social privilege. Secondly, there were serious complaints against the academy's non-critical admiration of antiquity during the 17th and early 18th century Neo-Classical period in which Roman art was held as the highest and final expression of architectural truth (Cret 1941). The second half of the 18th century saw two very different traditions evolving in parallel. While the architects of the French tradition strayed away from imitation and developed architecture and education that were in constant evolution, the neo-classical reformers perpetuated a heavy reliance on antiquity and Romanticism and thereby ignored the needs of contemporary civilisation.

Students, however, would be inclined to follow the innovators (Cret 1941). The *Ecole des Beaux-Arts* and the Academy in Rome, despite their traditions, graduated a large number of talented architects who, together with the academicians, often critically challenged the *Ecole's* routine teaching of architecture (Cret 1941). Le Duc, Gilbert, Duban and Labrouste were part of that group; they were referred to later as modernists as they utilised new technologies and materials such as steel, and would thereby break away from the precedents of the neo-classicists who employed traditional systems. Their efforts to transform the Academy and the *Ecole* were partially successful as these institutions were slow to transform. This resulted in a crisis in 1863 when Viollet le Duc obtained the support of Napoleon III in an attempt to break the hold of the Institute on the *Ecole*. Le Duc was, however, too closely allied to the neo-gothicists and therefore did not win the favour of students who protested against the attempt to enforce any official creed, but rather fought for the school's liberal traditions. During that time, Liberalism had become the main tradition of the *Ecole*. This mode of the *Ecole* afforded the student the freedom to select his teacher and to pursue his training with the same independence outside as inside the school (Cret 1941).

Admission to the *Ecole* was by competitive examinations. Students who were admitted were considered mature enough to manage their own time and schedules and the only requirement was that the student passed his examinations. There was no time limit for completion of the Diploma; however, no student over the age of thirty was allowed to remain at the *Ecole*. The students had the freedom to choose any professor from either the three *ateliers* of the *Ecole* or freely from the ten *ateliers* of the academies. The student even had the freedom of rejecting the advice of his professor if he so chose (Cret 1941). Students and graduate practitioners were supported by Patrons, who were usually from the aristocracy. For any Patron to serve on a jury, however, he would have been required to have a fixed minimum number of students, of his *atelier*, pass the entrance examination to the *Ecole*.

The *Ecole* avoided education by dictation and regimentation and opted rather for a 'cases' system. Competitions were perceived as cases conducted by the students for submission to a jury, who would pass judgement (Cret 1941). While in principle, the system gave the students the freedom to explore and experience design, the major pitfall was that students tended to produce what was most likely to please the judges rather than the best architectural solution. Furthermore, much emphasis was placed on the awe of the image and presentation which took precedence over good quality architecture. Competitions and examinations, judged by the jury, were the principal forms of assessment of the *Ecole* until almost two centuries later. Fricker (2010) highlights the fact that students were driven by punishing workloads, focusing on renderings that would amaze, consisting of rich detail in difficult media such as water colour. Projects comprised dozens of architectural drawings that were produced in a short space of time for critique by elevated faculty or studio masters (Fricker 2010). Fierce competitions showcasing the awe of architectural production defined the highest level of assessment. The *Grand Prix de Rome* prize was the greatest of the competitions, in which the honoured received scholarships to study in Rome, then the fountainhead of classicism (Fricker 2010). The *Ecole* regarded the robust imperial classicism as one of the eternal truths of architecture (Fricker 2010). This tradition continued until the late 19th century when the impact of modernism in Europe when the ideologies and philosophies of the *Ecole* system would be critically challenged as students and academics questioned the relevance of the system in contemporary societies.

On 19 April 1966, the architecture professors of the *Ecole Nationale Superieure des Beaux-Arts* in Paris went on strike against the *Beaux-Arts* system of teaching architecture. They were joined by students in the demand for educational transformation at the *Ecole*, as they were starting to question the *Beaux-Arts* system's relevance to contemporary society. The sustained intensity of the criticism resulted in the *Grand Prix de Rome* prize, that had existed since 1717, being suspended (Weismehl 1967). The *Ecole* would hence be in urgent need of transformation. The 1966 uprising was of such intensity that it resulted in the transformation and restructuring of the *Ecole*, which changed its identity and pedagogic approaches as evident from the late twentieth century to the present day. According to Gulgonen and Laisney (1982), the *Ecole* was separated into semi-autonomous pedagogical units, each with its own ideological position. Although the *atelier* pedagogy continued, the former hierarchical structure and formality was abolished. Contemporary architectural production, in the new system, was defined by solid theoretical positions on urban form and structure with particular sensitivity to heritage and historical urban centres. The *Ecole* would thereby evolve from a rigid system of strictly defined outcomes, to one that promulgated diversity through a system of pedagogic units.

4.2. The British System

Howarth (1959) establishes the emergence of formal architectural education by reference to the system of articled pupillage in Britain. The first societies for architecture emerged during the mid-18thcentury. On 20 October 1791, the "Architect's Club" was established comprising academicians or associates of the Royal Academy in London and /or the Academies of Rome, Bologna, Parma, Florence or Paris. However, this club could not sustain itself and in 1806 another group, the "London Architectural Society" was founded. Neither this society nor its successor, the Architectural Society which was formed in 1831 survived, largely due to dissention amongst their members. The constitution of the Architectural Society was subsequently changed and the organisation re-emerged as the "Institute of British Architects" which would eventually evolve into the world renowned professional organisation – the "Royal Institute of British Architects" – RIBA (Howarth 1959).

The first open meeting of the RIBA happened on 15 June 1835. Earl De Grey was the first president-elect and would have a profound influence on the future of the institute (Howarth 1959). During this time the RIBA developed international relations with foreign academies. It defined architectural discourse and granted awards for architectural design excellence. Initially, the Royal Family presented the award of the Royal Gold Medal that was originally intended to encourage young architects to compete in design. The results of the competition failed to meet the prescribed conditions and the Royal Medal would subsequently be awarded to practicing architects for completed built work, allowing for submissions by both British architects as well as foreign architects (Howarth 1959). The architectural profession in Britain up to this point remained largely an elite, learned society. During this period, articled pupillage in the practice of the architect was the only route to professional architectural practice.

The early 19th century, however, realised rapid growth of the architectural profession in Britain and the demand for formal architectural education started to increase. The main reason was that articled pupils raised concerns due to the inconsistent and unreliable experience of articled pupillage. This led to articled pupillage being supplemented by evening classes in which students would be taught geometry, construction and elementary design. Much of this education consisted of copying from plates and books. The articled pupil paid a premium in order to serve a four to six year learning term without a salary. The quality of training was often inadequate and few professional skills were imparted. After completion of articles the pupil would work as an 'improver' or a 'drawing clerk', later known as junior draughtsman, for a few years. Upon serving this time the pupil would qualify to take on greater responsibility within the practice or set up private practice (Howarth 1959).

In 1842 a group of draughtsmen who were dissatisfied with their training founded the Association of Architectural Draughtsmen, which aimed to establish better working conditions. In 1847 this group with a few other apprentices were approached by Charles Grey and Robert Kerr in order to form a combined group. The group collaborated after office hours to discuss and share their experiences in order to develop alternatives to the architectural education system. The collaboration challenged the pedagogic approaches of the time and went on to establish a school of their own for architectural education in which they would engage eminent professional architects to supervise and direct their studies. The Architectural Association (AA) was hence founded. The first meeting of the AA was held on 8 October 1847 and by 1851, the year of the Great Exhibition, the membership had grown to 166 registered persons (Howarth 1959).

Both the AA and the RIBA were flourishing and the need for a formal qualification and professional exams that would be recognised by the professional body became logically necessary. On 25 June 1860, the RIBA reached a resolution to offer the opportunity of voluntary professional examinations to members and the first examinations were written in 1863 (Howarth 1959). These examinations resulted in very low pass rates, which generated much discussion around architectural education. The British RIBA members studied the architectural education systems of France, Germany and America in order to develop their system. However, architectural education in Britain continued as a system of articled pupillage supplemented by evening classes. The general opinion held by architects was that the art of architecture could only be learnt by observation and training in practice and, consequently, examinations could not be a true test of aptitude for architecture. After much debate, a regulation was eventually instituted that required all candidates to pass professional examinations, leading to the three-part examination being implemented, comprising the Preliminary, Intermediate and Final examinations.

The Preliminary examination was a measure of good general education that gave exemption to university graduates or the equivalent thereof. The Intermediate examination comprised sheets of drawings as testimony of studies, and ten written papers focused on art and science. The Final examination required the design of a building, testimonies of studies as well as written papers in history and technology (Howarth 1959). This system led to schools such as the AA having to review their syllabi, develop operations in order to provide regular classes and setting up studios. Instructors were hired to prepare students for the RIBA professional examinations. The AA hence transformed into a well organised voluntary educational institution, eventually developing into a fee-paying school with salaried teachers in its employ. This placed the pupillage system under serious threat. In 1892 the architecture school at the Sheffield School of Art was formed, followed in 1895 by the Liverpool School and others in most of the cities largely in Great Britain (Howarth 1959).

In 1902 the RIBA implemented its exemption policy which excused exempted students at accredited schools in Britain and the British Empire as well as America, who obtained a first class pass from the professional examinations. In 1929 this extended to exemption from the Final Examinations for Associateship. For accreditation, the schools had to align their curricula with the RIBA's Board of Architectural Education and had to agree to periodic inspections by the Board's examiners who assessed the standard of the education at the respective schools. Those examiners had the power to suggest withdrawal of accreditation should a school not have met the RIBA minimum standards for architectural education (Howarth 1959).

The RIBA also took interest in promoting architectural collaboration in education and in 1924 it sponsored the first International Congress on Architectural Education. Delegates from Britain and abroad engaged over three days, focusing their discussions around architectural education and the future thereof. It was there that much attention and admiration was placed on the logical training of the French *Beaux-Arts* system and the problem-focused studio known as the '*atelier*', developed by the *Beaux-Arts* (Howarth 1959). Howarth (1959) further affirmed that the Americans also implemented the *Beaux-Arts* system in their own schools of architecture which developed further.

By the late 1930s the AA underwent radical transformation as its politically and socially motivated student body and new staff appointments retaliated against the classicist methods of the school, ultimately banishing the *Beaux-Arts* system; choosing rather to adopt modernism and revise its curricula accordingly. Hence, the AA would be UK's first modernist school, becoming known as the hub of 'Archigram' (Bottoms 2010).

From the early 1970s, under the headship of Boyarsky, the AA continued to transform, becoming a major international cultural institution that attracted some of the most famous contemporary architects as tutors. It is interesting to note that Boyarsky did not believe in a set curriculum, but rather opted to give the tutors the freedom to set their own outcomes and to pursue their own interests and manifestos (Bottoms 2010). The AA continued to function within a modernist paradigm into the 20th century, with virtually no trace of its *Beaux-Arts* origins in its focus and pedagogic approaches.

The late 20th century witnessed a profound change in higher education mainly due to an increased need for post-war training of a technically skilled labour force, wherefrom the polytechnics would emerge. The rise and transformation of the polytechnics in the UK is very significant to the context of South Africa which is currently struggling with the issue of institutional identities of universities of technology which evolved out of technical colleges, within a former binary education system.

4.2.1. The evolution of Polytechnics in the UK

The investigation of the evolution of the polytechnics in the UK is important as it may provide a deeper understanding of differences and changes in institutional culture within a binary higher education system, which is particularly relevant to this thesis.

Pratt (1997) outlined the evolution and eventual demise of the polytechnics in the UK during the period 1965- 1992, which he termed "the polytechnic experiment". The emergence of a binary higher educational system in Britain can be traced back to the 19th century when many colleges that were established to serve the growing industrial cities, transformed into 'redbrick universities'. However, during the 1950s and 60s, due to its post-war concern for technical education, the British Government established colleges of advanced technology (CATs) in England and Wales. The CATs offered higher education with a focus on technology, wherein formal qualifications such as the Diploma of Technology were offered (Pratt 1997).

The rise of the polytechnics in 1965 followed a speech by Anthony Crosland at Woolwich, then the Secretary of State for Education and Science, where he announced the Government's proposal of a binary policy in higher education which distinguished the universities from technical and public colleges (Pratt 1997). Polytechnics were established in accordance with two separate policies, the binary policy, with was enunciated in 1965, and the polytechnic policy. The subsequent White Paper in 1966 established polytechnics as the leading institutions of higher education in the non-university sector. Crosland confirmed Government support the dual system, where each made its own distinctive contribution, and outlined four reasons for his preference of such system (Pratt 1997):

1. the increasing need for professional, vocational and industrial based courses that could not be met by the universities;
2. to avoid demoralisation in the public sector due to the ‘ladder’ concept;
3. part of the higher education system remained under ‘social control’, responding to the needs of society;
4. Britain could not stand up to foreign competition if it downgraded its non-university professional and technical sector.

At that time, there was wide criticism aimed at universities for not being able to serve industry and the professions as they remained exclusive and aloof to society; where research and teaching remained self-referential, preserving and extending knowledge for its own end; and wherein the working class was under-represented. The university system would be referred to as the autonomous tradition. The polytechnics, on the other hand engaged with society and responded to the needs of society through the development of relevant professional and technical education programmes. Research within these institutions was accordingly responsive to some external problem in society or industry, which often took the form of consultancy for companies (Pratt 1997). Knowledge transfer was therefore a strong defining feature of the polytechnics. They accommodated the working class and included diversity, within a ‘service tradition’ to the benefit of society. While the autonomous tradition of the university promulgated the priority of the discipline, the service tradition of the polytechnics focused on the complexities of human and political arguments. The service tradition would further acknowledge and include maturity and work experience as alternatives to academic qualification as entry requirements, which promulgated student diversity (Pratt 1997). In this way, polytechnics overcame the restrictions posed to society as a result of the British class structure and class prejudice (Robinson 1995 in Pratt 1997).

The new funding support systems which were developed by the National Advisory Body for Local Authority Higher Education, established in 1982 was succeeded by the Education

Reform Act 1988, which moved the polytechnics out of the local authority sector. Polytechnics served a very important social role in affording the opportunities to historically marginalised, the opportunity to study at higher education level. The distinguishing characteristics of the polytechnics were that they offered broadened access to communities that could not access universities for various social and economic reasons; were situated within the working class districts and afforded the opportunity for part time studies at undergraduate level, which further aided access to the working class comprising a significant proportion of mature students; and a general balance between male and female students. As the technical institutions became the responsibility of local authorities their funding was very different to the block grant system of the universities. They had to be accountable to society and industry and would attract resources, provided that students enrolled indicated an expressed need from industry or commerce (Pratt 1997). These colleges further responded to demand for higher education from adults who could not access such earlier, which eventually led to them having to offer degree courses.

However, the degree courses had to be subject to the academic authority of universities, which meant that the academic staff at the technical institutions had no part in planning, designing or examining such. This caused much frustration to the technical institutions, the consequence of which was an aspiration for autonomy, as they began to seek university status which Pratt & Burgess (1974 in Pratt 1997) refer to as academic drift'. However, as revealed in the Anderson Committee Report (1960), which had very noble intensions of access for all British residents, who met the minimum entry requirements to first degrees and other comparable qualifications, access to student maintenance grants, it simultaneously reinforced the distinction between advanced and non-advanced courses, which generally did not receive grants (Pratt 1997). The, Robbins Committee which was established in 1961, on the other hand, promoted a single system for expansion of higher education which was heavily bias in favour of universities. Higher education thereby became synonymous with university education. Universities dominated the higher education system which, by intent, led to academic drift. Robbins further divided higher education into two forms: the universities, which accommodated mainly full time students; and the technical colleges, accommodating mostly part time students. The funding grants, however, were only accessible to autonomous universities.

The technical institutions would consequently start to break free of public control and external validation as they sought to adopt the structures and initiatives of the autonomous universities. They would increase focus on research and adopt the identity of the autonomous institutions as far as possible, which in instances, would compromise their vital role in offering broadened access to students who could not access higher education. Therefore, despite the vital function that polytechnics served in society, the polytechnic policy remained controversial up to the year 1992 when polytechnics changed to universities (Pratt 1997). The proliferation of polytechnics since 1965 would come to an end on 6 March 1992 whereupon the Queen gave the Royal Assent to the Further and Higher Education Act. This ultimately led to the change in institutional identity of the polytechnics, most of which would become universities. Crosland (1965 in Pratt 1997) argued that the change in institutional identity of colleges to that of the universities inevitably led to the neglect of the local needs and the educational demands of society for whom the colleges were actually founded.

In the article, *What a Waste* (THE. October 1996), Warnock posited that the abolition of the binary line between polytechnics and universities was a mistake as it ended the vocational role of the polytechnics and fatally debased the value of a university degree. She went on to confirm the two principle reasons for such abolition, namely; the funding of these two institutional types being rolled into a single funding council and that, as such, the two institutions were deemed to be of the same status and therefore became universities. She further attributed the change of the polytechnics into universities to the cumbersome, time-consuming and expensive process of external validation, mainly effected by the Council for National Academic Awards (CNAA). The polytechnics felt that they were just as capable as the autonomous universities in awarding degrees and monitoring the standards thereof. The CNAA would gradually diminish, subsequent to the Lindop Commission report of 1985 – this report did not outline any criteria for differentiation between degree-awarding polytechnics and the autonomous universities.

The subsequent White Paper on Higher Education (1987) proposed that all polytechnics with a student population exceeding 350 should become free-standing in terms of staff appointments and budget management, while the CNAA would continue to validate their degrees. Warnock (in THE. October 1996) argued that this was the time where polytechnics could have established their identity, which would focus on industry / the work force at all levels of occupation / profession. Her position strongly favoured qualifications in science and technology; and research which would be closely related to industry. She named the failure to achieve this as an educational disaster, which led to academic drift, whereby polytechnics drifted from their core offerings in science and technology to offer courses such as literature, philosophy and sociology, among others. Warnock alleged that philosophy seemed preferable to practical design, which fatally injured the polytechnics.

In the same article, Price took a different stance where he argued that the name change from polytechnics to universities did not matter very much as it better reflected the work of the polytechnics over the past ten years. Blackstone supported this view in stating that the polytechnics were making a substantial contribution to higher education as they offered various degrees, master's degrees and were engaging in research. In her view, the distinction between polytechnics and universities was not so great as to maintain a separate funding system and a separate institutional designation. She further argued that the change of polytechnics into universities would bring a rich diversity into the single higher education system. Toyne supported this view as he asserted that polytechnics were no longer "sub-degree technics" and should therefore not be labelled as such, which had an international perception of being a lower grade / standard than universities. The perception of polytechnic graduates during the 1980s were, according to Toyne, being rubbished as not as good as university graduates, which would lead to the creation of second-class citizens simply based on their place of education and not for their worth. Booth presented a strong argument against Warnock, in asserting that the transformation of the polytechnics gave a broader range of people access to the best education and value. He argued that the modern dynamic accompanied by a fast changing labour market did not warrant a segregated higher education system. He further posited that some of the old universities were forced, by market and industry pressures, to become more like polytechnics (THE. October 1996).

Brosan (1972) regarded polytechnics as committed to the application of knowledge in practice, thereby bridging the dichotomous gap between theory and practice. He further distinguished between the realistic and the nominalist views of knowledge, wherein he criticised the pursuit of knowledge for its own sake in which infinite complexity would be conveniently codified through objective application of concepts. He asserted that, within this paradigm, man could only learn if he subjected himself to immortal truths. Therein emerged the problem of disconnection between theory / academia and practice / society. The nominalist view, he argued, held that science was not an objective description of reality but a metaphorical ordering of reality (Brosan 1972: 43).

Brosan referred to two clear functions that differentiated polytechnics from universities, namely, matching and monitoring. Matching referred to the ability of the educational system to provide society with trained manpower in order to fulfil operational needs – education would respond to societal and industrial needs; where knowledge would transfer to society. This was typical of the polytechnic system. Within such system, education would always adapt and respond to societal needs and, by implication, change – a flexible model of vocational education. The university system, on the other hand, would be aligned to a monitoring function, isolated from society and industry, wherein the perception of reality would be filtered through predefined norms of truths and objective principles – a model of self –fulfilment whereby knowledge is generated for knowledge sake and not for the benefit of society.

Brosan further highlighted that, within the polytechnic system, the training of manpower for operational needs extended beyond higher education, and included tradesmen, craftsmen and technicians. He determined the significance of the polytechnics at the apex of the vocational education system, which provided training to technicians and applied technologists. Technologists, however, included professionals in various disciplines such as architecture, law, accounting and engineering (Table. 4.1.). This definition of technologist was therefore not limited to technological or technical skills, but a designation to the highest professional competency level within the polytechnic system.

AREA	CRAFT	TECHNICIAN	TECHNOLOGIST
Law	Legal Secretary	Legal Draftsman	Lawyer
Accountancy	Book-keeper	Senior (non-chartered) Accountant	Chartered Accountant
Language	Bilingual Secretary	Multilingual Interpreter	International Negotiator
Architecture	Draftsman	Architectural Technician	Registered Architect
Engineer	Toolmaker	Tool Designer	Chartered Engineer
Business	Clerk	Office Manager	Corporate Planner
Psychology	Junior Youth Employment Officer	P.S.W.	Qualified Psychiatrist
Art	Sign Painter	Layout Man	Artist
Building	Bricklayer	General Building Foreman	Chartered Surveyor

Table. 4.1. Trade / Professional designations / categorisation of activities per selected disciplinary areas within the typical polytechnic system (extrapolated from Brosan 1972: 43-44).

The above discussion revealed that differentiation in higher education in the UK was not as much as in the differentiation in institutional name as in the actual nature of the institutions and their societal significance. The nature of polytechnics was of offering courses in line with the operational needs of industry and the humanistic needs of society. As such, the polytechnics would develop their educational offerings beyond the limits of the training of a subservient workforce and began to offer high level qualifications. Within the polytechnic system there was a range of access and exit levels, as illustrated if Fig. 4.1., which would create a richness and complexity of student profiles within the institutions, as well as diversity in qualification offerings. With reference to Brosan (1972), matching would further extend to the needs of the student at different stages in career development, which would thereby allow for mid-career upskilling", attracting mature students who would typically be employed in industry. This implied that the demand for higher professional qualifications was inevitable. The matching of the education to society / industry coupled with the needs of students over time, inevitably led polytechnics into offering higher level qualifications. In this regard, it is important to note that the polytechnics had been transforming into degree awarding institutions, as a response to industrial and societal needs, including those of the students, sometime before their formal abolition in 1992. Therefore, upon their change to universities, they brought into the university system a richness and diversity to a sector of higher education that had been historically disconnected from industry and society. Polytechnics thereby redefined the status of universities in the UK.

The above discussion on the evolution of polytechnics in the UK, supports the argument that the change of name of these institutions was not of major concern, as they continued to maintain their historic identity as an educational system that was adaptable, flexible and relevant to industry and society; a system that negated perceptions of objective reality and absolute truths opting for inclusivity of diversity and contextual responsiveness.

Although the polytechnics changed their identities to that of universities, the institutional differentiation in higher education in Britain, nevertheless, had significant impact on other industrialised countries in Europe. The *Fachhochschulen* in Germany, the *Instituts Universitaires de Technologie* in France and the technical institutes in Austria, looked to the British model for their new policy developments (Pratt 1997).

The British formal higher education system transformed from a binary structure to a single structure that included the former polytechnics that became universities. As a consequence, the system naturally redefined itself, reflecting richness and diversity, both in education and its student body. Similarly, higher education in other European countries developed along parallel streams, that of the traditional universities and that of the technical institutions. The artistic paradigm of the *Beaux-Arts* and the pragmatic stance of the technical institutes is critical to the subsequent discussion. It is therefore necessary to briefly look into differentiation and identity within a sample of educational systems in Europe and their impact on the USA and Africa.

4.3. The Vienna School in Central Europe

Architectural education in Vienna had a profound impact in Central Europe, as Vienna established itself as one of Europe's most progressive centres for teaching architecture (Long 2001). The *Beaux-Arts* system coupled with the influence of modernism in Vienna in the late 1890s changed the course of architectural education in the city. The Vienna Academy of Fine Arts based its education on the master classes of the *Beaux-Arts* system, whereas the Vienna *Technische Hochschulen*, a polytechnic university, promoted the study and development of new materials and structures (Long 2001). The first polytechnic university was established in Prague in 1806, based on the model of the Paris '*Ecole Polytechnic*', followed by the *Polytechnische Institut*, which opened in Vienna in 1815. Polytechnic universities, later known as *Technische Hochschulen*, would eventually equal the traditional universities both in prestige and enrolment (Long 2001). The architecture programmes at the *Technische Hochschulen* would focus their 'curricula' on engineering and practical disciplines viewed building as objective science. The Vienna Academy had a beneficial relationship with the *Technische Hochschulen* as it required that entering students had previously mastered basic architectural skills usually at one of these institutions or other schools of trade or arts. The Vienna Academy would thereby gradually assume the status of a postgraduate school focusing on current architectural issues (Long 2001). This collaboration of the *Technische Hochschulen* with its diverse science and technology-based curriculum and the subsequent master class system of the Vienna Academy would develop an all-rounded professional with both design flair and technical skills. The *Technische Hochschulen* would later become universities of technology hence the formation of the Vienna University of Technology. Both the Academy and the University of Technology would stand equal in stature, albeit with very different academic outcomes and graduate attributes.

During the latter part of this era, a science and technology approach, combined with an artistic creative process redefined the process of architectural design in response to the needs of contemporary industry and society. Architectural design henceforth started to assume a functionalist approach, utilising the technological advances of modern society in its artistic creation. It was during this period that the rationalist functionalist approach of Otto Wagner, widely regarded as the founder of modern architecture, started to impact on the future of architectural education and practise in Europe and later the rest of the western world.

4.3.1. The influence of Otto Wagner on Modern Architecture

Otto Wagner was born in Vienna in 1841. His architectural education was at three distinctly different institutions which had either a science and technological focus, such as the Technical University in Vienna and the Bauakademie in Berlin, to the artistic liberal approach of the Academy of Fine Arts in Vienna (Encyclopaedia of World Biography: 2004). It is noted that his early education was scientific and technological, followed by the artistic liberal, which could have influenced the design approach of his own work.

His early works were defined by Neo-Renaissance and Neo-Baroque approaches, as evident in his residential buildings and the academy of fine arts project. It was during his tenure as professor of architecture at the Vienna Academy of Fine Arts, during the years 1894-1913, that Wagner promulgated his theories on a functionalist modern approach to architecture. His defining impact was during his inaugural lecture at the Vienna Academy, which was subsequently published in his book titled, *Moderne Architektur (1896)*, referred to hereafter as the translated edition – Wagner 1902 - was followed by various publications of the lecture during the following years (Encyclopedia of World Biography: 2004). During this lecture, Wagner made a profound statement on architecture, which defined the course of a new modern architecture:

"Modern art must yield for us modern ideas, forms created for us, which represent our abilities, our acts and our preferences" and "Objects resulting from modern views…harmonise perfectly with our surroundings, but copied and imitated objects never do." Wagner further referred directly to Godfried Semper: *"Necessity is the sole mistress of art…"* (http://www.encyclopedia.com).

Wagner's acknowledgement of scientific and technological advancement and the value thereof to architecture is summed in his statement:

"All modern creations must correspond to the new materials and demands of the present if they are to suit modern man; they must illustrate our own better, democratic, self-confident, ideal nature and take into account man's colossal technical and scientific achievements, as well as his thoroughly practical tendency – that is surely self-evident!" (Wagner 1902: 78).

Wagner postulated that the art of architecture and building must emerged from construction in order to have meaning. He further emphasised that construction is not merely the outcome of algebraic progression and structural calculations, but from the ingenuity if its invention – the art of construction, which is in the domain of the architect. His argument was that the approach of engineering in construction ignores the cultural values of man, as evident in his statement: *"The engineer who does not consider the nascent art-form but only the structural calculation and the expense will therefore speak a language unsympathetic to man,…the architect's mode of expression will remain unintelligible if in the creation of the art-form he does not start from construction."* (Wagner 1902: 94*).* Wagner thereby implicitly affirmed that the epistemology of architectural practise had to emanate from the intuitive ingenuity of the architect who would have the ability to transform technology and science into forms of social and cultural value – art. This process is one which strives to promulgate the definition of technology as a cultural construct whereby the architect may create artistic works through the means of modern science and technology.

While Wagner continued to develop his architecture, emphasising the attributes of modern society, his teachings and works were in turn inspired by his students, who continued his legacy. Josef Hoffman and Joseph Maria Olbrich, were two such students, who also worked in the practice of Wagner. These influences shifted Wagner's architecture beyond Art Nouveaux into the contemporary modern, defined by exposed steel, glass and lightness of mass. Simplicity, clarity of form and honesty of materials, principles widely used in today's modern architecture, were actively promulgated through the teachings and practise of Wagner. It was precisely his emphasis of the vital synergy between ingenuity, science and technology that defined his philosophy of education and practice. This was a paradigm shift for architecture, which had up to that point, relied heavily on the evolution of historic forms and motifs.

Wagner's reinterpretation of construction as a science and an art, which defined architecture of social meaning, promulgated a new realistic ideology of architecture in Europe, which would have resonating impact on architectural form and expression; it is therefore that he is considered as the founder of modern architecture. His impact on the Vienna Academy and the

Vienna Secession deeply influenced European architectural education and practise. The construction, or making of architecture by combining science and technology with art and craft, defined a new, integrated mode of architectural training – an ideology which indirectly seemed to have influenced the evolution of the Bauhaus.

4.4. The Bauhaus of Germany

The Bauhaus evolved from a purely arts and crafts based model into accepting that technologies and the products of modern society were an intrinsic part of architectural creation and expression. The early methods of the Bauhaus tended towards the Arts and Crafts philosophy and works of William Morris and the Arts and Crafts Movement, which inspired and influenced the architectural education sector in the central European Countries. Architectural education in central Europe was significantly shaped by the philosophies of William Morris and the Arts and Crafts Movement, Wairndorfer and Hoffmann of the 'Weinerwerkstiitten', the Grand Duke of Hesse of the 'Kunstlercolonie' at Darmstadt and the 'Deutschewerkbund' which emerged in 1907 (Howarth 1959). While the projects in Vienna and Darmstadt focused on the production of original work by bringing together art, design and craft, the 'Deutschwerkbund' adopted the opportunities that modern industry and machine production offered, as conceptualised by Henry van de Velde almost a decade earlier (Howarth 1959).

Dearstyne (1962) traces the antecedents of the Bauhaus to the Arts and Crafts School, created by Henry van de Velde in Weimar, in which he had immense influence through his pedagogic approaches. Van de Velde was called to Weimar for the purpose of acting as artistic advisor to the industry and production of handicrafts of the Grand Duchy. He established the *Kunstgewerbliches* Arts and Crafts seminar at his research institute which centred on an experimental laboratory in which new forms of technology where tested. Van de Velde based his pedagogic system on the analysis of the project rather than the application of any preconceived formula to it. In 1906 van de Velde established the *Kunstgewerbeschule*, the Arts and Crafts School, which was housed in a newly erected building that later became the home of the Bauhaus. The central pedagogic space at the *Kunstgewerbeschule* was the workshop, which defined and expressed the radical pedagogic approach of Van de Velde that vastly differed from other Arts and Crafts schools.

The workshop system created the possibility of selling the products which were largely hand-crafted. Van de Velde, however, lauded the works of the engineer and the beauty of machine-made objects, a radical departure from the usual ideologies and methods of the Arts and Crafts Schools. Dearstyne (1962) refers to a passage from a lecture by Van de Velde, titled "The role of engineers in modern architecture", which epitomises his admiration of the opportunities of modern technology: *"There is a class of people from whom we can no longer withhold the title of artist. Their work is founded, on the one hand, upon the employment of materials whose use was hitherto unknown and, on the other, upon an audacity so extraordinary as even to surpass that of the cathedral builders. These artists, the creators of the new architecture, are the engineers... For them no doubt exists about the laws of which we have spoken* [the laws, still valid, which guided creation in the Gothic period], *and the effect of these laws is so certain, so undisputed (the only agency which is certain and able eternally to produce new and beautiful things) that they must be looked upon as the only ones which have bestowed new and beautiful forms upon mankind. The exceptional beauty which resides in the works of the engineers springs from the fact that this beauty was as little aware of itself as was the unconscious beauty of the Gothic cathedrals ....I have often mentioned locomotives, steamboats, machines and bridges; one should also not forget, among modern creations whose beauty has attracted us, the first English baby carriages, the various fixtures of laundries and bathrooms, electric lamps, surgical instruments, etc ..."*(Dearstyne 1962:15).

Implicit in Van de Velde's admiration of the opportunities of the machine, was the acceptance of the principle of mass production and reproduction afforded by modern technology. Van de Velde continued on the rediscovery of basic truths and universal formulae which impacted on the architectural methods of the generations to follow. Furthermore, he stressed the essential role of construction as captured below in Dearstyne (1962:15):

"What I recognize to be ... the crux of all the artistic endeavours of our time is a yearning for a new harmony and a new aesthetic clarity. I adhere to this by proclaiming in the arts and crafts the sole principle which, in my opinion, is valid – that of construction. And I extend this structural principle just as far as I possibly can to architecture as well as to household utensils, to clothing and to jewellery. I strive to eliminate from the decorative arts everything which degrades them by making them meaningless and I wish to replace the old symbolic elements, in whose efficacy we no longer believe, by a beauty which is new and equally imperishable".

Dearstyne (1962) attributes the physical and doctrinal foundations of the Bauhaus to Van de Velde. According to Dearstyne (1962), Van de Velde conceptualised the reunification of the arts long before Gropius did. His introduction of the workshop system in Weimar, as the principal pedagogic space became the cornerstone of the Bauhaus system. Gropius later adopted the workshop system and the sales of its products, first in Weimar and later in Dessau. It was Van de Velde's admiration of the value of the machine and the beauty of its products and utility that was later adopted by the Bauhaus. In fact, Van de Velde's doctrine of 1894 was still too radical to be adopted by the Bauhaus, in its infancy in 1919, which then continued to pursue form over function (Dearstyne 1962).

It was from the opportunities of industrial production rather than the *atelier* system of the *Beaux-Arts* that the Bauhaus emerged. Walter Gropius stated in "The Idea of Structure"(1923) that the Bauhaus would endeavour "*determinedly to transfer and to practice the ideas of its predecessors Ruskin and Morris, Van de Velde and the Darmstadt group*" and to "*gather all creative art activities into one unity ... the great building*" (Walter Gropius in Howarth 1959:29). In Bauhaus 1919-1928 he further states, "*Let us create a new guild of craftsmen*" and "*the Bauhaus believes the machine to be our modern medium of design and seeks to come to terms with it*" (Howarth 1959:29). Westphal confirms that, according to the pedagogical ideas of Walter Gropius, the Bauhaus did have affinities with the English Arts and Crafts movement of Ruskin and Morris as well as with the reformist educationalists such as Rousseau, Pestalozzi and Froebel (Westphal 1991). The fundamental influence of Van de Velde was implicitly embedded in the Bauhaus pedagogy and its principal learning space, the workshop.

The Bauhaus started off successfully with some significant architects of the time being involved in tuition. After the first few years, however, differences of opinion within the organisation and political pressures from authorities forced the closure of the school. Gropius resigned in 1928. Hans Meyer succeeded Gropius and similarly resigned in 1930, followed by Mies van der Rohe. In 1932 the government of Anhalt closed the Bauhaus in Dessau and relocated it to Berlin as a private institution which eventually and finally shut down in 1933 (Howarth 1959:29). This is unfortunate, as political imperative reigned superior over a liberal education system of one of the most respected systems of architectural education of the modern era. Despite the demise of the Bauhaus School, the integrated approach of the Bauhaus continued to greatly influence the evolution of architectural education far beyond Europe.

4.5. The influence of the European Tradition on the United States of America

Lackney (1999) highlights the impact of the European tradition, especially that of Central Europe, on architectural education in the United States of America (USA). The adoption of the Bauhaus pedagogy by Columbia University in 1934 was a significant shift in American architectural education and the subsequent arrival of Walter Gropius at Harvard University in 1936 cemented the position of the integrated/interdisciplinary Bauhaus pedagogy in the USA (Lackney 1999). Burchard (1959) confirms that Gropius had significant influence at Harvard during the 1930s, which was enhanced and developed subsequent to World War II. Burchard attests to this as he, himself having been a Harvard student, related to the influence of Gropius and Marcel Breuer on the Harvard pedagogy that emphasised the role of architecture as a function of contemporary situation, which generated appropriate design methods. This approach focused on interdisciplinary integration across many subject lines, which engaged engineers, economists, planners, administrators and businessmen who would all highlight the different aspects of the design problem, thereby working towards the development of a total solution (Burchard 1959:23).

Burchard emphasised that the aesthetic discipline of the *Beaux-Arts* became increasingly out of touch with the 20th century realities as scientific knowledge started to offer new opportunities and new solutions to architectural problems. He further highlighted that the static methods of the *Beaux-Arts* Institute of Design were more closely related to the 19th century than the needs of contemporary societies of the early 20th century. This resulted in a significant shift in the pedagogic approaches of the USA system of architectural education, which Burchard attributes to the “Chicago School” of the 1880s and the work and philosophy of Frank Lloyd Wright during the late 19th century. The Central European influence continued to shape architectural education in the USA and had a profound impact on some of the most prominent schools of architecture in the USA today.

Geraniotis (1985) highlights the impact of the French and German pedagogic approaches on the Illinois University (Chicago) as well as MIT. He refers to the influence of Ricker at the University of Illinois, and his impact on architectural education in the Midwest during the last quarter of the 19thcentury. While MIT and the University of Illinois pioneered architectural education in the USA, their respective curricula were significantly different. MIT adopted a liberal and general approach, while Illinois drew inspiration from the German system, focusing on scientific, structural and technical studies particularly in the first two years of its four-year curriculum (Geraniotis 1985). In 1892 Illinois University developed a four-year Degree in Architectural Engineering, which attracted students from a broad range of allied disciplines such as building and mechanics. Ricker argued that few students were equally competent in both design and construction and that architectural education should cater for specialisation in each. Ricker was innovative in both the design of the curriculum and the pedagogic approaches as evident in his interdisciplinary/integrated curriculum that defined the development of architectural education at Illinois University. An important development at Illinois University was the Master’s Degree in architecture which was introduced in 1878 and could be completed by either a year of graduate study or a successful term of practice succeeded by a thesis (Geraniotis 1985). In the context of this research, the practice based mode supplemented by a thesis could be of great value to diverse socio-economic contexts where full time studies may not be a viable option. The architectural education system in the USA generally continued to remain diverse and differentiated, albeit within a single system of universities. The distinguishing feature, as in Vienna, was that different institutions would have a particular focus, either on the liberal arts or science and technology.

While differentiation was achieved by choice of institution in Germany, France and the USA, which developed identities either along the general / liberal arts / artistic approaches or the science and technology curriculum, differentiation within the British system was based on the inclusion of the polytechnics as universities, which added a new richness and diversity into a single higher education system. Within this system, differentiation would be defined by the historic cultures of two separate institutions within a former binary system: the autonomous universities in pursuit of knowledge within a paradigm of objective truths and reality, and the polytechnics which defined their purpose as a response to industry and society.

The above discussion reveals that the original approach of the *Beaux-Arts* was predominantly situated within an introverted artistic paradigm in which the lure of the image and the finality of the product presentation was emphasised and the value thereof reflected in assessment in the form of a jury. While, on the other hand, the Bauhaus was rooted in the crafts and the act of making; embracing technology, the machine and mass production. The utilitarian approach of the workshop-based Bauhaus therefore contrasted with the artistic *atelier* of the *Beaux-Arts*. Although the *Beaux-Arts* approach claimed to encourage exploration, this was focused on indulgent form-making and elaborate presentation rather than contextual response. The Bauhaus similarly focused on product and production, albeit with an emphasis on the machine and technology. It is argued that both these systems failed to develop architecture as a response to contextual needs and aspirations, thereby positioning architecture as elitist symbolism within defined paradigms; they would thereby, implicitly exclude socio-economic structures, culture and the natural environment.

The two systems of higher education impacted on architectural education in Europe and the rest of the developed and developing world. Architectural education in the African context inherited these systems through colonial influences as well as the training of local African architects overseas. While the *Beaux-Arts* and the Bauhaus had value in terms of artistic expression and the use of modern technology and advanced production methods, their value to the needs and aspirations of developing nations requires critical review. Similarly, the concurrent existence of traditional academic universities, with polytechnics or universities of technology has had influence on the higher education systems of Africa which were largely inherited from Europe, mainly due to its colonial past.

4.6. The influence of the European Traditions on African architectural education

The preceding discussion highlighted the evolution of the major systems of architectural education in the developed world; these systems all originated in Europe. The British, French and German systems were characteristically different as they responded to different philosophies and ideologies about what architecture and architectural education ought to be. Choice of curriculum and pedagogy, within the respective systems, often depended on the ideological preferences of the various schools of architecture rather than a concern for the needs and aspirations of society. The influence of political ideologies also had significant influence on the architectural profession and consequently influenced the systems of architectural training in different countries; as evident in the British and French colonies.

While the differentiated systems in the developed world were generally adopted by choice, architectural education in the developing world became entrenched through colonialism. In Africa, the influence of this entrenched colonialism has raised many concerns about the relevance of architectural education and, consequently, practice to context. Furthermore, many post-colonial nations are striving to define their regional identities, thereby posing a real challenge to architecture, and the identity of architectural education. It is important to note that

Africa is divided into regions defined by different European colonial influences, which profoundly influenced the identity of place and culture and the state of the respective economies; these influences translated into the quality of the built environment. The pursuant discussion therefore briefly looks into the influences of the European systems of architectural education in Africa, before focusing on the South African context.

The developing world is faced with socio-economic and environmental realities that require urgent attention to ensure the sustainability of emerging economies and cultures. This implies that architecture has to be inclusive of, sensitive to, and informed by the multi-layered realities of complex contexts that generally characterise the developing world. The methods of architecture and architectural education in the developing world, however, suggest that it continues to habitually adopt the approaches and methods of the developed world without necessarily seeing the value of the complexities of its own context. However, it is not as much about the curriculum and content, than the critical evaluation of the relevance and application of such to the developing context; this has significant pedagogic implications. The current challenges facing the developing world, with particular regard to sustainable development, cannot be addressed unless the inherited systems of architectural education are critically reviewed against the social, economic and environmental realities of such context. The need to harmonise environmental, economic and social dynamics requires a holistic and complex approach to spatial transformation and development. Traditional societies had been sustainable through the vital eco-systemic balance between various contextual dynamics. With further consideration to the rapid changes in the contemporary global environmental, it is necessary that the value of architectural education to society be interrogated.

It is necessary that broad-level research of the different colonial systems be undertaken in order to establish the histories and roots of the higher education models in the developing world, notably Africa, before honing in on architectural education. While European models of higher education perpetuate historic practice, they have also been able to evolve and transform over time. This has consequently developed to a level in which they have been able to differentiate, and also articulate between different qualifications and institutions, as evident in the evolution of the various polytechnics, institutes of technology and universities of technology. The developing world is similarly characterised by different kinds of institutions such as the technical institutions and the academic universities. Each form of institution is unique and addresses certain socio-economic and ideological needs. However, institutional transformation generally in Africa, is still challenged by many seemingly dichotomous issues such as the inclusion of institutional identity while reforming segregated educational systems into unified systems. Within unified systems, however, various concerns must be factored in. Some of these factors correlate to the European precedent. The main questions that emerge are: How can institutions of higher learning develop distinctive identities while simultaneously affording articulation across institutional types? ,and, how can higher education respond to the needs of industry and society, including the diversity of students who need access to such? The essential underlying concern is the incorporation of differentiation and diversity within unified systems.

Afeti *et al* (2008) define differentiation as a process whereby different types of educational institutions develop different types of education models in response to a country's need for education and skills. Such process, further factors in the broad and varied range of students who may have different backgrounds, abilities and interests. Differentiation is both an inclusive process as well as one that facilitates progress. In this regard, Afeti *et al* (2008) define articulation as a mechanism that allows for mobility and portability of qualifications within and among different higher education institutions. This process is based on credit transfers and exemptions, establishing equivalence of qualifications and recognition of prior learning (RPL) through informal education, industry practice or experiential learning. Furthermore, differentiation and articulation allow for an inclusive shift from restrictive elitist ideology to mass, or widened access to tertiary education. This widening of access to higher education is due to the response to complex economies, which require a mix of human resources in order to maximise productivity, increase efficiency and competitiveness, both nationally and globally (Afeti *et al* 2008). This definition of differentiation and articulation implies that different institution types such as universities, polytechnics and universities of technology may develop distinct identities in response to the needs of industry and society, while affording the opportunity for mobility and articulation within a single unified system. A further implication is that different curricular foci, within this differentiated system, may produce a range of diverse graduate profiles that respond to the different needs of industry and society. Furthermore, the said graduate profiles may be of both national and global value, which is particularly relevant to the developing world defined by emerging economies, complex socio-economic and environmental structures. It is therefore essential to identify and discuss various existing differentiated systems in African countries in order to establish how such systems emerged, co-existed and responded to their respective contexts, before looking at the differentiated systems of South Africa.

Afeti *et al* (2008) confirm that the term ‘binary’ emerged in the UK during the 1970s, defining tertiary education as two separate sectors, namely, universities and non-university polytechnic-type institutions. The merging of institutional types, with the abolishing of the binary system resulted in the polytechnics becoming universities. While in the UK this implied a single institutional typology, namely universities, where differentiation was defined by historic cultures of the historically separate institutions, the situation in Africa developed slightly differently. Afeti *et al* (2008) highlight the blurring of distinct boundaries between universities and non-universities which led to the emergence of some hybrid institutions such as the Kigali Institute of Science, Technology and Management (KIST) in Rwanda and the comprehensive institutions of Malawi and South Africa.

The main reason for such hybrid institutions are, the ‘two-way’ drift between differentiated institutions and the lack of clear policy defining the distinctions between academic and technical institutions. This two-way drift refers firstly, to the “academic” drift in which technical institutions aspired to gain the status of academic universities as evident in Kenya, for example, where polytechnics have been transforming into academic universities. Secondly, the “vocational” drift evident in the academic universities offering more vocational programmes toward market-driven qualifications. The blurring of past distinct boundaries between different institutions is most evident in the complex systems of Nigeria and South Africa, both former British colonies. A lack of regulatory distinction between institutional mission statements, purpose, curricula and qualifications, as currently evident, has allowed a natural and unhindered drift to happen (Afeti *et al* 2008). This drift incidentally added complexity and diversity to the historically separated institutions, which implied possibilities for diverse skills and cultural crossovers within a single higher education system. Articulation between qualifications and among different institutions has offered increased mobility of students and portability of qualifications. This system has benefits as it produces a complex mix of graduate profiles and, further, assists in significantly improving success rates, reducing drop-out rates and addressing social demand and equity concerns. The system naturally allows for widened access to higher qualifications, which greatly assists in addressing the realities of economic equity imbalances facing developing nations. Many countries in the developed world and the developing world have established National Qualifications Framework Levels (NQF levels) in order to re-structure their respective qualifications to ease and enhance articulation. The NQF levels determine the exit level complexities and outcomes of each qualification, within a hierarchical structure. According to Harris (1996 cited in Afeti *et al* 2008) there are many benefits of a single coordinated articulation system to students and institutions. Apart from widened access, flexibility of choice of qualification and mid-stream changes to curriculum, which favours students, there are some significant benefits to institutions. The most obvious benefit of articulation to institutions and students, in the context of this research, is the enhanced possibility of transdisciplinary linkages across programmes and between institutions. This allows institutions to remain diversely different with distinct regional identities, while at the same time, facilitating the possibility of articulation between them, enriching both their curricula and their graduates.

The development of an integrated NQF has many positive impacts on the developing world, particularly with regard to the establishment of regional identity, social sustainability and the advancement of local and alternate technologies. These afford the integration of disciplinary knowledge domains, inter-cultural engagement and the establishment of regional identity and the sustainability of traditional and regional cultures within the global socio-economic environment. It is important to note, however, that an over-emphasis on vertical articulation could leave skills gaps at lower levels, which may inevitably compromise architectural production.

Sawyer (2002 cited in Afeti *et al* 2008) highlights that post-secondary education in Africa comprises a mix of training colleges, vocational and technical institutes and, at the apex, are the universities and the polytechnic-type institutions. The pressure for widened access to higher education, the need for socio-economically responsive education and the aspiration towards the establishment of regional identity has influenced African governments to favour institutional and programme differentiation. However, it is necessary to understand the origin of the different systems of architectural education in Africa. What were the precursors of higher education in Africa?

Lulat (2003 cited in Afeti *et al* 2008) defines the precursors of pre-colonial higher education in Africa–with reference to Alexandria in Egypt, along with various Islamic and Arabic institutions. These systems were later transformed by colonial administrators which resulted in the adoption of either Anglophone, Francophone or Lusophone systems. For example, the higher education sector in Cameroon is divided along linguistic lines while most of the higher education institutions are based on the French traditions similar to other Francophone countries such as Senegal. There are a few English-speaking institutions, including those in South Africa, which were influenced by the British system.

The British established various higher education institutions in Africa, known as 'Asquith Colleges' through a mechanism known as the Inter-University Council for Higher Education. the University of London awarded qualifications at such Asquith Colleges through their association Lulat (2003 cited in Afeti *et al* 2008).

The French, similarly had great impact in most of West Africa. Ajayi, Goma and Johnson (1996 cited in Afeti *et al* 2008) highlight the subsequent emergence of the Pan-African movements and nationalism in West Africa which increased local demand for higher education. Ashby (1966 cited by Lulat 2003 in Afeti *et al* 2008) charges the African elites in French colonial Africa for the lack of development in higher education within Africa. They considered African education institutions as inferior to those of France and thereby placed higher value on the opportunities to study in France. As the cost of education for educating Africans in France became restrictive, together with the anticipation of political autonomy of French colonies, the French universities created overseas branches in African colonies. Lulat highlights that these institutions continued to maintain close ties with the French universities even after independence. Within this system, local institutions were seen primarily as centres for training civil servants and avenues for academics from France, Britain and Belgium to experience aspects of Africa. These foreign academics would subsequently be considered as experts in African studies (Ajayi, Goma and Johnson (1996 cited in Afeti *et al,* 2008).

The specific roles of the colonial University Colleges, however, led to their being criticised for an elitist orientation and consequent disconnection from their respective local contexts. The complex socio-economic contexts of developing world, on the other hand, could have benefitted from a responsive approach to architectural education. The role of architectural education with regard to the plight of the developing world was highlighted at the 1965 VIII Congress of the *UIA* in Paris in which Howarth (1966) referred to the purpose and challenges of architectural education in the developing (Third) world – Africa, the Middle East and the Far East. He emphasised that architecture needed to respond to the pressing social, economic and environmental realities of the developing world which challenged the "exhibitionist" nature of traditional western models of architectural education. He further stated that regionally responsive architectural education could assist in resolving the social and planning problems that plagued developing nations. Implicit in Howarth's speech was an ethical accountability of colonial education to the developing world context.

In this regard, the British formal education system sought to create linkages with African schools of architecture, which resulted in the “twinning” system that was led by the UK. The intention was that established schools, in the UK, would directly inform their “twin” schools in Africa. The two most established schools of architecture in the UK at the time, namely the AA and Liverpool University established “twinning” relationships with Kumasi in Ghana and Nairobi University in Kenya, respectively (Howarth 1966). This however, implied that the West had a lot to offer the African schools of architecture, thereby assuming a position of superiority and authority. While the benefit of adopting an established system made sense and was convenient, it is argued that such system would have required significant transformation in order to respond to the complexities of developing contexts. As traditional societies in the developing world built in response to their respective social, cultural and ecological contexts, could the developed world not, alternately, learn valuable lessons therefrom? Howarth alluded to this possibility when he stated that *“the citizens of the Third World have much to teach us and, all our sophistication notwithstanding, we have much to learn”* (Howarth 1966:43). This statement had significant neo-liberal inferences which could have greatly assisted with the de-stigmatisation of the intellectual worth of developing nations.

Bechhoefer (1977) highlighted the plight of architectural education the Middle-East and Africa during the early 20th century, in postulating that the cultural and development goals of societies informed the roles of architects and architectural education in developing nations. His research highlighted the problem of practitioners trained in the West, which raised questions about the effectiveness of their participation in the developing world. He further highlighted the pressures of modernisation and industrialisation on the traditional patterns of social and economic interaction that characterised the developing world. He stressed that the international, western outlook of local practitioners, due to their training abroad, resulted in little respect for the local environment and almost totally ignored culture (Bechhoefer 1977:19). Very importantly, Bechhoefer confirmed that the superiority of the colonial culture was assumed and defended by local architects, through the appropriation of their colonial models of education; this in turn, alienated them from their own developing contexts and society. Bechhoefer further elaborated on the lack of opportunity, infrastructure and industrial technology in the developing world where local architects found difficulty in applying their (formal) skills to their own contexts. As these local architects were trained in Europe, this often resulted in the importation of foreign architectural models that became imposed on the built environment in superficial ways. This in turn, impacted on local builders who picked up stylistic fragments of the imported architectural languages in order to express architecture of a perceived superior quality, which their wealthy clients viewed as modern and of high value. Consequently, the preferred architectural “style” further alienated architecture from society; becoming less sympathetic to culture and the environment; architecture thereby assumed the status of elitist symbolism which Howarth (1966) referred to as “exhibitionist”.

The need for regionally responsive architectural education became increasingly urgent; the unfortunate reality, however, is that many decades later, much of the developed world continues to uncritically adopt the historic systems of the West resulting in architecture that is alien to context. The following section looks at precedent in the developing world, in which inherited architectural education models transformed in order to develop regional significance and identity. The African context has some significant examples in this regard.

4.7. The influence of European traditions on African architectural schools: adopted pedagogic approaches.

Although colonial influences categorised schools of architecture into mainly the Anglophone and Francophone systems, the various schools of architecture on the continent developed hybrid approaches to architectural education. The main pedagogic approach remained studio-based, relying heavily on the studio as the central learning space, implementing the *Beaux Arts* model. Furthermore, the major graduation project or design dissertations at these institutions were subject to evaluation and assessment by jury, a process also adopted directly from the *Beaux Arts*.

All schools that were located in previously British colonies, such as in Kenya, Ghana, Nigeria and South Africa, in addition to being studio-based, required that students completed a period of work-based training after which they wrote professional practice examinations, similar to the RIBA examinations, thus implementing, in part, the system of apprenticeship. Furthermore, the binary system of the UK manifested in some countries, such as South Africa.

The evolution of the architecture programme at the University of Nairobi is particularly relevant to this research, which evolved over time to focus on the realities of a specific Kenyan context. University education in Kenya dates back to the establishment of the University of Nairobi in 1956, which was then known as the Royal Technical College of East Africa in affiliation with the University of London (Afeti *et al* 2008). The Royal Technical College was further developed and renamed as the Royal College of Nairobi in 1958, which was subsequently upgraded to the title of University College in 1961. Afeti *et al* confirm that at that time the Royal College of Nairobi offered a Bachelor of Arts, a general Bachelor of Science and a Bachelor of Science in Engineering, which were all affiliated to the University of London. Kenya gained independence in 1963 and the Royal College consequently transformed into the newly named University College of Nairobi which was joined by Makerere College in Uganda and Dar es Salaam College in Tanzania to form the University of East Africa. The consolidated University of East Africa fragmented in 1970 and the University College was redefined as the University of Nairobi (Afeti *et al* 2008).The Department of Architecture at Nairobi was established in 1956, as the only department within the Faculty of Architecture, later known as the Faculty of Art and Architecture at the Royal Technical College of East Africa (www.architecture.uonbi.ac.ke). As such, its educational model was structured on the British system. Upon completion of the academic component, the RIBA professional examinations were the final qualifying examinations. The East African Institute of Architects controlled professional standards. The Department of Architecture at the Royal College of Nairobi developed its first degree course in 1963, the Bachelor of Arts in Architectural Studies, followed by a Master of Architecture degree.

During this period, the college was also greatly influenced by the USA, wherein concerns for the development of humanistic architecture and social sustainability started to emerge. Much of this influence was due to Professor Buckminster Fuller from the University of Southern Illinois, USA, who visited the college as part of his world itinerary of lectures to schools of design. Fuller introduced his theories on synergetic/energetic structures and outlined his proposal for a world Design Research Decade at schools of architecture, focusing on human trends, needs and resources (www.architecture.uonbi.ac.ke).

The humanistic concerns of architectural education in Nairobi was evident in its focus on the housing crisis in Kenya, which had significant influence on the architecture curriculum at the University of Nairobi. This was largely due to the UN sponsored report, titled 'Housing in Kenya' by housing consultants, Abrams and Bloomberg in 1965, which resulted in the Kenyan Government prioritising their plans to build cost effective houses. This initiated the establishment of the Building Science component of the Department of Architecture and Building Science at the newly formed University of Nairobi which had evolved from the Royal College of Nairobi. The Government established the 'Housing Research and Development Unit' (HRDU) at the university in order to research low-cost housing in both urban and rural areas. The unit was upgraded in 1993 and renamed the 'Housing and Building Research Institute' (HABRI) - a multi-disciplinary research space (www.architecture.uonbi.ac.ke). This multi-disciplinary approach led to the merger of relevant allied departments resulting in the formation of the Department of Architecture and Building Science, which allowed various aspects of architectural design and building technologies to synergise in order to develop appropriate design responses.

The current curriculum of the Department of Architecture, within the School of the Built Environment, at the University of Nairobi, is defined by a range of thematic areas which focus on urbanism, human settlement and sustainability. The focus on the local context and regional identity hence becomes increasingly evident in the curriculum. While the Nairobi case represents a relatively smooth transformation from the British/American model to adapt to the needs of the Kenyan context, other developing countries had to grapple with the issues of a responsive architectural curriculum, by seeking alternatives to firmly entrenched European colonial traditions.

Nigeria, also a former British colony, owed much of its architectural traditions to the British and/or American models (Olotuah 2006:81). Olotuah (2006) confirms that the British established the first architectural school at Zaria, which subsequently informed the establishment of many more schools of architecture in Nigeria. According to Olotuah and Adesji (2005) architectural education began in Nigeria in 1952 at the Royal Academy, originally located at Ibadan and subsequently relocated to Zaria in 1955. The Diploma in Architecture exempted graduates from Parts I and II of the RIBA examination while allowing them admission to the final examination. The Nigerian College of Arts, Science and Technology was renamed the Ahmadu Bello University in 1962, which resulted in the Diploma programme being restructured into the Bachelor of Architecture degree. This school, established during the British colonial period, was almost completely run by the British-trained personnel. In 1969, the programme was again restructured into a two-tier offering, namely, the Bachelor of Science and the Master of Science degrees.

The period between 1963 and 1979 realised the establishment of four other schools of architecture in Nigeria which were dominated by architects from Europe; Olotuah and Adesji (2005) refer to this as the semi-colonial, experimentation period. They note further, that a third period in the evolution of architectural education in Nigeria since 1979 realised the establishment of fourteen schools of architecture, which were predominantly serviced by Nigerian staff/faculty. Of these the University of Nigeria established a Department of Architecture in 1963, followed in 1970 by a third school at the University of Lagos. By 1999 the number of degree-awarding institutions had increased to sixteen (this has risen to nineteen since then), while there were also nineteen Polytechnics and Colleges established (Olotuah and Adesji 2005). The newly formed schools of architecture in Nigeria strived towards establishing a post-colonial regional identity and therefore had to redesign their curricula in order to respond to the local contexts. The aim of architectural education was eloquently captured by Olotuah and Adesji (2005) who stated that:

"The goal of architectural education is subsumed in the general concept of education, which is to prepare people to improve and perpetuate their society. This is achieved by taking due cognizance of the society's political, social and economic circumstances in the design of the educational programme."

Schofield (1972 cited in Olotuah 2006:83) confirmed that the aim of education was to put people in touch and to train them to appreciate the cultural and moral achievements of mankind and to provide them with the necessary skills in order to further their knowledge. This definition strongly supported the view that architectural education has to be contextually rooted in order to become relevant and meaningful to society.

Olotuah and Adesji (2005) noted further that architectural education in Nigeria had been challenged, from within, over the past fifty years in order to respond to the national needs and aspirations while embracing the advances of modern architecture, despite the fact that the historic curriculum was structured around the British and the American *Beaux-Arts* traditions. The relevance of such model had been under critical questioning and had been debated at national architecture conferences facilitated by the Nigerian Institute of Architects (NIA), the Commonwealth Association of Architects (CAA) and the later established Association of Architectural Educators (AARCHES) in Nigeria. The need for a contextually responsive architectural education was highlighted by the African Union of Architects (AUA) as far back as 1984 (Mulumba 1988 in Olotuah 2006). Mulumba highlighted three major issues of concern regarding architectural education in Africa, namely, its inadequacy to deal with emerging urban and rural problems, the insufficient number of trained architects and the inability to adapt to the socio-economic realities of African countries. Adeyemi (1998 cited in Olotuah 2006) argued for a new direction in architectural education which would overthrow the *Beaux-Arts* model which he contended as irrelevant to the concept of architecture as a cultural phenomenon. Olotuah similarly asserted that architecture was a culture-dependent activity and had to therefore respond to the social aspirations of the people in context, with due regard to time.

Nigerian schools of architecture have since been developing their ideologies and philosophies, over the past fifty years, towards a contextually responsive architectural education, guided by the National Universities Commission (NUC). Central to this is the concept of a studio. Olotuah (2000) confirmed that the design studio had been the nucleus of the curriculum, geared towards imparting skills required to provide appropriate solutions to problems of the built environment (Olotuah 2000 in Olotuah and Adesji 2005). He further stated that the design studio afforded the imparting of cultural values to students as well as expanding their world views (Olotuah 2002 in Olotuah and Adesji 2005). The studio, in that instance, would become a simulated real-life place to engage with the complex problems facing societies in the developing world.

The impact of the French system on architectural education in Africa is well reflected in the case of Tunisia, a former French colony, the influence of the *Beaux-Arts* system of which is highlighted by Bechhoefer (1977). Importantly, he confirms that Tunisia had been able to adapt modernisation to its own culture and values, unlike its North African neighbours who resisted modernisation. Tunisia hence assumed the perceived position of a moderating force in an area characterised by polarised extremes. Although the revolutionary thinking of the early 20th century, defined by the Bauhaus, started to change the modes of architectural education in the West, Tunisia established its own *Ecole des Beaux-Arts,* which was a model copy of the Paris school, offering a three-year architecture programme that prepared students for entry into the first year in Paris (Bechhoefer 1977). Many graduates went on to pursue further studies at the Paris school, however few returned to Tunisia as architects and as a result, Tunisia continued to rely on the services of foreign architects. The lack of a critical mass of Tunisian architects led to a decision in 1965 to train architects locally at the *Ecole des Beaux-Arts* in Tunisia, under the headship of Safia Farhat (Bechhoefer 1977). The best Tunisian architects were invited to develop the new curriculum which sought to include more of the local concerns with regard to culture and environment. However, as these architects were all trained in Paris, the curriculum leaned heavily towards the *Beaux-Arts* model of Paris. As such, Tunisian culture, climate, economy and resources were not included in the curriculum. This became a cause of concern for Farhat who was seeking a more contextually relevant architectural curriculum.

A watershed moment for all the Francophone schools occurred in 1968, with the fall of the *Beaux-Arts* in Paris. This, together with the lack of a locally responsive curriculum for Tunisian architecture, led to Farhat seeking an alternate system of architectural training. Farhat travelled abroad to Sweden where she was profoundly impressed by the studies that evolved from the Bauhaus system (Bechhoefer 1977:20). There she was exposed to the value of technical subjects in design, which translated to application in the local built environment. Farhat also travelled to Montreal, where she attended a conference on computer technologies. These experiences shaped her approach to design as a problem-solving activity rather than a simple matter of aesthetics, a radical departure from the strictly *Beaux-Arts* system. Farhat took those experiences back to Tunisia and transformed the existing education model with an entirely new focus and pedagogic approach, which were rooted in the local context, its people and the advancement of global technologies of the time. This new pedagogic approach required that students engaged with the structures and lifestyles of Tunisian families, analysing traditional buildings in order to understand relationships between spatial and utilitarian needs, the relationship of technology and materials to the local climate and how architectural forms could be manipulated in order to express cultural value and meaning (Bechhoefer 1977:21).

Moving forward, the new curriculum and pedagogic approaches at the Tunisia school did not follow any one particular system, but became a hybrid fusion of the *Beaux-Arts*, Bauhaus and the study of traditional indigenous building in Tunisia. The programme comprised three cycles, the first being most significantly influenced by the "*atelier Americain*". In this three-year cycle students were exposed to basic design methodology, visual expression techniques, environmental challenges and technical subjects. This was structured around a problem-based pedagogy, focusing on researching existing conditions and developing unique design responses; a most significant departure from the *Beaux-Arts* approach (Bechhoefer 1977). The system developed and resulted in students becoming increasingly sensitive to the local context and encouraged Tunisian-trained architects to remain in practice in their own country. The second cycle, of a two year duration, also focused on design problems and programmes of increasing complexity. In the third cycle, of two years, students pursued studies in an area of interest; the first year at school and the second as an internship year. Upon completion, a further two years of internship within the Tunisian Ministry and subsequently at a ministry in France was required. The two-tiered internship was a vital component of training at the Tunisian school, which assisted in alleviating the problem of a lack of resources while also exposing students to the realities of the local context and the developed world. Upon completion, graduates were considered competent to practice without the need for any form of licensing.

In 1973, the Tunisian Government conferred full university status to the *Ecole des Beaux-Arts* and certified its degrees. The school was subsequently renamed *L'Institut Techno-logique d'Art, d'Architecture et d'Urba-nisme de Tunis*, and an administrator from the Ministry of Public Works became the director of the architecture section. The ministry was actively involved in promoting the architectural profession in Tunisia and provided work opportunities for architects in the country (Bechhoefer 1977). This ensured that the intellectual and skills resources generated in Tunisian schools of architecture were not lost to the West, but rather ably applied to the benefit of the Tunisian context.

The Tunisian case is an encouraging scenario in which the partnership between the school and the Government formed a vital synergy in the effort to transform the architecture of the country, through the advancement of knowledge and skills, and the retention of local architects.

Chapter Summary

This chapter outlined the roots of formal architecture and highlighted the dominant models of architectural education in the developed world and their respective impacts on the developing world. The discussion revealed that colonially inherited systems became increasingly unable to respond to the complex socio-economic and environmental realities that plagued the developing world.

The French, British and German systems were critically reviewed as autonomous systems and then against their relevance to context and society. The epistemological tendencies within each system were distinctly different, as evident in the practice-based British model and the binary system, the studio-based (*atelier)* of the *Beaux-Arts* in France, and the workshop-based, technology-focused, mass production model of the Bauhaus in Germany. It was established that all three systems impacted on the developing world, notably Africa, in which these architectural education models were inherited through colonial legacies.

The discussion further revealed how the key African precedents in architectural education, Kenya, Nigeria and Tunisia, evolved from a colonial legacy in order to transform their 'curricula' and focus on the socio-economic and environmental realities of their respective regional contexts. This provides insight into the possibilities for transformation of architectural education in South Africa.

While the Kenyan, Nigerian and Tunisian precedent highlighted their approaches to the transformation of architectural education towards contextual relevance, South Africa is a new and emerging democracy in the developing world. As such issues of educational transformation are in infancy. The added complication of divisive policies such as apartheid poses further challenges to architectural education. It is therefore necessary to understand the impact of colonialism and apartheid on architectural education. One of the consequences of divisive policies was the promulgation of a binary system of higher education, not dissimilar to that of the UK. The following chapter, therefore, importantly seeks to establish the roots of architectural education as well as the statutory regulations that govern the architectural profession in South Africa. Such study will be vital in defining an alternate model within the post-apartheid, democratic era.

CHAPTER 5:

HISTORY AND EVOLUTION OF ARCHITECTURAL EDUCATION IN SOUTH AFRICA

The previous chapter outlined the main influences of European architectural education systems on the developed and the developing worlds, with particular reference to Africa. Some liberated, independent African nations evolved and adapted to find ways of transforming their inherited systems of architectural education, in order to respond to the needs and aspirations of their respective countries. Architectural education in South Africa similarly evolved from colonial influences and currently faces similar challenges of creating a regional identity, meaning and relevance. The South African education system was, however, unique as it was defined and shaped by two distinctly different dispensations in its political history, namely the Union Period and the Nationalist era of the Republic of South Africa. These periods were ideologically dissimilar and as such, influenced education differently. The other distinguishing factor of the South African context was a dual system of post-secondary education which was divided between the technical stream of the technical colleges and the academic stream of the traditional universities.

Therefore, in order to understand the influences on the evolution of architectural education in South Africa it is necessary to trace the origins and evolution of architectural education through its political history, commencing in the mid-19th century, as well as its dual education model. The present model of architectural education is formal and the succeeding discussion, therefore focuses on the evolution and development of formal architectural education in South Africa.

5.1. The origins of formal architectural education in South Africa

Up until the mid-19th century, architectural practice and education existed as completely regionally autonomous, under the influence of practicing architects who had trained abroad and returned to their respective regions in South Africa; there was no linkage between institutions of the different provinces in South Africa. There were two British influenced provinces, namely Natal and the Cape, and two Boer influenced provinces, namely Orange Free State and Transvaal. The architecture and architectural education foci of the different regions were heavily influenced by the respective architectural practitioners along with their training, architectural philosophies and methods. The profession was therefore defined by fragmented identities across the various provinces and regions.

During the Union Period of the early 1900s, however, a growing interest towards a unified architectural profession emerged, which sparked the initiation of formal discussions around education and practice. These discussions focused on architectural practice and architectural education, enabling a dialogue across the provinces of South Africa, which began in the form of conferences on architectural education. The seriousness of the concern for a unified profession was evident as it was the main focus of the 1923 Conference on Architectural Education which was held at the Technical College in Durban (www.artefacts.co.za/lexicon). The conference attracted delegates from across the country and from different sectors of the profession. Conference delegates consisted of professional bodies and institutions of architectural training from the Cape, Transvaal (now known as Gauteng) and Natal (now known as KwaZulu-Natal). Among the conference delegates was Professor Pearse of the University of the Witwatersrand (Wits), which was the only university in South Africa that offered an architecture course at the time. Professor Snape, a civil engineer with interest in architecture, represented the University of Cape Town (UCT) while Mr Martin, a senior lecturer in Fine Arts, represented the Natal Technical College, and its constituent body, the Durban School of Art was represented by Mr Oxley. The Union Government was also officially represented in order to engage with the concerns around architectural education at a national level (www.artefacts.co.za/lexicon). While the conference focused on architectural education, there was significant input from academics as well as the architectural profession in the form of practitioners. It is interesting to note that, during this period, architectural education was situated at different types of institutions, such as universities and colleges, and discussions around architectural education and the profession drew interest from members of other disciplines such as engineering and the arts.

The two major points of discussion at the 1923 conference were around the possibility of the formation of a federal educational body and the benefit of a professional publication on architectural education. Discussions led to a resolution that a Federal Council on Architectural Education be formalised. The constitution of the Federal Council subsequently defined its role as a co-ordinator of architectural education in South Africa while also having the authority to devise schemes for architectural education and examinations within the Union of South Africa. These schemes and proposals were forwarded to the relevant institutions and societies for their consideration (www.artefacts.co.za/lexicon). The first meeting of the Federal Council on Architectural Education, held in 1924 in Cape Town, agreed to recognise two standard models for courses in architecture, namely, the Diploma and the Degree. The extant diploma course of Wits and the degree course of UCT defined the standards for each model. The different foci of the two models were apparent; the degree model had a liberal arts focus as compared to the engineering and science focus of the diploma model.

The Transvaal, where Wits was located, constituted the largest distribution of architectural practitioners and training institutions. Transvaal was defined by two major cities, namely, Johannesburg as the economic centre of the country and Pretoria as the capital city. The issues, challenges and opportunities that this situation offered led to the Federal Council meeting with the Council of the Association of Transvaal Architects and the Board of Examiners in 1926, in order to discuss architectural education in the Transvaal. During this period, there were two sites of architectural education in the Transvaal, namely the Pretoria Technical College in the city of Pretoria and Wits University in Johannesburg. Pretoria Technical College did not have a course for the training of professional architects and therefore students wishing to pursue a career as professional architects undertook the Wits diploma course. This was due to the fact that there was no Chair of Architecture in Pretoria. Pearse proposed that successful students of the Pretoria Technical College be awarded the Wits diploma; a move which was initially opposed by the Minister of Education most probably on the grounds of the different focus and identity of the respective institutions. The Minister eventually gave consent in 1929 which then resulted in the collaboration of the newly established Institute of South African Architects and the Chapter of SA

Quantity Surveyors, to create the Department of Architecture and Quantity Surveying at the Transvaal University College situated in Pretoria. This department was located in the Faculty of Science, under the headship of Professor Bell-John who was a Quantity Surveyor and Chief Engineer at the Public Works Department. In 1930 Bell-John and the renowned Pretoria-based architect Gerard Moerdyk, approached the Minister of Education to request that a Chair of Architecture be established at the University of Pretoria (UP). This proposal was opposed by the Transvaal Institute of Architects who argued that Wits was under-resourced and, that any such proposal may only be served to the Central Council. At a joint meeting between Wits and UP in 1931, it was resolved that the centre for Architecture be situated at Wits while Quantity Surveying be situated at UP. This decision was immediately ratified by the standing committee of the Central Council. The need for an architecture course at UP became convincing enough and the chair in Architecture was transferred from Wits to UP in 1943, thereby establishing the architectural course at UP. The two schools had inevitably influenced each other, however the programme at Wits was adopted and thereby guided the focus of the UP curriculum. The school of architecture developed over the next decade whereby the curriculum adapted to become more responsive to the Pretoria context, mainly due to the academic staff composition, predominantly of practitioners from Pretoria. This eventually led to the two schools developing their curricula autonomously and the UP curriculum defined its own focus and direction.

Architectural education in Natal was originally based at the Natal Technical College in which an architectural course was established in 1922, also under the sponsorship of Wits University. This relationship to Wits established a strong link between architectural education in Transvaal and Natal (www.artefacts.co.za/lexicon). The University of Natal, which was founded in the early 1900s, eventually broke away from the Natal Technical College as a separate entity in 1929 (d'Almaine *et al* 1997). Carter (2013) confirms that the Natal Technical College architecture programme subsequently moved to the Natal University College in 1933. The Natal University College later changed to the University of Natal and then to the University of KwaZulu-Natal (UKZN), as it is currently known.

The development of architectural education in both the Transvaal and Natal were initially based at technical colleges with a different focus to the liberal arts curriculum of UCT. However, as discussed, the architectural courses in the Transvaal and Natal moved into the respective universities; a move which changed the curricular nature of the respective courses. Wits played the leading role in the establishment of schools in Pretoria as well as Durban in Natal thereby significantly influencing the philosophies and the curricula foci of those schools. There were no other training centres for architecture in South Africa at the time, and the policy of the Central Council exercised caution in authorising the establishment of any new schools of architecture.

The shift of professional architectural training from the technical colleges entirely to universities, resulted in the university-based curriculum becoming the prevalent model for architectural education. The university model was supported by the Central Council who affirmed that they considered Universities as the ideal sites for architectural education; this opinion of the Council sparked strong concerns from the technical colleges and Government. Importantly, in the context of this research, the architectural profession raised concern mainly due to a vested interest in 'second level architectural education' for the training of architectural assistants, which traditionally happened at the technical colleges (www.artefacts.co.za/lexicon). The profession therefore viewed the training provided by technical colleges as supportive to the universities, rather than of equal status. The value of technical colleges extended beyond the architectural profession and played a vital role in technical skills training across many trades. The primary purpose of technical colleges was vocational skills training for specific industries, predominantly in the engineering and manufacturing sectors. These colleges were defined by their regional location and thereby provided skills in response to the regional needs of industry and the regional economies.

Architecture programmes at South African universities, on the other hand, were influenced and shaped by well-established international traditions rather than having any bearing on the need for regional skills development. Carter (2013:43) identifies the different inherited systems that shaped architectural education at the different universities in South Africa. UCT was characterised by a 'compositional and fine art' inclination, which suggested a *Beaux Arts* influence; the 'building arts' model at the Nelson Mandela Metropolitan University (NMMU, formerly known as the University of Port Elizabeth) was based on the Bauhaus workshop system; while the 'engineering with arts' model of Wits related to the French '*Ecole Polytechnique*' system adopted also by UP and Natal University. While universities seemingly had the option of exercising preference in their modes of education, the technical institutions had to serve very specific needs of the country's economy and the requirements of the professions and industry.

The distinctive divisions between academic universities and technical institutions remained a contentious issue in professional disciplines. The differentiation of training/educational institutions transcended the ambit of education and escalated as a means of political influence and control. During the colonial Union period, the various technical institutions became divided along racial lines, while universities remained largely inaccessible to historically disadvantaged people. This was a deliberate outcome of the political ideology of the time, which aimed at controlling access to resources including the technical labour force. The division of training and educational systems therefore had both a technical/professional differentiation as well as a political agenda. Afeti *et al* 2008 defined the binary system of education in South Africa, consisting of academic universities and technical institutions, as divisive and 'technicist'. Ajayi *et al* (1966 cited in Afeti *et al* 2008) confirm that the University Act of 1916, enacted by the Union Government, established the 'decolonised' higher education system in South Africa. This led to the establishment of the University of South Africa (UNISA), Stellenbosch University, and UCT. Afeti *et al*, however, highlight that all subsequent higher education institutions, including technikons and colleges, continued to be segregated along racial lines until the demise of apartheid in 1994. Post 1994 realised broad level transformation of the higher education landscape and the previously distinct divisions between the two major types of higher education institutions, namely, universities and technikons, started to become increasingly permeable.

The change of Government from a nationalist dispensation, in which apartheid was promulgated, to a democratic dispensation in 1994, initiated transformation of many public-sector structures including higher education in South Africa. The need to respond to the socio-economic challenges of a new developing nation, during the late 1990s, saw increased political and financial pressure being exerted on the existing universities. Redress in higher education sought to promote equal access and strategies for accessibility to historically marginalised communities became one of the primary concerns of the democratic dispensation. Furthermore, the capacity and resourcing of the existing universities were under pressure due to an increase in demand for access to higher education by a large part of the population from historically disadvantaged communities. These considerations, among others, led the restructuring of higher education legislative frameworks. One of the primary objectives of the transformation of higher education was to create a coherent structure, which would facilitate articulation of qualifications from different institutions and different levels of entry. The distinctive and divisive barriers between institutions of higher learning, henceforth, started to break down. The following section discusses the transformation of frameworks, polices and legislation that defines and impacts on the current state of architectural education at universities of technology.

5.2. The transformation of architectural education in South Africa

The segregated higher education framework that developed since the Union period became increasingly criticised by the post-apartheid government. The main criticism of the historic frameworks was their rigid and exclusive nature that prevented the mass of the historically disadvantaged population from gaining access to quality higher education and also to articulate to higher levels of qualification. As a consequence, the Parliament of the Republic of South Africa authorised the enactment of the Higher Education Act 101 of 1997 (www.che.ac.za), which, was the first for higher education in South Africa.

5.2.1. The transformation of the higher education in post-apartheid South Africa

The demand for access to higher education by historically disadvantaged people, and the anticipated technical and professional skills shortage in South Africa, created the need for proper regulation, governance and resourcing of higher education in South Africa. The Higher Education Act 101 of 1997 was a serious response to such need. The Act importantly required that a statutory body be created for academic quality control and the development of a coherent single system of higher education. This was achieved through the establishment of the Council on Higher Education (CHE) as the statutory council governing higher education in South Africa.

The impact of such legislative changes created some challenges to higher education institutions, which developed within the dual tertiary education system, while it created many opportunities for institutions to rethink their missions and goals. At the same time, the architectural profession had to consider opportunities for transformation within a new education and training paradigm. The following discussion focuses on the key strategic objectives of the Act and the CHE. The discussion then leads into one of the major challenges to higher education in South Africa: pre-university education. This section is followed by the response of the architectural profession to transformation.

5.2.1.1. The Higher Education Act 101 of 1997

The Act was the eventual outcome of a series of processes and conversations since the dawn of the new democracy in South Africa. The Higher Education Act 101 of 1997 came into effect on 19 December 1997 (www.che.ac.za), subsequent to the Education White Paper 3: *A Programme for the Transformation of Higher Education*, which was published on 24 July 1997 (General Notice, Notice 1196 of 1997). The Education White Paper 3 was the ultimate outcome of the National Commission on Higher Education (NCHE) which was established by the first democratic president, Nelson Mandela, in February 1995. Broadly, the White Paper sought to develop a programme for the transformation of the higher education system in order to reflect the societal changes, values and practices within the new democracy. The key objectives of the White Paper were the development of a single co-ordinated system as well as governance and funding of resources – all of which impact on architectural education and training.

The purpose of the act was: *to regulate higher education; to develop and define the functions of a Council on Higher Education; to provide for the establishment, governance and funding of public higher education institutions; to provide for the appointment and functions of an independent assessor; to provide for the registration of private higher education institutions; to provide for quality assurance and quality promotion in higher education; to provide for transitional arrangements and the repeal of certain laws; and to provide for matters connected therewith* (Higher Education Act 101 of 1997: 1).

The main objective of the Act was to reform the higher education sector with the following desired outcomes (cited in the Higher Education Act 101 of 1997):

- Establish a single coordinated higher education system which promotes co-operative governance and provides for programme-based higher education;
- Restructure and transform programmes and institutions to respond better to the human resource, economic and development needs of the Republic;
- Redress past discrimination and ensure representivity and equal access;
- Provide optimal opportunities for learning and the creation of knowledge;
- Promote the values which underlie an open and democratic society based on human dignity, equality and freedom;

- Respect freedom of religion, belief and opinion;
- Respect and encourage democracy, academic freedom, freedom of speech and expression, creativity, scholarship and research;
- Pursue excellence, promote the full realisation of the potential of every student and employee, tolerance of ideas and appreciation of diversity;

- Respond to the needs of the Republic and of the communities served by the institutions;
- Contribute to the advancement of all forms of knowledge and scholarship, in keeping with international standards of academic quality;
- Higher education institutions to enjoy freedom and autonomy in their relationship with the State within the context of public accountability and the national need for advanced skills and scientific knowledge.

The following discussion engages with those objectives that are most pertinent to the transformation of pedagogy and learning space development, which is the focus of this research. The establishment of a single co-ordinated system of higher education is within the ambit and responsibility of the CHE, which will be discussed hereafter.

The desire to respond to the needs of society correlates to the discussion on the contextual relevance of education and situated learning. Furthermore, education and practise thereby had to relate more closely to social and environmental concerns. This particular intention has great implications on the current models of architectural education, which require critical review. Curricula, pedagogies and learning spaces have to be reconceptualised, which may in turn offer many possibilities for programmes at universities of technology. However, the challenge for universities of technology is to maintain a distinct identity which is different to traditional universities, as per the paper: *The Restructuring of the Higher Education System in South Africa* (Asmal 2002).

To provide optimal opportunities for learning, the creation of knowledge and the advancement of knowledge and scholarship relate to both pedagogy as well as research. This relates back to the social and environmental context of learning, which impacts on curricula, pedagogy, learning space development and research areas. Education in this context is as much about finding out what the problems are, in context, as to proposing possible solutions. This is vital in the development of the proposed new model.

One of the most important factors toward the development of a new model for architectural education, in the context of this research, is the unified co-ordinated single higher education system and the promotion of advanced skills and scientific knowledge. It is therefore necessary to discuss the role and mandate of the CHE.

5.1.1.2. The Council on Higher Education (CHE)

The Education White Paper 3 (General Notice, 1196 of 1997) sought to develop strategies to redress past inequalities and to respond to the new realities and opportunities within the context of the new democracy. Access to higher education by historically disadvantaged individuals had to also consider the opportunities for vertical articulation within the higher education system. The real challenge was that a previously marginalised population, from different social and economic backgrounds, would access a system that previously separated education into the academic, liberal arts with unlimited articulation possibilities, and technical skills training, which was limited to training for the labour force. The traditional universities provided the former, while technical colleges, the latter.

The introduction of technikons into the higher education system was between the two extremes as it offered technically focused academic programmes, still distinctly separated from those of the traditional universities. The critical point to note here is that technikons offered access to the historically disadvantaged communities. Universities and technikons were both considered as institutions of higher learning, however the latter could not offer the higher-level qualifications. The most severe implication of this bifurcated system was that the lower level qualifications, as offered by the technikons, could not articulate vertically with the higher qualifications of the traditional universities. This ultimately had profound effect on the wealth of individuals, families and communities, as persons in employment had no means of improving their qualifications, other than full time studies at a university.

In order to respond to the challenge of the segregated higher education system, the CHE was tasked with developing a single qualifications framework for all higher education qualifications as per the National Qualifications Framework (NQF). Furthermore, the CHE became the authority for quality assurance and as response, it established the Higher Education Quality Committee (HEQC) as a permanent committee for academic quality promotion and assurance. The HEQC was deemed accredited by the South African Qualifications Authority (SAQA) as primarily responsible for quality assurance in the higher education sector. The previous quality promotion and assurance function of SAQA hence transferred to the HEQC. The objective of creating a single co-ordinated system of higher education required that all higher education qualifications had to be part of a coherent system that allowed for various articulation possibilities, while ensuring that qualifications were of adequate standard at the respective NQF levels.

The CHE, hence developed the draft Higher Education Qualifications Framework (HEQF), as a system which offered alternate routes of progression within a single higher qualifications framework. This framework offered many possibilities of access, articulation and exit – a transformative model. Mobility and portability of qualifications became possible within the new framework. Over time the HEQF evolved and became refined to its present form, the Higher Education Qualifications Sub Framework (HEQsF) (CHE 2013).

The most important outcome of the HEQsF, in the context of this research, was that within this new higher education framework the parallel qualification structures of universities and technikons could articulate within a single framework; all higher education qualifications were incorporated into the HEQsF and it was the NQF level of the qualification that determined its position, rather than the institution that offered such qualification. The requirement of any qualification at higher education level was that the exit level outcomes and credit values at the respective NQF levels had to be well-aligned in order to facilitate articulation to higher qualifications (Table 5.1.).

NQF level	***Minimum credits per qualification (and at exit level)***	***Qualification type***
10	360 (360)	Doctoral Degree
9	180 (120)	Master's Degree
8	120 (120) 120 (120)	Honours Degree Postgraduate Diploma
7	360/480+ (120) 120 (120)	Bachelor's Degree Advanced Diploma
6	360 (240) 120 (120)	Diploma Advanced Certificate
5	120 (120)	Higher Certificate

Table 5.1. The HEQF: Qualifications, Levels and Minimum Credits (Ministry of Education 2004) – the credit values at each level are stipulated as well as the exit level credits (indicated in brackets).

The HEQsF allows for articulation between the vocational stream, as defined by the Certificate and Diploma qualification types, and the academic Degree stream; eventually coming together at Master's degree level, which may articulate to Doctoral degrees. The lowest level within the HEQsF is the Higher Certificate, at NQF Level 5. This is a vocational qualification that is generally offered at Further Education and Training (FET) colleges, within the public educational institution sector. Typically, the vocational stream affords broader access as the entrance requirements are generally lower than that of the degree stream, while it also offers various points of exit at lower NQF level. It is important to note that all first qualifications start with their respective first year levels at NQF 5. The Higher Certificate articulates vertically to the Advanced Certificate at NQF Level 6 and to the Diploma at NQF 6. The HEQsF is a complex matrix which allows different exit level qualifications. In this regard, the Higher Certificate (NQF level 5), the Diploma (NQF level 6) and the Bachelor's Degree (NQF level 7) are all first exit level qualifications, albeit at different NQF exit levels, duration of study and credit values. These qualifications constitute the undergraduate qualifications on the HEQsF.

Within the vocational stream, the Diploma articulates to the Advanced Diploma at NQF Level 7. These qualifications are typically of a skills or technical focus for employment within the trades, industries or professions. Note that the Advanced Diploma is at the same level as the Bachelor's Degree, both at NQF Level 7, while the Postgraduate Diploma and the Honours Degree are at the same NQF level and accumulative credit value. The Advanced Diploma typically articulates to the Postgraduate Diploma, while the Bachelor's Degree articulates to the Honours Degree, both at NQF level 8 – the beginning of the postgraduate level. This allows for diversification in foci of different qualifications yet with the academic and technical rigour and quality standards demanded of the system.

While the preceding discussion focused on vertical articulation, the HEQsF also allows for horizontal articulation between streams as evident in Figure 5.1. Note, importantly that the Bachelor's Degree may horizontally articulate to the Advanced Diploma and then to the Postgraduate Diploma. The most significant implication of horizontal articulation to architectural education is that it affords mobility between liberal arts based programmes and science and technology based programmes. Students can pursue areas of interest /research at higher level irrespective of their entry level into the system – this is the most commendable outcome of the

HEQsF as a transformative framework. Note further that any higher education institution, irrespective of its historic beginnings may apply to offer any qualification on the HEQsF – this is a significant departure from the segregated and hierarchical dual systems of the past.

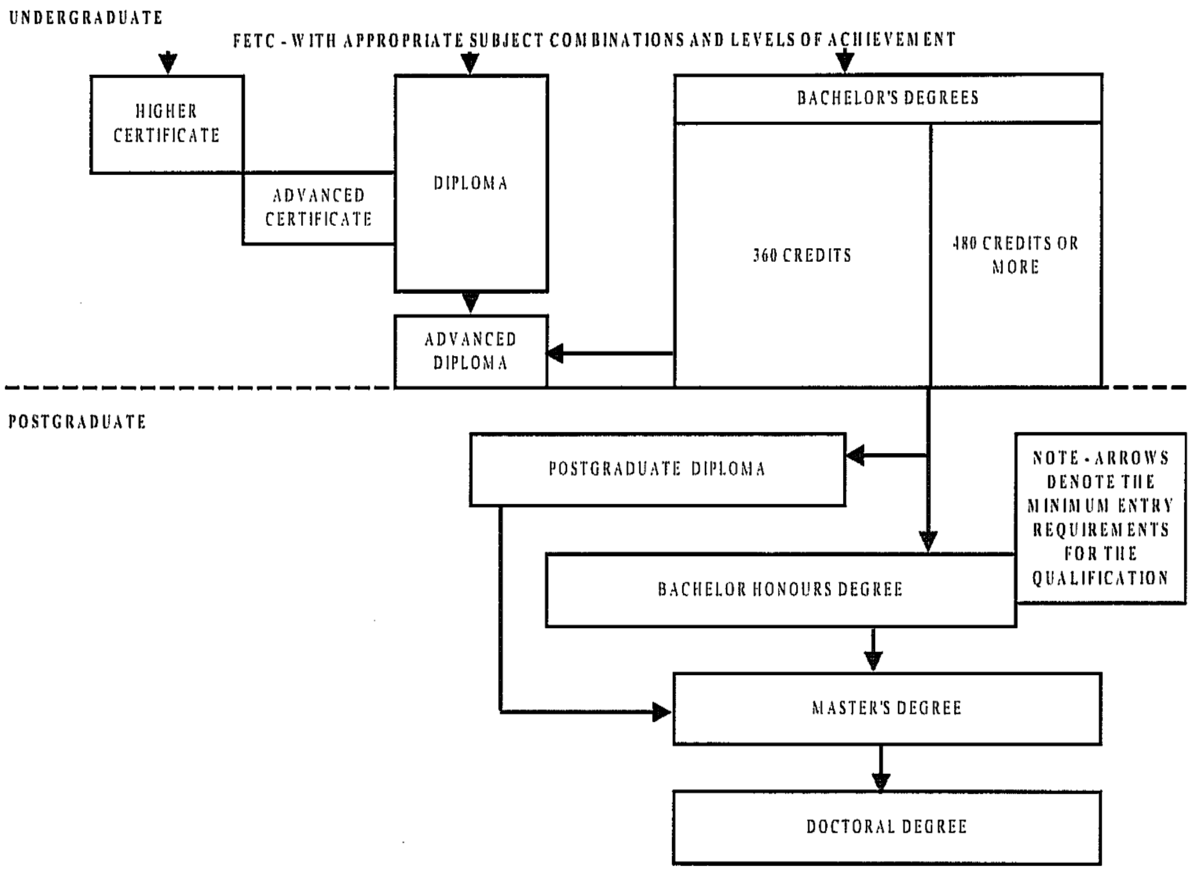


Figure 5.1. Articulation within the HEQF (Ministry of Education 2004)

The HEQsF has provided articulation possibilities from qualifications that would typically be offered at technical institutes to higher postgraduate academic degrees. Therefore, through legislative restructuring, many new opportunities have opened up to universities of technology particularly, to upgrade their qualifications and to offer higher degrees such as master’s and doctoral degrees at the NQF levels as defined by the HEQsF. As a consequence, many schools of architecture at universities of technology are ‘curriculating’ towards professional qualifications, while developing curricula for higher degrees.

The above discussion highlights the broad level transformation of the education sector in South Africa, which realised fundamental changes to the frameworks and structures that governed qualifications and level standards of higher education qualifications. The new higher education system affords access to historically marginalised communities; allows multiple entry and exit points, with alternate routes of articulation; new opportunities for institutions and a focus on the contextual needs of society. Such system is transformative, with clear objectives, however, there are two major challenges that the system poses. Firstly, the universities of technology are challenged with defining their identities and foci within a system that affords many opportunities, and secondly, many students entering higher education are underprepared, especially with regard to science and technology. It is therefore necessary, at this point, to briefly discuss the state of 'pre-university' education, with particular focus on mathematics and science education

5.2.2. Pre-university education and its impact on universities of technology in South Africa

The social and economic policies of apartheid, which led to marginalisation of the vast majority of the South African population, has led to a general lack of 'preparedness' of students entering university, which presents a major challenge to the higher education sector. The greatest area of weakness among high school exiting students is in the mathematics and science subjects; this poses a serious challenge to universities of technology, in the science, engineering and built environment disciplines, among others. On a broader scale this weakness in mathematics and science, impacts negatively on the skills supply to the professional and industrial sectors such as engineering, construction and management. As such the growth of the economy and nation-building are seriously hindered. The following discussion briefly quantifies and explains the extent of the lack of mathematical and scientific competences at 'pre-university, or high school level.

Siyepu (2013:1) confirms the seriousness of the mathematics and science performance in South Africa by stating that: *"South Africa has a huge shortage of skilled workers in various fields such as engineering, applied sciences, accountancy, architecture, medicine and law"*. Mji and Makgato (2006), on the other hand, confirm that, given the current state of mathematics and science education in South Africa, an insufficient number of students will be able to access Science, Engineering and Technology (SET) studies at universities. Pratzner (1994), Frantz *et al* (1996), Ramsuran (2005), Gardner and Hill (1999) and the Department of Arts, Culture, Science and

Technology (DACST) (1996 all cited in Mji & Makgato 2006) all affirm that South Africa does not have the capacity to expand economically without importing foreign skills and expertise. This has serious negative implications for South Africa's participation in the global economy which may compromise socio-economic redress. Mji and Makgato therefore strongly posit that a level of scientific and technological literacy and advancement thereof is needed in order to enable growth and expansion of the economy.

Evidence suggests that, due to the disparate schooling system in South Africa, the most underprepared and poorly performing schools are those located in the historically disadvantaged communities. Reddy (2004 in Siyepu 2013) states that there is no single cause of 'under-preparedness' and poor performance of South African students in the subjects of mathematics and science and that there are a diverse and complex range of inter-connected factors that may affect this. Such factors include issues of poverty, under-resourced schools, a lack of proper infrastructure, low teacher qualifications and poor learning cultures in schools. This view is supported by Van der Walt *et al* (2008) and Nlovu (2011), both cited in Siyepu (2013), who attribute poor performance of South African learners to poor socio-economic backgrounds, lack of appropriate learner-support materials, general poverty of the school environment, poor quality of teachers, language of instruction and inadequate study orientation.

Mji and Makgato (2006) attest this to the general under-development of the human potential of blacks in particular, due to the education and training mechanisms during the apartheid era. The Department of Education (DoE) (2001) confirms that teaching and learning in mathematics and science were most severely affected. The severity of this problem became evident in the Third International Mathematics and Science Study (TIMMS), conducted in 1995, where South African high school Grade 8 mathematics students came last, scoring significantly lower than the international benchmark (Mji & Makgato 2006). TIMMS (2011), however, indicates an improvement in scores, which it suggests is likely due to the structural and educational changes made by the Government, post-1994. However, the performance of South African students ranked second to last, with a score significantly below the international benchmark. TIMMS (2011) revealed that education and learning are shaped by the learners' school, home and community environments, which in the South African scenario, contrasted significantly with its international counterparts.

With reference to the school environment, a lack of infrastructural resources certainly impeded teaching and learning in the historically disadvantaged schools, however the lack of suitably qualified teachers in the subjects of mathematics and science was most significant. TIMMS (2011) confirms that only 60% of all mathematics learners and 53% of all science learners, in South Africa, were taught by teachers who had completed a degree. Mji and Makgato (2006) confirm the seriousness of the lack of adequate training and qualification of teachers of mathematics and science, who implement outdated teaching practices, in overcrowded and underequipped classrooms. The DoE (2001 in Mji & Makgato 2006) states that all these factors have produced a new generation of teachers who perpetuate this cycle of mediocrity. The mathematics and science Audit of 1997 revealed that more than 50% of mathematics teachers and 68% of science teachers had no formal qualifications in their respective subject areas (DoE (2001 in Mji & Makgato 2006).

Mji & Makgato (2006) further refer to the concept of an enabling environment which incorporates alternative perspectives and conceptions about science among learners; which are related to their prior experiences of phenomena and their respective cultural influences. Here, reference is made to social constructivism and also, implicitly, to experiential learning theory as learners find relevance in situating learning concepts in context, thereby establishing relevance of the requisite learning content. Under-qualified teachers generally lack the motivation and self-efficacy to facilitate such learning and therefore revert to teaching in modes that they were exposed to as students, which perpetuates the condition. This is counter-productive as new methods and pedagogic approaches are abandoned. Mji and Makgato suggest that, given this scenario, it is critical that teachers continually attend refresher courses on teaching and pedagogic approaches in order to skill them to facilitate an enabling environment.

The period between 1994 and 2011 realised a radically new historical era for school education in South Africa, which witnessed the implementation of Outcomes Based Education (OBE), in order to move away from the apartheid-based curriculum to one that addressed skills, knowledge and values (Mouton *et al* 2012). The intention of OBE was to create a facilitative environment wherein learners could investigate and explore solutions to problems, using different methods in order to achieve the desired outcomes. However, the success of this was severely compromised as teachers were not adequately trained to facilitate OBE; whereby learners could create, invent, discover and investigate knowledge on their own (Siyepu 2013). Educators generally found the OBE approach problematic and difficult to implement, which eventually led to it being scrapped (Mouton *et al* 2012). Jansen (1998) predicted that OBE would fail as it had little to do with classroom life, but was rather politically driven, as an abandonment of the extant schooling system during the apartheid era. Kallaway (2012) confirms that the OBE curriculum came under increasing criticism by 2010, due to its inherent weaknesses, and by 2011 it was replaced by the new National Curriculum Statement (NCS), which was revised as the current Curriculum and Assessment Policy Statement (CAPS). CAPS differs significantly from OBE as each subject has a single, comprehensive and concise policy document with guidelines on teaching (http://maskewmillerlongman.ning.com). The impact of the CAPS on mathematics and science education is expected to improve performance, mainly due to the structured approach to curriculum and defined pedagogic approaches. Such impact, however, may only be assessed after it has been implemented for a reasonable period of time.

The above discussion critically reviewed the schooling system and the impact of the relevant legislations that affected 'curricula' and the associated pedagogic approaches. While such factors impact on the performance of learners, the home environment has a critical influence on performance of learners, especially in the South African context. The home environment of students, especially in the historically disadvantaged communities, had significant impact on their academic performance. A major hindrance to these students was the language spoken at home, which in most cases differed from the language of test and instruction. TIMMS (2011) confirms that, in South Africa only 26% of learners reported that they mostly spoke the language of test at home, while 9% reported that they never did so at home; this again contrasted significantly with the international average of 79%. This highlights the importance of speaking the language of testing and instruction at home, in order to mitigate the possibilities of misinterpretation. English is the language of mathematics and science instruction in South African schools, however, meaning in 'everyday' spoken English may differ significantly from that of test and instruction, which may lead to misconception and confusion in learners especially from the historically disadvantaged communities, given their generally poor schooling background.

A further hindrance to learners from historically disadvantaged communities is that the vast majority of their parents had never studied at tertiary institutions, implying that these learners access higher education as 'first-generation' tertiary learners. The lack of adequate support at home largely stems from the fact that only 19% of learners had at least one parent who had completed a minimum of a university degree; this contrasts significantly with the international average of 32% (TIMMS 2011). As such the role of the parent is limited albeit vitally important in their children's education.

The preceding critical review of the South African 'pre-university' education system has linked poor performance in mathematics and science to three major influences namely, inadequacy of schooling resources, including the appropriate qualification of teachers, the home environment and parental support, and the use of language as a medium of communication of mathematical and scientific concepts. Given this background, different learners may require different degrees of individual attention and supervision in order to learn and apply principles and concepts pertaining to mathematics and science. This places pressure on teachers to be able to respond to the various abilities of different learners, differences largely due to different life experiences and cultural influences.

In this regard, reference is made to Vygotsky's ZPD, previously discussed in chapter 3. Borchelt (2007:2 cited in Siyepu 2013) posits that learning is established by interaction among learners, the social context and also the nature of the problem to be solved; this directly supports Vygotsky's (1978) idea that higher order thinking cannot develop in cognitive isolation, but rather firstly in action and then in thought. Such action requires social participation between the learner and teacher on the one hand, and his/her fellow learners, on the other. Wertsch (1985:60 cited in Siyepu 2013) confirms this by stating that a student's cultural development happens first on the social plane and then on the psychological plane. Therefore, learning of concepts ought to happen firstly as inter-personal and then intra-personal processes. Atkinson *et al* (2000 in Siyepu 2013) refer to socio-cultural theory which emphasises the role of dynamic interaction between learners and teachers and the task at hand in order to optimise an enabling learning environment, where learners actively engage with study concepts and develop understanding and meaning. The role of the teacher in this environment is facilitative. This has vital importance and impact on students entering the first year of higher education.

Given this background, it is clear that the problem of ‘under-preparedness’ of first year students at tertiary institutions will continue to remain for some time, as mechanisms to inculcate enabling learning environments in the schooling system will take time to be implemented. The major implication and impact on higher education is that these ‘learner-deficiencies’ will have to be accommodated and remedied within the higher education institutions. Curricula and pedagogic approaches would, therefore, have to be developed in order to bridge the gaps in ‘pre-university’ education in order to develop efficient educational models at university level. The relevant approaches around pedagogic transformation and the associated theories and concepts were elaborated upon in chapter 3. There is precedent regarding bridging the gap created by underprepared schooling. Such precedent includes the case of the ‘Extended Curriculum Programme’ (ECP) at the Cape Peninsula University of Technology (CPUT) in South Africa, explained in chapter 6.

The growing skills requirement in the SET sector and the pressing need for economic redress and transformation has to take cognisance of the ‘pre-university’ education system on the one hand, while it has to simultaneously implement the objectives of the Higher Education Act 101 of 1997. While the higher education legislative frameworks have been transformed to allow access, articulation and mobility, the architectural profession itself has also undergone fundamental transformation. This has given the South African architectural profession an entirely new identity and a new framework for recognition of different categories of architectural practitioners – a situation that is unique in the global context.

5.3. The transformation of the architectural profession in South Africa

This section examines the transformation of the legislative frameworks that govern the architectural profession in South Africa. The changes of the statutory regulations governing architecture since 1910 have afforded possibilities of articulation to lower levels of practitioners who were previously excluded from professional registration. This is somewhat similar to the transformation of the higher education legislative frameworks as discussed above.

5.3.1. The regulation of the architectural profession in South Africa

The South African architectural profession was governed by a statutory body, the South African Council of Architects, for over two decades during the nationalist Republic of South Africa, a body which continued to remain in force almost a decade into the post-apartheid era. The Architects Act 35 of 1970 established the South African Council of Architects on 1 March 1971 (www.sacapsa.com). Under this Act and its subsequent amendments, only professional architects were allowed to register with the council and were consequently the only practitioners of architecture who were bound by the relevant codes of practice, ethics and conduct.

A large portion of architectural work, however, was carried out by 'non-architects'. This meant that the South African public commissioned the services of practitioners who had no formal 'license' to practice, nor were bound by any professional code of ethics or code of conduct. The only limitation set by the Council on the limit of works of non-registered persons was that such persons did not undertake work of a scale greater than 500 square metres in floor area. There was absolutely no reference to the complexity of such work which could, and did, result in incompetent practitioners being commissioned for work which was beyond their scope of training. The Act, therefore, while regulating and supporting only professional architects, was counter-intuitive in that all 'non-architects' could practice without being bound to any code of professional ethics, which in turn, left the public vulnerable to malpractice.

Furthermore, these 'non-architects' had limited means by which to advance their qualifications or professional status in mid-career; the only option was to register for full-time studies at the recognised universities that offered professional architectural qualifications. Many of these 'non-architects' were from historically disadvantaged communities, and the majority of architectural works commissioned by these communities were undertaken by 'non-architects', many of whom were trained at technical institutions. This may have been due to the fact that 'non-architects' were more affordable as they were not governed by any regulated fee structure. While this presented the opportunity to access some basic architectural services, it also had potentially serious consequences as these communities were always vulnerable to malpractice and a compromised quality of their buildings and, on a broader scale, the built environment.

The democratic government (post 1994) reviewed the state of the various professions and their roles in nation-building and economic redress. This led to critical review of the legislation in order to include the broader South African communities who were largely excluded by previous legislation, resulting in many fundamental changes to professional legislation and practice and also the redefinition of the architectural profession in South Africa. The Architects Act 35 of 1970 was replaced by the Architectural Professions Act 44 of 2000 which was promulgated on 1 December 2000, and implemented on 26 January 2001. This Act replaced the existing architectural council with the South African Council for the Architectural Profession (SACAP), established on 12 September 2001.

SACAP is among six built environment professions that are governed by an over-arching statutory body, namely the Council for the Built Environment (CBE). SACAP reports to the CBE which, in turn, reports to the Minister of Public Works. As a response to broad level national transformation in a new democracy, SACAP placed transformation high on its agenda in order to make a positive impact on the built environment as reflected in its mission statement hereunder (extracted from SACAP Annual Report 2011-2012).

Make a positive impact on the built environment by ensuring excellence in performance and service-delivery by fostering collaborative relationships with role players in order to:

- *Effectively regulate the architectural profession*
- *Ensure pro-active public protection*
- *Develop a quality, sustainable and professional skills base*
- *Ensure good governance within SACAP*
- *Promote the role of the architectural profession in transformation*
- *Create a legacy of humane and sustainable architecture*

SACAP inaugurated its new 4th term Council on 6 June 2014. This Council redefined its Vision and Mission which were adopted on 26 and 27 June 2014 (accessed online: www.sacapsa.com: 20 August 2014), which reads as follows:

Vision: *People-centred architecture for South Africa*

Mission: *SACAP will transform, promote and regulate the architectural profession through collaborative engagement in the pursuit of excellence.*

The 4th term Council extended its emphasis on relevance and transformation of the architectural profession by focusing on people-centredness, collaboration and promoting excellence in architecture. This new vision and mission statement emphasises the contextual relevance of architecture, which strives to be people-centred. Furthermore, there is a firm and explicit statement that SACAP will transform the profession - a very explicit and bold statement which underlines the determination of the Council to reform the profession and promote excellence in architecture.

Regularisation of the architectural profession is one of the key objectives of SACAP. The uncontrolled and unregulated practice of 'non-architects' is a serious concern of the new council and so is the reality that there is a critical mass of 'non-architects' doing a significant amount of work with no reasonable way of upgrading their qualification and skills. In this regard, SACAP had already established new categories of registration in addition to 'Professional Architect' – a uniquely South African situation. The Act thus allows for registration of all categories of architectural professionals consisting of the ranks of 'Professional Architectural Draughtsperson'; 'Professional Architectural Technologist'; Professional Senior Architectural Technologist' and 'Professional Architect' (www.sacapsa.com). In addition to these professional registration categories, a 'Candidate' level registration came into effect for each of the respective professional categories. All members of the 'Candidate' registration category are required to pass a relevant professional practice examination, which is administered by SACAP, in order to register as professionals. Consequently, the Act subjects all practitioners to rules, regulations and the professional 'Code of Conduct' as defined by SACAP.

The structure of registration categories is, however, hierarchical, with the professional architect having unlimited access to the scope of work defined by scale and complexity of projects and conversely, the professional draughtsperson having the most limited scope of work. The

Identification of Works (IDOW) in this sense, is rather restrictive and is in need of revision. The new 4^{th} term Council, strives to further promote ease of academic and professional articulation in order to 'upskill' the critical mass of existing practitioners, from historically disadvantaged backgrounds, who had up until now, no means of such articulation other than enrolling for full-time studies at university. This had been a major impediment to transformation. Therefore, the IDOW is currently under critical review. In order to understand the existing hierarchical structure and categorisation of registration it is necessary to briefly outline the differences in registration requirements for each category of registration.

However, it is important, first, to briefly outline the international benchmarks governing architectural education and registration in South Africa. Historically, the South African accreditation system had been defined by the RIBA, which had been integral in setting the benchmarks for both professional and academic competence. The RIBA identifies three levels of professional practice examinations, namely PART 1, PART 2 and PART 3 (http://www.architecture.com/RIBA/Becomeanarchitect/Becominganarchitect.aspx). Part 1 comprises a three-year undergraduate degree, generally a BA or BSc, which equips the student with a broad understanding of architecture. Students within this stream may register with the RIBA as student members from the first year of study.

Part 2 comprises a further two years of study beyond the first undergraduate degree. This may be in the form of a B.Arch, diploma or M.Arch degree.

Part 3 is the internship period of two years working under mentorship in a practice and thereupon writing the professional practice examination for admission as Professional Architects. Given this background, it is necessary to briefly outline the 'products' of architectural education and their impact on practice and design in the built environment.

5.3.1.1. Architectural education and its products: the practise of architecture in the built environment.

South Africa has a completely unique system of registration, which allows for different categories of architectural professionals and candidates, as outlined above. To this has been added a level of complexity that requires the adaptation of the RIBA model. The requirements for the category of Professional Architect are exactly the same as per the RIBA system, except for differences in nomenclature of the qualification. The Professional Architect category requires the successful completion of Parts 1, 2 and 3 as defined by the RIBA. Similarly, the requirement for the level of Professional Senior Architectural Technologist aligns with the RIBA Part 1; however the requirement for the candidate Senior Architectural Technologist to be admitted as Professional Senior Architectural Technologist, is the successful completion of the Professional Practice Examination which is a RIBA Part 3 requirement. This is unique to South Africa. The Requirements for registration of Technologists and Draughtspersons are not quite aligned to the RIBA recognised qualifications as the requisite qualifications for such registration in South Africa have emanated from the segregated South African architectural education system.

The registration of architectural professionals in South Africa further requires that the requisite qualifications align with the appropriate NQF levels as per the HEQsF. This further co-relates to the professional categories of registration as stipulated by SACAP. Table 5.2. illustrates the alignment of categories of registration with academic qualifications and the respective RIBA alignment.

SACAP Category of Professional Registration	**Requisite Qualification**	**Candidacy training period (years)**	**NQF Level**	**RIBA alignment (where applicable)**
Professional Architect	M.Arch / M.Tech B.Arch	2	9 8	PART1, 2 &3
Professional Senior Architectural Technologist	B.Tech / BAS/ BAS (Hons)	2	7 /8	PART 1 &3
Professional Architectural Technologist	Dip	2	6	N/A
Professional Architectural Draughtsperson	Higher Cert	2	5	N/A

Table 5.2. Alignment of SACAP categories of registration with the HEQsF and RIBA (Author 2014)

Each of the professional categories is subject to SACAP's IDOW; the reservation of work based on scale and complexity, relative to professional competence is outlined in the SACAP IDOW draft policy (www.sacapsa.com) as per ANNEXURE A. It is important to note that the reservation of work now extends beyond the scale of project which was previously defined by square meterage, to include project complexity. To date, the draft IDOW policy has undergone many revisions as a result of public participation and is intended to protect the public while not prejudicing architectural practitioners. The document is currently with the CBE for comment (SACAP Annual Report 2011-2012). According to an interview with O'Reilly and Van Stade (2014) (ANNEXURE B), the current registrar of SACAP, the IDOW is being completely transformed in order to base the identification of works on a combination of project complexity and professional competence, rather than on the current simplistic model based on square meterage. The reason for this is that the Council felt that the existing IDOW framework did not provide rational measures that distinguish the various categories of registration.

The IDOW policy and the categories of professional registration meant that SACAP had to monitor and evaluate academic standards of qualifications offered at tertiary institutions, relevant to these registration categories. SACAP consults with the CBE with regard to all matters concerning IDOW and the Code of Conduct. For all academic quality matters and qualifications articulation, SACAP is obliged to consult with the CHE and the relevant Education Training Quality Assurance (ETQA) bodies in order to determine the requisite levels of education and training standards for each qualification level. In this regard the SACAP minimum competencies required for each category is closely aligned with those of the HEQsF. Table 5.3. illustrates the alignment of architectural qualifications with the relevant NQF level that are recognised against each category of professional registration. The minimum time required for each category is indicated next to the respective qualification.

CATEGORY Candidate —	ACRONYM	QUALIFICATION	NQF LEVEL	MINIMUM DURATION
Professional Architect	PrArch	M Arch (Prof) [minimum 1 year, 180 credits]	9	5 YEARS (cumulative)
Professional Snr Technologist		BAS Honours B Arch (Prof) [4 years, 480 credits] PG Diploma	8	4 YEARS (cumulative)
	PrSArchT	BAS [3 years, 360 credits] Advanced Diploma + 1 yr WIL	7	3 YEARS (cumulative)
Professional Technologist	PrArchT	Diploma [3 years, 360 credits] Advanced Certificate [total 240 credits, + 1 yr WIL]		2 YEARS (cumulative)
Professional Draughtsperson		Advanced Certificate [Hi Cert + 1 yr, 120 credits]	6	
	PrArchD	Higher Certificate [1 year, 120 credits, + 1 year WIL]	5	1 YEAR (cumulative)

Table 5.3. Alignment of SACAP categories of registration with the relevant qualifications and NQF levels (Adapted from SACAP 2010). Note: WIL denotes Work Integrated Learning

Each of the categories of registration, therefore, is defined by a limited scope of professional competence in line with the respective level of academic training. This in turn affects skills sets and ability to practise design in the built environment. Table 5.4. illustrates the 10 essential skills and knowledge areas, known as competencies that SACAP has deemed to be necessary to practice architecture in the built environment.

Architectural design	1
Environmental relationships	2
Construction technology	3
The structure of buildings	4
Contextual & urban relationships	5
Architectural history, theory & precedent	6
Building services & related technologies	7
Contract documentation and administration	8
Computer applications	9
Office practice, legal aspects and ethics	10

Table 5.4. Skills and knowledge areas for the practise of architecture (SACAP 2010)

The 10 competencies above affect each category to a greater or lesser extent, however all categories of registered persons are required to be competent and skilled in each of the 10 skills and knowledge areas. For, example, the architect is required to have the highest possible level of competence in each of the skills and knowledge areas, while the technologist may have varying degrees of competence and certainly less so in items 1, 5 and 6 of the table. Hence, the level of design ability in the built environment is directly related to the level of qualification.

As registered persons are expected to have the required level of skill and knowledge in order to perform in an ethical and professional manner, SACAP has to monitor and evaluate the standards of qualifications at architectural learning sites (ALSs) - a quality control measure. The primary quality assurance mechanism of architectural education at ALSs is the SACAP validation process.

5.3.2. The validation of architectural programmes in South Africa

Part of the regulatory mandate of SACAP is its quality assurance function. All architectural programmes are required to meet the minimum competency levels as stipulated by SACAP for each of the categories of registration, and institutions are evaluated through the SACAP validation process. This is a rigorous process that is undertaken by a diverse and representative validation board comprising academics, practitioners and official members of SACAP as well as representatives of the Commonwealth Association of Architects (CAA). The evaluation process is evidence-based and portfolios, assignments, test and exam scripts are evaluated in order to establish what outcomes have been achieved. The course outcomes are assessed by establishing the level of alignment of the SACAP stipulated competencies for each respective category of registration. This is a cyclic process that recurs every four years.

The formalisation of the 2005 CAA/SACAP Validation Agreement encouraged international best practice and robustness of the South African validation system, by establishing several principles to ensure quality of architectural qualifications offered by South African institutions. Both SACAP and the CAA acknowledge the value of reflecting regional identities and complexities of local transformation and the two validation systems run as complementary although separate. This is possible as SACAP continues to benchmark its validation procedures against the CAA ‘Green Book’. In December 2011 it was resolved that two CAA representatives join the SACAP visiting boards to Architectural Learning Sites (ALSs) in South Africa. This system allows for the exchange of best practices and the development of both the SACAP and CAA validation systems. In this regard, a mutually acceptable, reciprocal revision of the CAA/SACAP Validation Agreement was signed in 2012 (www.sacapsa.com/action/media/Accessed: 18 June 2013).

SACAP has since, further considered the possibilities of gaining global recognition of South African architectural qualifications and therefore applied for membership of the Canberra Accord, to which the CAA is a signatory. SACAP is currently a provisional signatory, awaiting full signatory status pending the outcome of the September 2016 visit by the Canberra Accord. This could result in the mutual global recognition of South African architectural qualifications with the current members of the Canberra Accord, namely the USA, Canada, Mexico, China, Korea and Australia.

The functions and purpose of the Canberra Accord is succinctly captured on its website and reads as follows:

Signed in April 2008, the Canberra Accord is a document by seven accreditation/validation agencies in architectural education. The Canberra Accord is intended to facilitate the portability of educational credentials between the countries whose accreditation/validation agencies signed the Accord. It does not address matters related to professional registration or licensure (http://www.canberraaccord.org/Accessed: 16 June 2013).

SACAP aims to extend the benefits offered by the Canberra Accord to other collaborating schools, ALSs, voluntary associations and registering authorities through the creation of reciprocal regional agreements via its 'Africa Outreach Project'. At the CBE *Indaba* in March 2013, the Minister of Public Works, Mr T Nxesi, emphasised that the various built environment professions in South Africa should start collaborating with other African counterparts especially in sub-Saharan Africa. International portability of South African and African architectural qualifications is a complex process, and in order to facilitate this, the establishment of relationships with sub-Saharan African countries, therefore, became the sensible first objective of SACAP's 'Africa Outreach Project'. This implied that the needs of regional systems had to be considered in addition to the quality assurance of the professions, through international benchmarking. The first SACAP validation visit to Namibia is scheduled for 2017.

SACAP's Africa Outreach Project, which was launched in 2012, is defined by three principal considerations:

First; historical commonalities occurred over the whole southern and eastern Africa and events reverberated throughout the region, even in pre-colonial times. Second; the region includes the geo-political clustering of the Southern African Development Community (SADC) and common professional practice, education and research agendas seem both meaningful and mutually beneficial. And third; not only is there is a significant number of students from neighbouring countries studying at South African architectural learning sites, but an increasing number seem to be eager to find employment in South Africa, while South African architects are increasingly involved with projects in other African countries(www.sacapsa.com/action/media/).

SACAP is considering expanding its network through collaboration with other sub-Saharan African countries, meaning that collaborating countries need to share competence in broadly common design, technological and administrative procedures. However, at the same time that these commonalities are necessary, each country is marked by individual ethics, social and environmental responsibilities. The possibility of engagement with sub-Saharan countries via SACAP's 'Africa Outreach Project' could see South African trained architectural professionals applying their professional competence across the borders, especially in the SADC nations. At the same time students and practitioners from those countries could find opportunities in South Africa. This cross-pollination of skills can only increase the quality of architecture responsive to the respective contexts, as practitioners may apply acquired skills that may not be prevalent within their own contexts in order to resolve architectural and built environment problems in their respective countries.

The alignment with international validation standards and the establishment of the SACAP validation system via the Africa Outreach programme, together with the transformation of the professional legislative frameworks as governed by SACAP, has resulted in implications on the standard levels and quality of education at all ALSs, particularly the universities of technology. The real impact of this is that the academic curricula and pedagogic approaches of the former technikon based programmes, which have to change in order to include a greater level of design thinking, scientific and technological competencies in the graduates. The reality, as confirmed in interviews with the various heads of the ALSs, is that there has not been any intense collaborative discussion amongst all the heads of the ALSs in order to develop an appropriate strategy moving forward. In an interview with the SACAP Registrar, O'Reilly (2014), SACAP felt it necessary to facilitate such discussions with regard to the new professional and educational frameworks within which the practice and training of architectural professionals is situated.

5.3.3. The impact of national imperatives on the architectural profession in South Africa

While the HEQsF, the CAA and other international benchmarks influence professional standards, very importantly, the national imperatives of South Africa must be addressed in architectural education and training. SACAP is guided by the policies and strategies of the Department of Public Works (DPW), which focus on the broad level national imperatives for the transformation of the built environment and nation-building. The strategic plans of the DPW are based on the National Development Plan (NDP) subsequent to the Reconstruction and Development Plan (RDP) which was instituted by the democratic government in 1994. The RDP looked at a national plan and developed strategies for poverty alleviation and to build a non-racial and non-sexist society (www.nelsonmandela.org). The RDP focused on key areas of urgent need in order to uplift societies that were struggling to sustain their livelihoods and access the skills market.

The key programmes of the RDP were:

- meeting basic needs
- developing human resources
- building the economy
- democratising the state and society
- implementing the RDP

The key points referring to 'developing human resources' and 'building the economy' are particularly relevant to this research. Government published revisions of the relevant Acts of Parliament and also revised various policies on education and economic development, which were very comprehensive and relevant to the needs of democratic South Africa. However, although significant progress has been made since 1994, there are serious shortcomings in the implementation of the RDP as many poor South Africans have not realised the anticipated benefits; millions of people remain unemployed and many of these are youth and young adults. This led to the development of the NDP (www.npconline.co.za).

The NDP was developed by the National Planning Commission, and published in June 2011 (www.npconline.co.za). One of the key priority areas of the NDP is to develop an economy that will create more jobs. Two of the key proposals under the key priority areas most pertinent to this research, are:

- Improve the skills base through better education and vocational training.
- Increase investment in social and economic infrastructure to lower costs, raise productivity and bring more people into the mainstream of the economy.

The improvement of the skills base through better education and training has particular significance to higher education as the demographic representation of historically disadvantaged people in the economy is still seriously lacking. The architectural profession is characterised by a dire lack of professionals from historically disadvantaged backgrounds, especially in the 'Professional Architect' category. While the ALSs are making an effort to recruit more students from these backgrounds, the impact on the demographic statistics has a time lag of at least eight years, due to the training required for professional architects.

On the other hand, there is a significant number of historically disadvantaged persons practicing in the lower categories of registration; this presents a challenge and also an opportunity to SACAP to find alternate methods of 'up-skilling' these practitioners to higher professional registration categories. The process of Recognition of Prior Learning (RPL) is vital, and in this regard, SACAP is currently developing a rigorous RPL strategy (refer to interview with O'Reilly) (ANNEXURE B).

The problem of the lack of professionals from historically disadvantaged backgrounds is exacerbated by the second key proposal listed above. The national government's commitment to investment in infrastructure, particularly social infrastructure, will require the supply of even more professionals from historically disadvantaged backgrounds; this places further pressure on institutions of higher learning and professional regulatory bodies such as SACAP.

SACAP, as a regulatory body, is accountable to the DPW which has established a policy framework that defines the key strategic national imperatives for the development of the built environment including human settlements; this emanates from the alignment with the NDP. The DPW *Strategic Plan 2012-2016* was presented by the Minister of Public Works, Mr TW Nxesi in 2012, outlining the key programmes and strategic objectives of the DPW. The critical objectives pertaining to this research, extracted from the *Strategic Plan 2012-2016* are:

- Sub Programme: *Projects and Professional Services* - Objective statement: Creation of training opportunities for 500 built environment graduates over the next 5 years
- Programme 3: *Expanded Public Works Programme*
  Strategic objective 4: Promote an enabling environment for the creation of both short and sustainable work opportunities, so as to contribute to the national goal of job creation and poverty alleviation.

The two strategic objectives above, extracted from the document, has significant implications for the built environment disciplines at institutions of higher education. With regard to the first of the listed objectives, providing training for 500 graduates over a five-year period; the training of these graduates has to prepare them to enter work-based training programmes, as suggested by the DPW. Furthermore, the nature of training of these graduates has to equip them with the skills and knowledge to perform in complex multi-cultural environments in order to contribute to nation-building, job creation and poverty alleviation. Nxesi further iterated the endeavour to train young professionals in his document titled 'Rebuilding the Department of Public Works': *Five Year Policy Statement and Vision for 2014-2019,* which was published on 20 June 2014. Reference is made to *Outcome5: Skilled and capable workforce to support an inclusive growth path.* This outcome of the document confirms that the DPW has set a target of 3128 beneficiaries of the national 'skills development programme', including 675 in the 'Young Professionals Programme'. The implications of this on higher education institutes, is immense and it is an opportune time for the built environment professions to take the opportunities that this initiative offers.

The initiatives of the DPW, supported by the commitment of the Minister of Public Works, shows a serious concern for relevant skills development that are necessary for economic redress, job creation and poverty alleviation – all towards nation-building and spatial transformation. This requires that the institutions of higher education transform their curricula and graduate attributes in order to respond to the respective imperatives; the training of architectural professionals is thereby directly impacted. The foci of curricula and projects have to be situated within this framework in order to be beneficial and responsive to the broad national imperatives.

The national imperatives/agenda presents many opportunities for architectural education at universities of technology, which have historically established strong engagement with communities and have focused on industry partnerships and technology transfer. This again places universities of technology in a unique strategic position to address and respond to the national imperatives, more specifically those of the DPW with regard to the built environment disciplines.

Chapter Summary

The chapter outlined the origins of formal architectural education in South Africa, which it traced back to the 1923 Conference on Architectural Education which was held at the Technical College in Durban. Among the delegates were representatives from Wits, UCT and the Natal Technical College. The main outcome of the conference was the formalisation of a Federal Council on Architectural Education, which developed 'curricula' and monitored standards of architectural education.

Wits was the only university that offered an architectural course at that time. Subsequent to the conference, UCT established its architecture programme. Wits assisted in developing the Natal University College (formerly the Natal Technical College) programme and later the UP architectural programme. Later, UP established its architecture programme. The first meeting of the Federal Council on Architectural Education, held in 1924 in Cape Town, agreed to recognise two standard models for courses in architecture, namely, the Diploma and the Degree. The Diploma course of Wits and the Degree course of UCT defined the standards for each model. Each of the universities had a particular leaning; either an engineering / science based model of the Wits Diploma, or the academic and artistic model of the UCT Degree. The architectural profession in the form of practitioners and the South African Institute of Architects were key role players in the development of architectural education.

The Federal Council changed to the Central Council, which determined that universities would be the ideal sites for architectural education and consequently, the university-based curriculum became the prevalent model of architectural education. This initiated much concern from Government and Technical Colleges, as well as the architectural profession which had vested interest in the training of architectural assistants through the second level training offered by technical colleges.

After 1994, Democratic South Africa realised broad level transformation of educational and professional frameworks, which changed the system of architectural education and the architectural profession in South Africa. Revisions to Acts of Parliament led to the formalisation of the Higher Education Act 101 of 1997 and the Architectural Professions Act 44 of 2000. The Higher Education Act initiated the development of the Higher Education Qualifications Sub-Framework (HEQsF) while the Architectural Professions Act regularised the profession by establishing SACAP, which introduced new categories of registration inclusive of draughtspersons and technologists. The recognition of categories of registration of professionals, other than the professional architect, could further allow such professionals to articulate to higher levels of professional registration via the RPL process. In this regard SACAP is unique and has set a new benchmark and precedent for public protection, redress and professional articulation.

The HEQsF and SACAP structures afforded articulation between levels of different qualifications and professional categories. This meant that mobility and portability of qualifications became possible. Together with the increase in demand for higher education from the previously excluded historically disadvantaged population, this posed challenges, while also presenting the opportunity for curriculum revision at lower levels in order to allow for mobility and vertical articulation of qualifications and professional registration. The former technical institutes have also changed over time, becoming universities of technology. The new legislative frameworks governing architectural education and the architectural profession, have positioned universities of technology in an opportune position for curriculum transformation, and also afforded them the opportunity to upgrade their qualifications.

While there is no explicit resistance to universities of technology offering higher degrees towards professional architects' training, the major concern is how the universities of technology are going to upgrade their existing qualifications and offer new higher qualifications while developing a distinctly different identity to the traditional academic universities. While there seems to be an obvious perceived threat to the traditional universities, the need for a distinctly different model of architectural education, albeit at the same academic and professional levels of the traditional universities, is a valid argument especially with regard to government's need for capacity building towards spatial transformation and socio-economic redress. In this regard the universities of technology have the opportunity to define a relevant niche in architectural education, through pedagogic transformation.

The chapter concluded with a brief discussion on the national imperatives and the strategic objectives of the NDP and the DPW. It was posited that universities of technology are strategically positioned to respond to the national agenda. The next chapter will analyse a key sample of universities of technology in South Africa in order to determine how these institutions may have transformed under new legislation and their respective current states of architectural education.

CHAPTER 6:

HISTORICAL EVOLUTION OF ARCHITECTURAL EDUCATION AT UNIVERSITIES OF TECHNOLOGY IN SOUTH AFRICA

6.1. The transformation of technical institutions of higher education in South Africa

The previous chapter discussed the limited access that the historically disadvantaged communities had to higher education prior to the 1994 democratic elections in South Africa. It is necessary to briefly outline the institution and evolution of technical education in South Africa, prior to discussing enabling frameworks that emanated from legislative changes within the democratic era.

During the apartheid era, the principal sites for technical education and training were the technical colleges, within which architectural education evolved as a response to the need for technical skills training in South Africa. The Advanced Technical Education Act of 1967 was established in order to address a growing technical skills shortage in South Africa during the early twentieth century. The Act led to the transformation of existing technical colleges into colleges of advanced technical education (CATEs). These included the Natal Technical College and the M.L. Sultan College for advanced technical education. The emergence of technical education institutions within the higher education sector was the result of the Advanced Technical Education Amendment Act of 1979 that led to the establishment of technikons (D'Almaine *et al* 1997); an institutional designation unique to South Africa.

This led to a dual structure within the higher education sector consisting of two independent streams, namely the academic stream of the traditional universities and the technical / vocational streams at technikons and teacher training colleges. The influence of apartheid policies was very much part of this binary higher education structure. One notable example was the result of the divisive, Group Areas legislation, which resulted in two technikons in Durban, the Natal Technikon and the ML Sultan Technikon being divided along racial lines, while literally sharing common boundaries. The Natal Technikon (formerly known, as the Natal Technical College) was a historically white technikon, while the M.L Sultan Technikon (formerly known as the M.L. Sultan College for Advanced Technical Education) offered access to historically disadvantaged groups. Mangosuthu Technikon in KwaZulu Natal and Peninsula Technikon in the Western Cape were two other historically disadvantaged technikons in South Africa (d'Almaine *et al* 1997). Architectural draughting programmes would be offered at some of the technikons, with the specific aim of training architectural technicians as assistants to professional architects. The curriculum was specific and limited with a strong focus on developing drawing and technical skills to the benefit of architectural practice. It was, therefore, never a requirement of the technikons to provide professional education and training for articulation to the status of the professional architect.

The advent of the democratic government, post 1994, had significant impact on the status of higher education due to broader frameworks and legislation for transformation in South Africa. Redress and equitable distribution of wealth were two of the primary objectives of the democratic government, which led to the development of frameworks such as the Affirmative Action Policy and the Black Business Empowerment Policy. These policies aimed to offer historically disadvantaged communities economic opportunities and support that did not previously exist.

The consequent increase in demand for professional education posed a challenge to higher education institutions, which had to redefine their recruitment and selection policies while reallocating resources towards developing professional qualifications. A further contributor to this challenge to higher education institutions, was the professional and technical skills shortage within the built environment sector to meet the infrastructure development and spatial transformation initiatives of government. The impact of this challenge and the consequent changes in legislation was particularly significant to technical education institutions (Beaumont 1995 cited in d'Almaine *et al* 1997), which started to redefine their focus towards offering higher level qualifications.

The transformation of legislation governing higher education in post-apartheid South Africa led to technikons being given equal status to universities, albeit with different foci, as noted in the Higher Education Report of 1996 titled, *A Framework for Transformation*. Technikons had traditionally offered diploma programmes while degrees were within the ambit of the universities. This changed in the mid-1990s as new legislation allowed for degree programmes to be offered at technikons. It was intended, however, that degrees and higher degrees offered at technikons would have a different focus to those offered at traditional universities, as evident in the Higher Education Report 1996 (cited in d'Almaine *et al* 1997:102), which states:

The universities and technikons are intended to be complementary sectors with formally equal status but with differentiated missions. The binary distinction between the two sectors is based on the universities' role in general formative and professional education and basic and applied research, and the technikons' role in vocational and career education and "product related" research and development.

This defined the identity of degree curricula at technikons, which developed a pragmatic orientation that focused on product and outputs relevant to industry. The strong linkage with industry that characterised technikons continued to exist as the academic programmes at technikons incorporated work-based learning as part of their respective curricula. The Master's and Doctoral degrees similarly had a more practical focus (d'Almaine *et al* 1997). Strong links and partnerships with industry included input in changes to curricula, achieved through liaison committees or advisory boards representing the relevant industries and professions. The strong industry partnerships that developed over time became a defining feature of technikon education, which further enhanced the employability of graduates.

The traditional universities, on the other hand, were defined by curricula that evolved from hegemonic traditions and philosophies in isolation from industry. Any change or evolution of curricula at these universities happened without necessarily engaging with industry via advisory boards, even within the professional disciplines. This was mainly due to the broader theoretical and liberal focus of the traditional universities; industry partnerships, technology transfer and graduate employability did not historically feature as concerns of the traditional universities. In this regard universities of technology could be uniquely positioned to offer professional qualifications within a distinctly different paradigm of knowledge transfer to society.

6.1.1. The emergence of universities of technology in South Africa

The changes in legislation, since 2000 offered new opportunities, which led to technikons gradually changing to institutes of technology and then to universities of technology as they presently exist (Du Pre' from CHE 2010). Universities of technology nowadays aspire to become centres of academic excellence and provide knowledge that is useful to industries. The academic programmes at universities of technology continue to be characterised by having strong partnerships with industry and work-integrated learning continues to form an integral part of most academic programmes. Furthermore, according to Du Pre' (cited in CHE 2010: 16) universities of technology are research-driven institutions; research is therefore centred on the needs of industry, requiring a strong ethos of technology transfer and innovation. This has very definite implications on the type of research output which, in turn, impacts on the academic and pedagogic character of universities of technology.

In an interview with Professor Ahmed Bawa (ANNEXURE M), member of Higher Education South Africa (HESA), the distinguishing characteristics of universities of technology were determined as:

- The strong engagement with context, which is defined as the physical context, infrastructural context, industry, communities, local government and national government.
- The situation of 'knowledge projects' in context, which refers to community-based projects, defined by empirical research based on the 'cultural knowledge' of societies, through active engagement, which integrates the formal with existential knowledge. The result of this being high-level research output for the benefit of the local and global society.

Universities of technology, therefore, form a dynamic interface with industry and society through engaged pedagogies. In this regard, the role of design has an important purpose in spatial transformation of the built environment (Bawa 2014).

Geoff Scott (cited in CHE 2005:52) outlines the unique and distinctive characteristics of universities of technology based on the Australian experience. Scott clarifies the meaning of the word "technology" as the systematic treatment of an art or craft, which should have practical value or industrial use and that includes the skills and techniques of a particular civilisation, group or period (Scott in CHE 2005:54). This reference to technology having both utilitarian value as well as cultural value is particularly important to this research. This relation of technology to art, craft and culture could be paralleled with the pre-17th century mode of architectural training and practice, which was in the hands of master-builders and master-craftsmen; a significant departure from the general "modernist" understanding of technology, which focuses predominantly on product and mass production, largely devoid of cultural value.

Based on the understanding of technology as both a utilitarian and cultural asset, Scott (cited in CHE 2005:54) highlights the distinctive features of a university of technology as:

- Focus on applied research through industry partnerships towards social good and societal development agendas such as solutions to HIV and Aids, water shortage and sustainability.
- Research into the differential social impact and consequences of new technologies.
- The creation, dissemination and commercialisation of technologies relevant to national imperatives.
- The productive use of a range of technologies to the benefit of all.

The emphasis on social good, societal development and the differential impact of new technologies is particularly relevant to the developing world. The application of research and knowledge to the benefit of society emerges as a strong principle defining the objectives of universities of technology. Furthermore, research at universities of technology has a similar inclination towards application to the benefit of society. Knowledge production is hence also contextualised to respond to the realities and challenges facing society. The reference to national imperatives places a certain ethical responsibility on universities of technology to respond to the complex socio-economic challenges facing many societies, especially in the developing world.

It is argued that the impact and consequences of technology, implicitly, influences the extent of ethical and socially responsive practise. While the traditional universities also aspire to similar outcomes, Scott stresses practice-oriented research as a distinctive feature of universities of technology which is defined by strong links between academia and practice/industry or a theory-practice link. As a result of the historically strong links with industry, universities of technology inevitably developed strong partnerships with communities; community engagement thereby became another strong defining feature of these institutions.

Given the above discussions, the distinction between forms of university, traditional versus university of technology, is not as important as the interrogation of the broader criticism of architectural education and its disconnection from society. Reference to Chapter 4 is apt, which highlighted the distinctions in architectural education between technical universities in Europe and the USA. However, the British system in which polytechnics transformed into universities, is a valuable precedent as these institutions continued to maintain and develop their identities based on strong connection to the societal context and industry.

The above background leads to the position of this dissertation that universities of technology are better placed to offer professional education in architecture, due to their historically strong connection with society and industry. These institutions have also been identified as offering wider access to communities that could not access the traditional universities, which has characterised them as more reflective of the diversities and complexities of the social context. Universities of technology in South Africa have to forefront the theory-practice-society link as a very strong defining and distinguishing feature of value, while acknowledging their inherent cultural and social diversity which they have built over time as the features that differentiates them from the traditional universities

The following section outlines the evolution of architectural technology programmes that are all offered at either universities of technology or comprehensive universities. Universities of technology evolved from technikons and comprehensive universities emerged from the merger of technikons and universities. Therefore, it is necessary to analyse the historic status of the various programmes as well as to determine the particular inclinations or foci of the different architectural progammes, as case studies.

6.2. The evolution of architectural education at universities of technology in South Africa

Chapter 5 outlined the curricula of the different traditional universities, which were broadly structured along a liberal arts, science or technology/engineering focus. While the traditional universities had the freedom to define their own curricula and pedagogic approaches, the former technikons, from which universities of technology emerged, were governed by rigid standardised regulatory frameworks. The traditional universities had the freedom to explore theoretical discourse and criticsm, with a focus on knowledge generation through academic research, while, technikons had a very specific purpose to train skilled labour for the workplace and industry. It is therefore necessary to understand the frameworks that governed technikons and their impact on the evolution of universities of technology.

6.2.1. Regulatory frameworks governing technikons

The Technikons Act No 125 of 1993 guided the establishment and management of technikons. Under this Act, the Committee of Technikon Principals was formed. The role of this Committee was to advise the Minister of Education on general policies relating to technikons and also to prescribe the relevant admission requirements to technikons, among its other functions. Academic quality was administered by the Certification Council of Technikon Education (SERTEC). SERTEC served as the accreditation body for architectural education, prior to the establishment of the SACAP validation system. The certification of architectural programmes under the auspices of SERTEC was, therefore, during the period prior to the enactment of the *Architectural Professions Act 44 of 2000*. During this period the statutory legislation was such that it did not afford the possibility of technikon graduates to register with the statutory body, SACAP. As a result, the focus and concerns of SERTEC was more around the skills and product output of the technikon programmes. The SERTEC evaluation process focused on the assessment of technical competence and little emphasis was placed on the evaluation of design or theory. Under this system, all technikons offered similar curricula in architecture and were rigidly structured and governed by specific frameworks.

Diploma and degree curricula at all technikons in South Africa were structured on the NATED 151 Report (01/04) which was developed by the Higher Education branch of the former

Department of Education. Accordingly, architectural education at all technikons had exactly the same suite of subject nomenclatures, descriptors and credit values (refer to Table 6.1. – extracted from the NATED 151 Report Vol 1, p76: Diploma Programmes and Table 6.2. – extracted from the NATED 151 Report Vol 2, p20: Degree Programmes).

3202014 NATIONALDIPLOMA:ARCHITECTURALTECHNOLOGY

DATEOFIMPLEMENTATION: MAY2003MINIMUMEXPERIENTIALTIME: 0,5MINIMUMFORMALTIMEINYEARS: 2,5

CODE	INSTRUCTIONAL OFFERING	CREDITS
20401512	APPLIED BUILDING SCIENCE I	0,167
20402012	CONSTRUCTION AND DETAILING I	0,167
20302012	HISTORY AND APPRECIATION OF ARCHITECTURE I	0,167
20516112	PRESENTATION I	0,167
20516012	STUDIOWORK I	0,167
59900512	COMMUNICATION I	0,083
60202112	COMPUTER APPLICATIONS I	0,083
20402222	CONSTRUCTION AND DETAILING II	0,167
20402322	PRACTICAL STUDIES II	0,167
20516322	STUDIOWORK II	0,167
20700403	BUILDING SERVICES III	0,100
20402103	CONSTRUCTION AND DETAILING III	0,200
20516203	OFFICE PRACTICE III	0,100
20100903	PRINCIPLES OF ARCHITECTURAL DESIGN III	0,200
20516403	STUDIOWORK III	0,200
60102103	COMPUTER AIDED DRAUGHTING III	0,100
82505403	SURVEY AND LANDSCAPING III	0,100

Table 6.1. Structure of National Diploma: Architectural Technology –
Extracted from NATED Report 151 Vol 1

3302003 BACCALAUREUS TECHNOLOGIAE:ARCHITECTURALTECHNOLOGY

DATEOFIMPLEMENTATION: JANUARY1995MINIMUMEXPERIENTIALTIME: 0,0MINIMUMFORMALTIMEINYEARS: 1,0

CODE	INSTRUCTIONAL OFFERING	CREDITS
20101106	APPLIED DESIGN IV	0,600
20101606	ARCHITECTURAL ENVIRONMENTALSTUDIES IV	0,100
20900206	ARCHITECTURAL MANAGEMENT IV	0,600
20900006	ARCHITECTURAL RESOURCE MANAGEMENT IV	0,100
20402906	CONSTRUCTION AND DETAILING IV	0,100
20200806	HOUSING IV	0,100
20900106	OFFICE PRACTICE IV	0,100
20101206	PRINCIPLES OF URBAN DESIGN IV	0,100
20402806	PROJECT AND CONTRACT ADMINISTRATION IV	0,100
20101306	STRUCTURES IV	0,100
20201106	STUDIO WORK IV	0,600
20101006	THEORY OF DESIGN IV	0,100
20101806	URBAN POLICY STUDIES IV	0,100
60102806	ADVANCED COMPUTER APPLICATIONS IV	0,100
60102706	COMPUTER AIDED DRAUGHTING IV	0,100

Table 6.2. Structure of B.Tech: Architectural Technology –
Extracted from NATED Report 151 Vol 2

Although the National Diploma curricula were similar at all technikons, the BTech degree offered some level of diversity due to three distinguished streams, namely, Applied Design, Technology, and Management. Different technikons opted for different foci. In Durban, for example, Technikon Natal offered the Technology stream BTech, while ML Sultan Technikon offered the Applied Design stream. The Applied Design suite of modules included Applied Design, Theory and Principles of Urban Design at the core of the curriculum, while the Technology stream comprised Construction and Detailing, Structures, Management and Computer Applications as its core. There was also the Management stream which comprised modules such as Office Management, Office

Practice and Computer applications. The Applied Design stream, therefore, offered a more general theory and design oriented education while the Technology stream developed higher levels of technical competency. The segregated streams were all offered at the same NQF level and all produced architectural technologists of equal status. On inception, there was no legislative framework for vertical articulation of the BTech degrees to the higher level of architectural qualifications that were offered at the universities.

This situation changed in the early 2000s when the CHE developed the HEQF, as it was formerly known, that allowed new possibilities for vertical articulation within a single framework, which included academic qualifications and the technical qualifications. The result was that technikon-based programmes could upgrade and change focus from skills training towards greater inclusion of academic substance in the form of design and theory modules. SACAP, similarly afforded opportunities for vertical articulation between registration categories; registered professionals could now upgrade to higher levels of professional registration, ultimately as professional architect.

During this period, architectural curricula and pedagogic approaches at universities of technology started to change. However, inadequate time and effort was placed on developing relevant curricula and building on the historic strengths of programmes due to the rapid transformation of the former technikons to universities of technology. The general approach of universities of technology was, therefore, rather to adopt the traditional university models of architectural education. This, however, could also be attributed to a long period of a perceived inferiority complex by the former technikons together with the time-saving convenience of adopting established models of architectural education from the traditional universities.

As the technikons evolved into universities of technology, through the process of restructuring and merger, there was a general shift towards the adoption of the Applied Design stream. This was further influenced by the recognition of the Applied Design stream by SACAP, as a means of articulation to higher professional qualification, namely professional architect. While the transformation of regulatory frameworks governing education and the profession fundamentally changed the character of architectural education at the former technikons, programme offerings in architecture were also significantly influenced by the mergers of higher education institutions during the early to mid-2000s. Some of the mergers were between former traditional universities and former technikons to create comprehensive universities. While this posed many challenges, it simultaneously created many opportunities for academic transformation.

6.2.2. The emergence of new institutions through the process of merger

Universities of technology emerged from the transformation of technikons either as individual institutions, such as Tshwane University of Technology (TUT) or from the merger of two institutions. Merger of institutions took two forms, either the merger of two technikons to form a university of technology, or the merger of a traditional university with a technikon to form a comprehensive university. Architectural education is presently offered at traditional universities, universities of technology and comprehensive universities. The mergers of different institutions inevitably resulted in the adoption of a particular curricula focus as all of the merged institutions, listed below, consisted of the merger of design-focused programmes with those of technology-focused programmes. There was invariably a trade-off between the two different foci. It is therefore necessary to establish which stream, design or technology, the various universities of technology and comprehensive universities adopted.

Table 6.3. indicates the accredited ALSs) in South Africa, illustrating the type of institution and the respective qualifications offered (extrapolated from SACAP – www.sacapsa.com).

ALS / Location	**Type of Institution**	**Professional Qualifications offered**	**SACAP Professional Registration Category (Candidate)**
University of Pretoria (UP) / Pretoria, Gauteng	Traditional university	BScArch BScHons M Arch (Prof)	Pr Arch T Pr S ArchT Pr Arch
University of Witwatersrand (WITS) / Johannesburg, Gauteng	Traditional university	BAS BAS (Hons) M Arch (Prof)	Pr Arch T Pr S ArchT Pr Arch

University of the Free State (UFS) / Bloemfontein, Free State	Traditional university	BAS BAS (Hons) M Arch (Prof)	Pr Arch T Pr S ArchT Pr Arch
University of Cape Town (UCT) / Cape Town, Western Cape	Traditional university	BAS BAS (Hons) M Arch (Prof)	Pr Arch T Pr S ArchT Pr Arch
University of Kwazulu-Natal (UKZN) / Durban, KwaZulu-Natal	Traditional university	BAS M Arch	Pr Arch T Pr Arch
Nelson Mandela Metropolitan University (NMMU) / Port Elizabeth, Eastern Cape	Comprehensive university	N Dip (National Diploma - Architectural Technology) B Tech (Architectural Technology) M Tech (Architectural Technology) BAS M Arch (Prof)	Pr Arch T Pr S Arch T Pr S Arch T Pr Arch T Pr Arch
University of Johannesburg (UJ) / Johannesburg, Gauteng	Comprehensive University	N Dip (National Diploma - ArchitecturalTechnology) B Tech (Architectural Technology - Applied Design) M Tech (Architecture Professional)	Pr Arch T Pr S Arch T Pr Arch

Tshwane University of Technology (TUT) / Pretoria, Gauteng	University of Technology	B Tech (Architecture Professional) B Tech (Architectural Technology) M Tech (Architecture Professional)	Pr S Arch T Pr S Arch T Pr Arch
Cape Peninsula University of Technology (CPUT) / Cape Town, Western Cape	University of Technology	N Dip (National Diploma - Architectural Technology) B Tech (Architectural Technology - Applied Design)	Pr Arch T Pr S Arch T
Durban University of Technology (DUT) / Durban, KwaZulu-Natal	University of Technology	N Dip (National Diploma - Architectural Technology) B Tech (Architectural Technology - Applied Design)	Pr Arch T Pr S Arch T
PrArchT = Professional Architectural Technologist, PrSArchT = Professional Senior Architectural Technologist, PrArch = Professional Architect			

Table 6.3. Accredited Learning Sites in South Africa and their respective Qualifications (Author)

Table 6.3. illustrates the current qualifications offered at the various ALS in South Africa. It is evident that all of the universities of technology have opted for the Applied Design focus.

Durban University of Technology (DUT), formed through the merger of Technikon Natal with ML Sultan Technikon, chose to adopt the BTech Applied Design stream. Although both the former institutions had similar curricula at National Diploma level, at BTech level the Technikon Natal curriculum focused on architectural technology and management while ML Sultan Technikon focused on design – refer to the respective 'prospecti' (ANNEXURES C & D). DUT presently does not offer a Master's programme in architecture, however this is currently being developed, as confirmed in an interview with Professor Debbie Whelan (ANNEXURE E).

Similarly, Cape Peninsula University of Technology (CPUT), which was created by the merger of the Cape Technikon with the Peninsula Technikon, also chose to adopt the BTech Applied Design stream of the former Cape Technikon. CPUT has an established a relationship with UCT, who accept successful students from CPUT into their Honours level programme. CPUT has no professional Master's degree at present. The present curriculum renewal process at CPUT is aimed at articulation from a Diploma in Architectural Technology via an Advanced diploma, a Post Graduate diploma through to a professional Master's degree and a professional Doctoral degree – refer to interview with Professor Andre van Graan (ANNEXURE F).

TUT has two BTech streams, namely, the BTech (Prof) for articulation to the MTech (Prof), which allows for registration as candidate architect, while the BTech (Technology) focuses on the training of technologists. TUT was the forerunner in introducing a professional Master's programme, in its old form as the Pretoria Technikon. As a result, they have produced candidate professional architects since the early 2000s.

There are two comprehensive universities of technology in South Africa, namely, University of Johannesburg (UJ) and NMMU. UJ was created through the merger of Technikon Witwatersrand with Rand Afrikaans University (RAU). It must be noted here that only the former Technikon Witwatersrand, offered architecture; RAU did not have any programmes in architecture. So, for all intents and purposes, the architectural curriculum at UJ was based on the technikon model at undergraduate level. UJ currently offers a Master's degree in its architecture programme.

NMMU, on the other hand, evolved from the merger of Port Elizabeth Technikon with the University of Port Elizabeth (UPE), each offering architecture programmes. While every other institution offers either programmes in architecture or architectural technology, NMMU comprises two separate departments within one school of architecture. The Department of Architecture inherited from the former UPE sits alongside the Department of Architectural Technology and Interior Design which were inherited from the Port Elizabeth Technikon. This situation offers many potential routes of articulation and specialisation within a single school structure. Presently, students with a design flair in the technology programmes may bridge across to the architecture programmes and vice versa.

Currently, TUT and UJ are the only institutions that have evolved from the previous technikon model, to offer a professional architects' qualification in the form of the MTech (Prof) degree. DUT is presently developing its MArch degree – refer to interview with Professor Debbie Whelan (ANNEXURE E). Whelan confirmed that the Professional Master's degree in architecture was an urgent and high priority of the department of architecture at DUT due to a growing demand from its graduates.

Concurrent with the development of the relatively new universities of technology and comprehensive universities, there was a corresponding revision of the foci of the academic curricula within such institutions. Architectural curricula, similarly transformed and evolved, which have significantly differed from the NATED Report 151(2004). The NATED Report 151 suite of modules for architectural education was limiting and could not cater for the changing focus of new institutions; it was inevitable that architectural programmes at universities of technology and comprehensive universities significantly deviated from the NATED Report 151. It is argued that this was inevitable as technology could not be isolated from theory and design. It is strongly posited that technology is a cultural construct as much as it is influenced by science and industry. However, this position could never materialise in architectural education at universities of technology due to the binary higher education system defined by prescribed frameworks such as the NATED Report 151.

The following section critically examines the undergraduate curricula at the various universities of technology and comprehensive universities in order to find the extent of variation from the NATED Report 151. Note that the credit weighting of each respective module is as per the NATED Report 151, which is the same for all universities of technology (Tables 6.1. & 6.2.). This is necessary to establish the particular inclinations (design, technology or management) that the respective institutions have been pursuing and in order to form a general critical view for the development of a relevant new model for architectural education at universities of technology in South Africa.

6.2.3. Present curricula at Universities of Technology and comprehensive Universities

6.2.3.1. University of Johannesburg (UJ)

FIRST-YEAR	SECOND-YEAR	THIRD-YEAR	FOURTH-YEAR (B Tech Degree)
Applied Building Science I Communication I Computer Applications I Construction and Detailing I Studio Work I History and Appreciation of Architecture I Presentation I	Construction and Detailing II Studio Work II Practical Studies II Architectural Practice II (in-service training)	Survey and Landscaping III Construction and Detailing III Principles of Architectural Design III Building Services III Office Practice III Studio Work III Computer Aided Draughting III	**APPLIED DESIGN Stream** Architectural Design IV Architectural Digital Technology IV Construction and Detailing IV Principles of Urban Design IV Theory of Design IV **MANAGEMENT Stream** Architectural Management IV Office Practice IV Housing IV Computer Applications IV Urban Policy Studies IV

Table 6.4. Curriculum at UJ (Author)

Table 6.4. outlines the undergraduate architectural curriculum at UJ. The curriculum is defined by the NATED 151 Report; however, the BTech (Applied Design stream) articulates into the MTech (Prof). This, as a consequence, has changed the focus of the undergraduate programme which incorporates more theory and design modules albeit within the nomenclatures stipulated by the NATED 151 Report. UJ is currently developing more degree and higher degree offerings as confirmed in the interview with Dr Finzi Saidi (ANNEXURE G).

Admission criteria - extracted from the UJ Dip Brochure (www.uj.ac.za accessed online: 12/11/13)

- Senior Certificate or equivalent qualification with a minimum APS or M-score as set out below.
- Attendance of an entrance assessment and submission of a prescribed portfolio once the application form has been processed.

- Completion of both National Benchmarking Tests (NBT): Academic and Quantitative Literacy (AQL) and Mathematics.

Recommended school subjects include Art, Technical Drawing and/or Physical Science.

Average Point Score (APS):

A minimum APS of 25 is required to apply for the programme. Mathematical Literacy is not accepted for this programme.

Selection is based on an entrance assessment and the submission of a prescribed portfolio.

The entrance assessment will be conducted by the University of Johannesburg Centre for Psychological Services and Career Development (PsyCaD).

6.2.3.2. Cape Peninsula University of Technology (CPUT)

FIRST-YEAR	SECOND-YEAR	THIRD-YEAR	FOURTH-YEAR (B Tech Degree)
Applied Building Science I Communication I Computer Applications I Computer Aided Draughting III Construction and Detailing I Studio Work I History and Appreciation of Architecture I Presentation I	Construction and Detailing II Studio Work II Practical Studies II Architectural Technology Practice II (in-service training)	Survey and Landscaping III Construction and Detailing III Principles of Architectural Design III Building Services III Office Practice III Studio Work III	Applied design IV Theory of design IV Construction and Detailing IV Architectural Environmental Studies IV Principles of Urban design IV

Table 6.5. Curriculum at CPUT (Author)

Table 6.5. outlines the undergraduate architectural curriculum at CPUT. The curriculum is defined by the NATED 151 Report; however, the BTech (Applied Design stream) has been adopted, which articulates into the Honours programme at UCT or the MTech (Research) degree that is presently offered at CPUT. The possibility of articulation to an Honours and then Master's degree has changed the focus of the undergraduate programme which incorporates more theory and design modules.

Admission criteria - extracted from the CPUT Prospectus (2013)

- A National Senior Certificate (NSC) as certified by Umalusi (or equivalent) with an achievement rating of 3 (Moderate Achievement: 40-49%) or better in four recognised NSC 20-credit subjects, an achievement rating of 2 for Mathematics or Mathematical Literacy, an achievement rating of 3 in the required official language at Home Language level and an achievement rating of 2 in the other required language on at least First Additional Language level; one of these languages shall be English or Afrikaans.
- Prescribed Portfolio of work must be submitted.
- Applicants will write a test to assess their competence at this level.

CPUT offers an alternate access route via an Extended Curriculum Programme (ECP). In an interview with Van Graan (ANNEXURE F) the unique nature of this programme was highlighted. The ECP specifically targets historically disadvantaged students as part of the transformation agenda of CPUT. Students accessing the ECP, however, have to firstly meet the minimum entry requirements of the university. The intention of this programme is to bridge the knowledge and skills gaps based on inadequate preparation at secondary school level; allowing for the completion of the three-year diploma, over four years.

6.2.3.3. Nelson Mandela Metropolitan University (NMMU)

FIRST-YEAR	SECOND-YEAR	THIRD-YEAR	FOURTH-YEAR (B Tech Degree)
Applied Building Science I Communication I Construction and Detailing I Studio Work I History and Appreciation of Architecture I Presentation I Survey and Landscaping III	Principles of Architectural Design III Construction and Detailing II Studio Work II Practical Studies II Computer Aided Draughting I Computer Applications I Building Services III Office Practice III	Office Practice III: Contract Management Construction and Detailing III Studio Work III Architectural Technology Practice III (in-service training)	Studio Work IV Construction and Detailing IV Principles of Urban design IV Structures IV Advanced Computer Applications IV or Housing IV

Table 6.6. Curriculum (Architectural Technology) at NMMU (Author)

Table 6.6. outlines the NMMU curriculum for architectural technology. Note that the BTech degree at NMMU is based on the architectural technology stream and not the design stream as

evident at DUT and CPUT. This is so as the architectural technology programme at NMMU sits alongside the architecture programme of the former UPE, within one school. This unique situation allows students from the technology undergraduate programme, who show design and theory flair, to bridge over to the third-year design programme of the BAS degree programme in architecture. The students who are strong in technology pursue the BTech (Technology stream) and then articulate to the M.Tech (Technology stream). The admission criteria for the National Diploma: Architectural technology will be used as it is the first qualification in the Technology stream at NMMU school of Architecture.

<u>Admission criteria - extracted from the NMMU Architecture Brochure (www.nmmu.ac.za accessed online: 12/11/13)</u>

- Admission Points Score of 32.
- Minimum NSC requirements for diploma entry must be met.
- English, Afrikaans or isiXhosa (home language or first additional language) on at least level 3 (40-49%).
- NSC achievement rating of at least 3 (40-49%) for Mathematics or 5 (60-69%) for Mathematical Literacy.
- Applicants with an Admission Points Score between 26 and 31, may be referred to write the Access Assessment Battery before a decision is made on whether or not to admit the applicant to the course.
- Qualifying applicants will be required to prepare a prescribed portfolio, attend an interview and complete a placement assessment. Some applicants may be required to attend a three-week "preparation to Architectural Technology" qualification course prior to registration.

Recommended NSC subjects:

- Visual Arts
- Design
- Physical Science
- Engineering Graphics & Design

6.2.3.4. Durban University of Technology (DUT)

FIRST-YEAR	SECOND-YEAR	THIRD-YEAR	FOURTH-YEAR (B Tech Degree)
Applied Building Science I Communication I Computer Applications I Computer Aided Draughting III Construction and Detailing I Studio Work I History and Appreciation of Architecture I Presentation I	Construction and Detailing II Studio Work II Practical Studies II Theory of Design II History and Appreciation of Architecture II Advanced Computer Aided Draughting II Work Integrated Learning (in-service)	Survey and Landscaping III Construction and Detailing III Principles of Architectural Design III Building Services III Office Practice III Studio Work III Theory of Design III History and Appreciation of Architecture III	Applied design IV Theory of design IV Structures IV Housing IV Principles of Urban design IV Office Practice IV

Table 6.7. Curriculum at DUT (Author)

Table 6.7. outlines the undergraduate architectural curriculum at DUT. The curriculum is defined by the NATED 151 Report; however, the BTech (Applied Design stream) has been adopted, with a view to a future professional Master's degree offering. This, as a consequence, has changed the focus of the undergraduate programme, which incorporates more theory and design modules. Note that the DUT curriculum comprises History and Theory modules as integral to its curriculum, both offered at second and third year levels as support subjects to the design and technology subjects.

Admission criteria extracted from the DUT Architecture Handbook (2014)

- The minimum requirements for application to the National Diploma: Architecture is a National Senior Certificate or equivalent with the following compulsory subjects:
  Maths - Level 3 Pass
  English – Level 3 Pass
- Other recommended subjects (not compulsory): Technology, History, Art, Technical Drawing, Geography.
- In addition to the minimum requirements, as set out above, prospective students will be required to undergo a selection test.

6.2.3.5. Tshwane University of Technology (TUT)

FIRST-YEAR	SECOND-YEAR	THIRD-YEAR	FOURTH-YEAR (B Tech Degree)
Applied Building Science I Architectural Design I Computer-Aided Draughting I Contract Documentation I Computer Applications I Communication I Construction Materials I History of Architecture I Construction Methods I Presentation Techniques I Theory of Design I	Experiential learning plus the following subjects: Architectural Design II Contract Documentation II Computer-Aided Design II Construction Materials II Construction Methods II Theory of Design II	Architectural Design III Architectural Practice III Building Sciences III Computer-Aided Draughting III Contract Documentation III Construction Materials III Construction Methods III Landscape Design III Surveying for Architecture III Specification and Quantities III Theory of Design III	**APPLIED DESIGN Stream** Architectural Design IV Construction Materials IV Construction Methods IV Law and Contract Management IV Project Management IV Principles of Urban Design IV Structures IV Theory of Design IV **MANAGEMENT Stream** Architectural Practice IV Business Management IV Contract Documentation IV Specification IV Construction Methods IV Construction Materials IV Advanced Computer Applications IV Project Management IV Law and Contract Management IV

Table 6.8. Curriculum at TUT (Author)

Table 6.8 illustrates the undergraduate architectural programme at TUT. Note that the programme has significantly departed from the NATED 151 Report. The TUT programme suggests a balance between Theory, Design and Technology which allows the BTech (Applied Design stream) to articulate into the current MTech (Prof) degree. The Btech (Management stream) allows students to specialise in office and contract administration.

<u>Admission criteria - extracted from the TUT Dip Brochure (www.tut.ac.za accessed online: 12/11/13)</u>

- A National Senior Certificate or an equivalent qualification with an endorsement of a bachelor’s degree, with at least an adequate achievement (4) for English (home language or first additional language) (5) and four other subjects excluding Life Orientation.

- A total APS score of 25.
- All candidates, after passing the initial administrative screening, will sit for additional assessment, arranged by the Department of Architecture. The purpose of the assessment is to select only students who are likely to be successful in their studies in architecture. This is a written test and is the only assessment used for admission to the programme.

6.2.4. The strategic direction of Universities of Technology and comprehensive Universities within a framework of programme transformation and curriculum renewal

6.2.4.1. University of Johannesburg (UJ) (extracted from interview with Dr Finzi Saidi (ANNEXURE G).

The strategic objective of the school is to build on a programme that currently delivers an MTech degree, which has been accredited by the CHE and validated by SACAP, as meeting the requirements for registration as Professional Architect. The current qualifications articulate from diploma level up to the MTech degree. UJ have obtained CHE accreditation for a B.Arch degree (3years) which articulates to the proposed B.Arch (Hons) and then the M.Arch degree as afforded by the HEQsF.

Dr Finzi Saidi strongly argues that the heritage of technical focus, which historically defined the architecture programme, has to also be maintained and strengthened by applying technological knowledge in developing contexts and places such as informal settlements. Alternative technologies and design are both vital in these contexts. UJ is focused on contextually responsive architecture. Saidi affirms this in his statement "There are different curricula for different contexts…and there are different places for different curricula…" It is envisaged that a PhD degree will be offered, which would allow staff to upgrade their qualifications.

UJ has since 2015 developed a Graduate School of Architecture (GSA), which is based on the UK 'unit system', which focuses on critical interrogation and response of different architectural contexts; a significant departure from the technical mode of the former Technikon.

6.2.4.2. Cape Peninsula University of Technology (CPUT) (extracted from interview with Prof Andre van Graan (ANNEXURE F)

The strategic objective of the school is to develop programmes at diploma level so as to maintain a position of accessibility to many students who do not necessarily have adequate preparation to access degree programmes. The directive from the university management is that the programmes in architecture will be offered at the diploma level as the first entry level qualification.

The programmes currently under development articulate from the Diploma in Architectural Technology through to professional Master's and Doctoral degrees. The corresponding SACAP professional registration categories, currently at (Candidate) Professional Architectural Technologist and (Candidate) Professional Senior Architectural Technologist will be able to articulate to (Candidate) Professional Architect via the professional Master's degree. The underlying academic philosophy of starting at diploma level, rather than at bachelor's degree level, is to build on a sound technical and scientific base, the strength of the existing programmes, while introducing more liberal arts and theoretical discourse at the higher levels of study.

The strong links with professional architectural practices and communities will be enhanced via the Work Integrated Learning (WIL) and Design-Build programmes that are embedded in the curriculum.

CPUT is uniquely positioned in the way it affords broadened access to students, especially from historically disadvantaged backgrounds. In addition to the formal selection and admission processes, the architectural programme consists of the ECP.

6.2.4.3. Nelson Mandela Metropolitan University (NMMU) (extracted from interview – ANNEXURE H)

It is envisaged that, in the near future, all students of the school enrol into the diploma stream and then articulate either to the design-focused degree stream or the technology-focused Advanced and Post-graduate diploma streams. This will significantly reduce the pressures on physical and human resources. Staff of both the current architecture and architectural technology programmes will teach within one strengthened undergraduate stream. The HEQsF allows for this type of articulation. The school is concerned, however, that public perception was in favour of degrees over diplomas which may, as a result, lead to problems in recruiting students. Another possibility is that a parallel diploma and degree stream be developed and that articulation be possible between the streams as allowed for by the HEQsF. The discussion concluded by referring to the possibility of offering the new 240 credit, two-year diploma and the four-year 480 credit Professional Bachelor's degree in Architecture. The general view that emerged was that there is still a need for the training of technologically competent architectural practitioners in both streams; however, the diploma stream would afford widened access and the opportunity of exiting at the level of Candidate Technologist for those students who may not have the design aptitude, flair or interest.

NMMU is a special case as two formerly separate institutions, both offering architecture programmes, merged into one school that shares learning space. This presents many opportunities for inter-programme articulation as discussed in the interview.

6.2.4.4. Durban University of Technology (DUT) (extracted from interview with Prof Debbie Whelan – ANNEXURE E)

DUT currently offers the National Diploma and the BTech (Applied Design) degree in Architectural Technology. These qualifications are validated by SACAP for registration as (Candidate) Professional Architectural Technologist and (Candidate) Professional Senior Architectural Technologist, respectively. The preferred route, as per the current curriculum renewal process, is to offer the first qualification as a bachelor's degree and then articulate up to a professional Master's degree which would allow for registration as (Candidate) Professional Architect.

The position that DUT is taking is unique in terms of its programmes. The bachelor's degree would be an interdisciplinary degree, namely the Bachelor of the Built Environment in Architecture (BBE:Arch). This three-year degree is intended to expose the student to a broad range of built environment and allied disciplines at the lower levels of study and architectural specialisation will strengthen from the second semester of second year in the proposed curriculum structure. The BBE:Arch will articulate to an honours degree, namely BBE(Hons):Arch which will encourage students to explore their own areas of interest in architecture and urbanism, to be categorised under the broad domains of *Heritage and Conservation, Sustainability, and Human Settlements, and Urbanism.* These three streams will guide students in the selection of their specialisation electives in the subsequent Master's degree which will be named the Master of the Built Environment in Architecture (MBE:Arch).

DUT intends to build on its historical strengths of a science and technology based programme together with its strong industry links through WIL and community engagement projects, thereby enhancing the existing general architectural education curriculum.

6.2.4.4.1. **Durban University of Technology (DUT)** (extracted from interview with Kamal Orie - Lecturer – ANNEXURE Ea)

Orie raised some concern about the direction of the university as the increased focus in design and theory has led to a dilution of strength in technology. This refers back to the argument on curriculum focus in the definition of identity, as outlined in Chapter 1. He further affirmed that the department has attracted academic staff that lack technical competence. A further concern raised was the reduction in access to students who could previously enter the programme.

6.2.4.5. Tshwane University of Technology (TUT)

TUT was the first institution to offer the M.Tech (professional) degree in South Africa, over a decade ago, when it was still known as Pretoria Technikon. As a result, TUT has evolved its Master's programme, which has obtained SACAP validation, to train architectural professionals for all levels of architectural registration, including Professional Architect.

TUT has, hence developed a balanced curriculum that focuses on design training supported, however, by a strong focus on science, materials and technologies. This makes them distinctly different to their traditional university counterparts.

Siegfried Schmidt, Head of Department in an interview (ANNEXURE Ia), who emphasised the value of the studio in the TUT pedagogic approach. He stressed upon the need for a collaborative learning environment which encourages interaction between students, as well as staff and students – the TUT plan form attests to this. In this regard he extended the learning environment to include the virtual environment, which includes a high-tech 21st century digital auditorium and digital infrastructure for maximum connectivity with the knowledge community. Technology enhanced learning spaces are a strong feature of TUT.

6.2.5. Comparative analysis of the schools of architecture

6.2.5.1. Strategic focus and Curriculum Development

Table 6.9. illustrates the strategic academic focus and curriculum development initiatives of each of the schools of architecture in case.

	University of Johannesburg (UJ)	**Cape Peninsula University of Technology (CPUT)**	**Nelson Mandela Metropolitan University (NMMU)** – Architectural Technology Department	**Durban University of Technology (DUT)**	**Tshwane University of Technology (TUT)**
Form of University	Comprehensive	UoT	Comprehensive	UoT	UoT
Historic Focus	Technical / Vocational	Technical / Vocational	Technical / Vocational	Technical / Vocational	Technical / Vocational
Current Focus and variance	General Architectural - Academic / Professional	Architectural Technology, Science and Design – Professional	Architectural Technology, Science and Design – Professional	General Architectural - Academic / Professional	General Architectural -Academic / Professional
Current Qualification Articulation within the HEQsF / [SACAP Reg. Category (Candidate)]	*ND: Arch. Tech* [PrArchT] *B.Tech.* [PrSArchT] *M.Tech.* [PrArch]	*ND: Arch. Tech* [PrArchT] *B.Tech.* [PrSArchT]	*ND: Arch. Tech* [PrArchT] *B.Tech.* [PrSArchT]	*ND: Arch. Tech* [PrArchT] *B.Tech.* [PrSArchT]	*ND: Arch. Tech* [PrArchT] *B.Tech.* [PrSArchT] *M.Tech.* [PrArch]

Strategic Focus	Higher Degrees, Increase research output – professional and academic	New Diplomas, Articulation to Higher Qualifications, Increase technical research output	New Diplomas – possibility of all students of the school first registering for Diploma then articulating to Higher Qualifications based on potential for technology or design. Increase technical research output and academic research at higher degree levels.	Higher Degrees, Increase research output – professional and academic	Higher Degrees, Increase research output – professional and academic
Strategic / Future Qualification Articulation within the HEQsF / SACAP Reg. Category (Candidate)	***B.Arch*** – NQF 7 [PrArchT] ***B.Arch (Hons)*** – NQF 8 [PrSArchT] ***M.Arch*** – NQF 9 [PrArch]	***Dip: ArchT***. – NQF 6 [PrArchT] ***Adv. Dip***: ArchT - NQF7 [PrArchT] ***PG Dip***: ArchT – NQF 8 [PrSArchT] ***M.Arch*** –NQF9 [PrArch]	***Dip: ArchT***. – NQF 6 [PrArchT] ***Adv. Dip***: ArchT - NQF7 [PrArchT] ***PG Dip***: ArchT – NQF 8 [PrSArchT] **In addition to current *BAS* and *M.Arch* Degrees	***BBE Arch*** –NQF 7 [PrArchT] ***BBE Arch (Hons)*** – NQF 8 [PrSArchT] ***MBE / M.Arch*** – NQF 9 [PrArch]	***B.Arch (Prof)*** – NQF 8 [PrSArchT] ***M.Arch*** – NQF 9 [PrArch]

Table 6.9. Strategic foci and Curriculum Development of the architecture schools in case

Table 6.9. illustrates the existing position as well as the strategic direction of each school of architecture in case. It is evident that there is no general strategic direction in the curricular focus

or the nomenclature of proposed new qualifications. However, this is not seen by the CHE or by SACAP as a problem. Each school is allowed flexibility in their strategic areas of strength or niche areas whereby regional diversity is encouraged. All schools have aligned their qualifications with both the HEQsF and the SACAP minimum competency stipulations per category of registration. As such, articulation, mobility and transfer of qualifications would be possible. Therefore, all of the respective curricula (proposed) are in compliance with the CHE and SACAP.

It is important to note that all of the schools articulate their programmes up to a Master's degree level in architecture, despite the varied focus of their respective undergraduate qualifications. The different foci in the undergraduate programmes at the different schools, results in diversity of knowledge and skills sets in students accessing the Master's programmes. This is especially so for those undergraduate programmes with a strong technical focus, such as at NMMU and CPUT. While UJ and TUT have opted for the traditional nomenclature of architectural qualifications, such as *B.Arch* and *M.Arch*, both have endeavoured to build on their strengths, as evident in the respective interviews. DUT, on the other hand, has opted for entirely new nomenclatures, the *BBE:Arch* and *MBE:Arch*, underpinned by a strong interdisciplinary curriculum and pedagogic approach.

The discussion above starts to reveal that there is no consensual agreement on the definition of technological focus which can be definitively separate to theory and design. The developments in curricula as evident in the case studies above, reveals an inclination toward a general education in architecture, which will eventually articulate to Master's degrees. It is argued that this is inevitable as technology is not separate to, but part of the cultural paradigm in which theory and design exists. As such, although the universities of technology and comprehensive universities may develop a distinguishable identity to the traditional universities, such identity, may not necessarily manifest in the broader architectural curriculum.. The strong historic engagement with society and industry, may define an identity based on pedagogies that enhance applied research and knowledge transfer.

While the universities of technology and comprehensive universities strive to determine their identities, they will have to also be guided by the objectives of the professional body, SACAP, which validates all professional qualifications in architecture.

6.2.6. The SACAP position on the future/strategic direction of Universities of Technology and comprehensive Universities

The position of SACAP, as the statutory body governing the architectural profession in South Africa, is critical in order to establish whether there could be a distinction in the character of architectural training between traditional universities and universities of technology. This problem has manifested from a perceived drift towards design and theory focused architectural curricula at universities of technology that are said to be very similar to those at the traditional universities; this has attracted much criticism from the traditional universities and has created much confusion in the profession.

Professor Gerald Steyn, former SACAP Council member and Professor at TUT, in an interview (ANNEXURE I) confirms that universities of technology are in fact emulating the historic models of the traditional universities and, in general, have no particularly unique strategic directions. Steyn commends the historic strength and value of the universities of technology with regard to their close ties with practice and community engagement, but notes that they should not drift too far from their historical missions.

He further states that universities of technology are culturally and historically better placed to train architectural professionals, particularly with reference to the context of the developing world. Accordingly, the historical science and technology focus of the universities of technology presents unique opportunities for engagement with the current environmental crises, especially through engagement with the material sciences. Here the strong science/engineering focus of the architectural curricula at the Vienna Academy and Hochschule as well as Illinois University of Technology become relevant. Note that the polytechnics in the UK evolved differently, reflecting their situation in communities, while embracing the value of disciplines such as the humanities.

The generally questions around the unique identity of universities of technology in South Africa have largely been around the idea of a science and technology curriculum, which could translate into technology focused studio design projects. This thesis, however, argues that universities of technology may develop a distinct identity while being equal to their traditional counterparts, even if their curricula are of a general architectural focus i.e. not necessarily purely science and technology focused. This is partly due to factors such as the transformation and reform agendas of the democratic government, which seek to widen access to historically disadvantaged communities, and the spatial transformation of the built environment. The higher education environment therefore affords numerous new opportunities to universities of technology, however, a distinct identity may emerge from building upon their historic partnerships with industry and society in a pedagogic paradigm of knowledge transfer and interdisciplinarity', and not necessarily from any definitive institution of science and technology.

Chapter Summary

The transformation of legislation governing higher education and the profession, as previously discussed, allows for the education and training of architects at universities of technology, without any prescription of the curriculum of such education and training. How then can there be characteristic difference in the identity of architectural education at universities of technology as compared to that of the traditional universities?

This thesis argues that it is possible for universities of technology to define and establish their own unique identities by referring to Du Pre's notion of the research driven education model that further emphasises the transfer of knowledge through partnerships with industry, as well as Scott's reference to industry partnerships towards social good and positive social impact together with the incorporation of new technologies. While Du Pre and Scott stressed the theory-industry partnership, this thesis posits that practice oriented research or education, or what is referred to as the theory-practice (industry) partnership, has to be extended in order to include interaction or engagement with society/communities. This form of community engagement would not happen only between practitioners and society but rather, vitally, during the education and training of architectural professionals. Steyn (ANNEXURE I) affirms that universities of technology need to engage with society and communities rather than (just) the architectural fraternity. He emphasised that universities of technology need to formalise their own ideologies around the needs of Africa and that skills transfer and employability continue to be strengthened.

Furthermore, the synergy between architecture, engineering and science, redefines technology as a creative act of design, according to Steyn. This definition places architectural design, at universities of technology, in the unique position of being able to create responsive solutions to the challenges of the built environment in the context of the developing world, through the adaptation and creative application of technology.

The contextual realities facing the built environment in the developing world have been much about socio-economic factors. In South Africa, national imperatives such as the Reconstruction and Development Programme and the National Development Plan defined strategic objectives aimed toward alleviating poverty through developing the economy in order to create more jobs. This further extends to the area of sustainable communities and sustainable human settlements.

However, the global economic crisis that recently emanated, has also redefined the economic status of the developed nations. Furthermore, issues of environmental sustainability have challenged both the developed and the developing worlds. While the developed world generally focuses on new materials and technologies for environmental sustainability, the developing world reflects on its traditional building technologies and materials, which have been found to be environmentally responsive, while also employing the technologically advanced methods of modern industry, and reflecting the cultural aspirations of society. In, addition, the South African context is defined by multiculturalism. These factors have particular significance to universities of technology which have strong foundations in science, technology and community engagement.

Dr Finzi Saidi refers to the heritage of the technical focus of universities of technology, which he affirms has to be strengthened in order to creatively apply technological knowledge in contexts such as informal settlements. The creative development of alternative technologies to such complex contexts places architectural education at universities of technology in a unique position of responsiveness through technological innovation. This places universities of technology in a prime position to develop programmes that respond to the realities of multicultural contexts. The main argument is, however, that the universities of technology should seize this opportunity to build on their strengths in order to define their own unique identities.

The chapter outlined and discussed the nature of curricula and learning spaces at universities of technology in South Africa. Importantly, the transformation of the pedagogical approaches due to the change of status and identity of the respective universities provide invaluable insight towards developing a new and relevant model for architectural education at universities of technology in South Africa. Much of this was made possible by the broad transformation of statutory and regulatory frameworks, which, furthermore, afford new opportunities for universities of technology and comprehensive universities. However, it has emerged that the architectural programmes at these universities have largely emulated the historic curricula and pedagogic approaches of the traditional universities. On the, other hand, interview data revealed a need and aspiration of universities of technology to build upon their historic strengths and create their own identities. Of particular importance is the fact that these institutions have a history of strong links to practice and communities, while affording widened access to historically disadvantaged communities.

While the curricula and pedagogic approaches of universities of technology have been discussed, a corresponding analysis of the learning spaces at a select group of these institutions is critical to understand how learning spaces may have transformed to facilitate transformed pedagogies. The following chapter focuses on the principles around the development of effective holistic learning spaces for architectural education. The chapter concludes with analyses of learning space development of a selected group of institutions as case studies.

CHAPTER 7:

LEARNING SPACE DEVELOPMENT AT UNIVERSITIES OF TECHNOLOGY IN SOUTH AFRICA

7.1. The transformation of learning spaces at universities of technology and comprehensive universities.

Chapter 2 outlined three major trends that have informed learning space design according to Brown and Long (2006); these include spaces that support active and social learning strategies, human-centred design and ownership of technological devices that enrich learning. The present form of universities of technology and comprehensive universities have evolved from a technical skills base and consequently the curricula and pedagogic approaches are much wider and exploratory research/application in design and knowledge generation have become defining features of these institutions, which were all but evident in their previous forms as technikons. This has had a significant and major influence on learning space development at the respective institutions. While the general assumption based on general evidence is that the principal learning space for architectural education is the 'design studio', historically the principal learning spaces in the former technikons were not 'design studios', but rather 'drawing rooms'.

The emphasis on the drawing room as the principal learning space was because the primary aim of technikon education, in the context of architectural education, was to provide supplementary technical skills to the professional architect. The drawing room therefore assumed a secondary position to the traditional architectural design studio. The drawing room space was configured around a skills training approach rather than one of knowledge generation. The layout pattern is a direct result of the pedagogic approach to architectural training at these institutions. As such the layouts of the drawing rooms were configured for teacher-directed skills training rather than for exploratory design or research work. Figure 7.1. illustrates the typical layout of the architectural 'drawing room'.

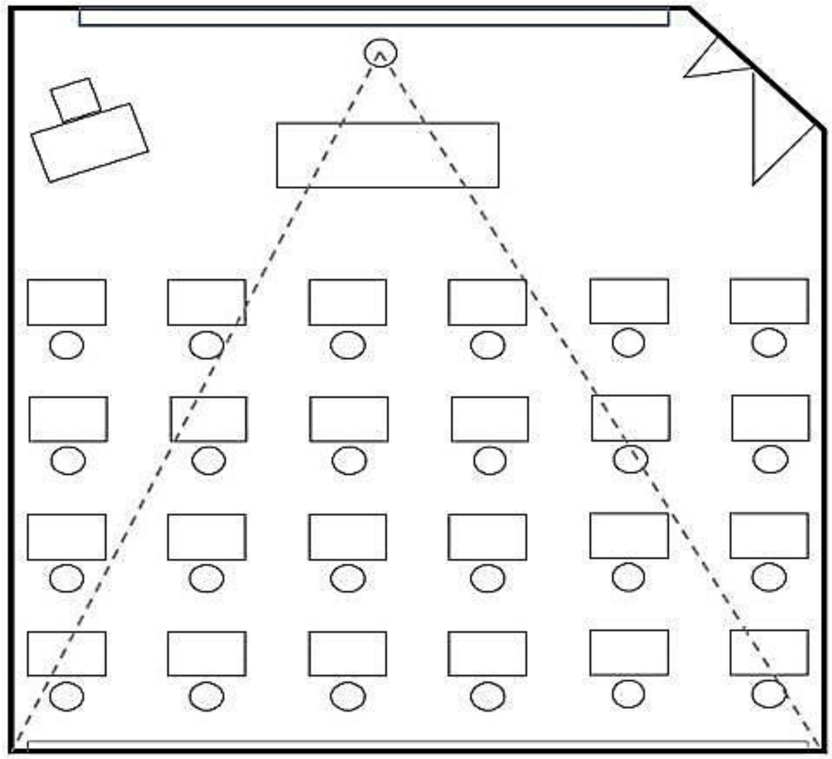


Figure 7.1. Typical Layout of Architectural Drawing Room (Author 2014)

Figure 7.1. indicates that this form of drawing room placed heavy emphasis on the teacher as all the drawing boards were orientated towards the front centre of the room, focussing on the teacher or chalkboard. This learning space epitomises a behaviourist approach to learning, which was typical of the skills training programmes offered at the former technikons. The drawing room configuration, therefore, did not stimulate active learning or knowledge generation. The present universities of technology and comprehensive universities require a vastly different form of learning space due to the transformed nature of curricula and pedagogies – largely learner-centred and active. This has resulted in the need for transformation of such learning spaces. The following section briefly examines the constituents of active learning environments in a generic form based on literature and theoretical positions, which has to be referred back to the discussion in Chapter 2. This is followed by case studies of a sample of existing universities of technology and comprehensive universities in order to critically analyse their respective learning spaces in their current form, against the theoretical framework defined in Chapter 2.

7.1.1. Spatial typology for architectural education at universities of technology in South Africa: the Formal, Informal, and Work-Based learning spaces

Universities of technology have been historically characterised by two primary learning spaces, one being situated within the academic institution and the other in industry. The latter, work-based, learning space is a major factor that distinguished the technical institutions from the academic universities. It is, therefore, necessary to discuss this vital learning space and to evaluate the impact of such training on the academic curriculum.

7.1.1.1 Work Integrated Learning (WIL)

All programmes at the South African universities of technology and comprehensive universities have a work-based component, which is known as 'Work Integrated Learning'(WIL) or otherwise known as 'Architectural Practice', as extracted from the respective 'prospecti', brochures or handbooks (ANNEXUREs J-N). WIL is the official title given to work-based or in-service learning. WIL comprises a minimum of six months' work experience in the practice of an architectural professional. This is intended to expose students to the realities of working in practice and on construction sites. Hence, during the WIL term, students learn many skills and develop knowledge that would not otherwise have been possible to obtain at the ALS. Such knowledge and skills include: legislation that govern practice, professional office management and operation systems, documentation and communication, site works and various aspects of project administration, amongst others, which the ALS is not able to provide. Furthermore, skills learnt at the ALS are implemented on real projects, under supervision of a 'practice mentor'.

However, the reality is that the WIL period is generally unstructured and all of the requisite learning may not be achieved within the allocated time. This is largely due to the fact that WIL does not bear a credit value, hence it has no subject descriptor that stipulates and evaluates the outcomes. However, if well managed, WIL has been shown to be beneficial to the students' learning and development.

Chapter 6 outlined the distinguishing features of universities of technology; the most distinctive feature being the strong partnerships with industry and society. This strong emphasis on applied research to the benefit of industry and society at large was iterated by Du Pre' (CHE 2010) and Scott (CHE 2005). The work place is in an ideal position to offer students real life contexts where they are able to see how knowledge is applied in practice and society. This is vital to the development of responsive architecture through interdisciplinary engagement. However, as mentioned before, work-based learning has to be properly structured, preferably with a credit value and definite assessable outcomes, governed by appropriate module descriptors, supported by reliable methods of monitoring and evaluation. This will be vital to the development of a holistic model for architectural education, especially at universities of technology.

Work-based learning spaces vary in quality, scale, operations and other characteristics as these are dependent on many variables such as: the type of projects undertaken, the number of staff, the location, the philosophy of the practice, and clients, among many other factors. As such the definition of such space is beyond the scope of this research. The formal learning environment at the ALSs, however, can be evaluated and developed to facilitate optimum learning. The formal learning environment at the ALSs generally comprise a mix of formal learning spaces and informal learning spaces. The quality of learning spaces at these ALSs is vital to the effectiveness of learning. The following section therefore examines the impact of pedagogy on learning space development, as well as the impact of learning spaces on pedagogic functions.

7.2. Changing patterns of learning space development at the ALSs: the impact of spatial typology on pedagogic function

The beginning of the chapter outlined a pattern of learning space, which reflected the approach of an education system that is teacher focussed, within a behaviourist paradigm. Although this pattern was due to the subsidiary technical skills training focus of the former technikons, historical systems of architectural education were also predominantly based on the educational philosophies of the time and were, hence, predominantly centred on a behaviourist approach to learning. Two of the most influential architectural education systems that influenced architectural education in South Africa were the French *Beaux-Arts* system of the 17th century and the British system of the 18th century. Both these were based on a behaviourist approach to learning that was focussed on the master or mentor. The *Beaux-Arts Atelier*, although intended to stimulate liberal thinking actually inhibited student thinking and resulted in a general decline in the level of design (Salama in Andjomshoaa *et al.*, 2011) as students tended to emulate the master rather than to critically explore responsive design options. Therefore, although the *Beaux-Arts* model was based on the 'explorative studio' approach, the power of the master inhibited exploration by students. In the British work-based system, on the other hand, the apprentice or articled pupil learned under mentorship by emulating his employer.

The developments in critical thinking and concerns for regional response and identity during the late 20th century realised a radical departure from the rigid pedagogic approaches of the preceding centuries; however the associated learning space development required critical rethinking in order to facilitate and stimulate such pedagogic approaches. As we approach the 21st century, however, the issue of appropriate learning space development, aligned with a predominantly collaborative and participatory pedagogic approach, has become critical; this is especially relevant to the case of universities of technology in South Africa, which evolved from a skills training base to institutions for knowledge advancement and critical discourse. Furthermore, the advent of social networking in virtual space has offered the youth of today ease of collaboration without the hindrance of physical and distance barriers while it also, very importantly, stimulates a culture of co-operation, collaboration and participation. The impact of the social realm in architectural education and learning space development can, therefore, never be overestimated. This poses a particular challenge to those learning environments that may be socially disconnected or those that may hinder social interaction.

Oblinger (2006) affirms that students today, generally prefer participatory learning environments that foster connections with other learners. Torin Monahan (cited in Oblinger 2006) uses the term 'built pedagogy' in order to explain the influence of the design and layout of learning spaces, to learning pedagogies. In the case of the former technikons, the drawing room would be defined as a teacher-oriented or behaviouristic learning environment. Universities of technology, however require learning spaces that foster a learner-centred pedagogic approach. A shift from a teacher-centred learning approach to a learner-centred approach has both pedagogic and spatial consequences that have implications on the pattern of learning space development. In order to understand the complexity of holistic learning environments it is necessary to analyse the various components or qualities of student-centred learning in order to be able to understand the spatial requirements for such learning. Figure 7.2. illustrates the various aspects of student-centred learning. These usually do not apply in isolation; however various combinations of different aspects are complimentary, which results in a holistic approach defined by the interrelationships between various constituents within an active learning environment. Such active learning environment requires the application of individual cognitive attributes as well as social learning attributes of students. The contextualisation of learning is also important for learning space development. In this regard, learning is always situated for example in project-based learning or research-based learning as illustrated in Figure 7.2.

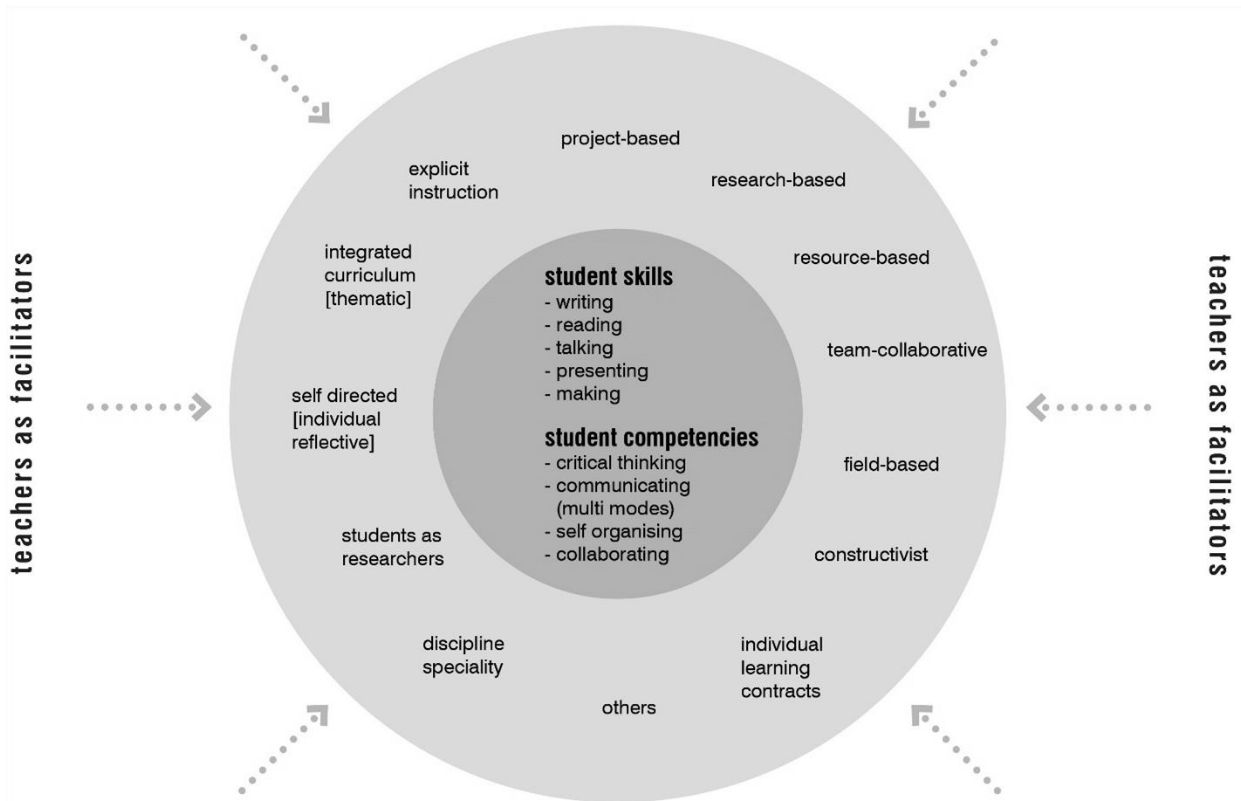


Figure 7.2. Diagrammatic representation of key pedagogical approaches for student-centred learning (Fisher 2005: 1.03).

The model represented in Figure 7.2., for the purpose of this research, is interpreted as follows: The model illustrates a holistic approach to learning that incorporates multiple modes as may be relevant to the learning problem. In this model, the student may combine both the individual cognitive functions, such as “self-directed” or “individual learning contracts”, as well as the social/collective “team collaborative” approaches to learning. Similarly, “explicit instruction” may supplement “constructivist” pedagogic approaches, while “discipline speciality” is contrasted by the “integrated curriculum”. The various components or constituents of learning, as such, are in dynamic flux which is centred on the core, as defined by student skills and student competencies. It is vital to note that the model is undoubtedly learner-centred as teachers act only as facilitators. Although the various components as listed above may seem dichotomous, within this model, they are seen rather as complementary.

The learning approaches as illustrated in Figure. 7.2., are dynamically interrelated within a complex and holistic framework. The consequence of such model is that learning spaces have to be adaptable and flexible to accommodate the various approaches to learning, hence learning space development is defined by complexity. It is vital, therefore, to co-relate learning principles, pedagogic approaches and pedagogic activities with the appropriate corresponding learning space requirements. The pedagogical approaches and their respective co-relations to building design will be discussed here in order to better understand the implications on the development of architectural learning space. Learner-centred pedagogies, which are by their nature based on the co-location of multiple learning settings, require that design reflects community values and accommodates cultural diversity. This suggests that the appropriate learning space is inclusive and supports interaction and expression that is supportive of cultural diversity. This space should stimulate dialogue, debate, contradiction and conflict, which is inevitable in multicultural spaces, with a view to developing solutions through negotiation and consensus. This constructivist approach to learning thereby stimulates a sense of community, defined by a participatory and inclusive approach to solving problems.

The succeeding discussion focuses on different learning principles and their effect on pedagogy and learning space development, within a holistic learning environment as outlined in the preceding discussion. Pedagogic approaches and modes of are translated to inform spatial development/building design requirements. Table 7.1. & 7.2. illustrate how pedagogic approaches and pedagogical activities impact on spatial requirements that define building design. Each of the pedagogical activities are co-related with the appropriate learning space requirements. This analysis will be vital in the analysis of the different case studies that follow later in the chapter.

The learning principles in the first column (Table 7.1.) are defined below in order to relate to the terminology previously defined in the thesis thus far.

principle	pedagogical approach	pedagogical activity	implications for building design
The learning environment is supportive and productive	Learner centred pedagogies with multiple learning settings collocated	delivering	Design reflects community diversity, respects and values different cultures Students have access to teachers
The learning environment promotes independence, interdependence and self motivation	Peer to peer learning, integrated problem- and resource- based	applying	Breakout spaces are provided to allow individual student work Furniture is suitable for cooperative learning
Students are challenged and supported to develop deep levels of thinking and application	Integrated, problem and resource based learning	creating	Access to ICT, multi-media supports authentic learning
Students' needs, backgrounds, perspectives and interests are reflected in the learning program	Theory linked to practice, problems integrate both aspects, resources used continually and creatively, integrated curriculum delivery	communicating	Quiet spaces Multi-purpose rooms that enable students to work on different subjects over longer periods of time, encourage integrated curriculum Teacher spaces that encourage cross-disciplinary teams of teachers working with groups of students
Assessment practices are an integral part of teaching and learning	Continuous assessment, utilising a pedagogy of assessment		Spaces for student-teacher conferencing Intranet facilities enable ongoing monitoring of student progress by students and parents
Learning connects strongly with communities and practice beyond the classroom	Project and resource-based learning on practical problems	decision making	Buildings and facilities that bring the community into the school ICT facilities that support curriculum links to professional and community practice

Table 7.1. Linking learning principles to learning space (Fisher 2005: 2.01).

The following principles for learning space development, aligned with different pedagogic approaches, are drawn from Table 7.1.:

Supportive and productive learning environment:

This implies that the learning environment stimulates learning within an adaptable and flexible environment. These include the individual functional learning spaces, which are adaptable to reconfiguration, as well as the relationship between different learning spaces within the broader learning environment such as the school of architecture. This type of environment allows students to interpret and define their learning spaces according to their values and aspirations and thereby becomes reflective of and responsive to multiple cultures. Furthermore, access to teachers is an important feature of this type of learning space. The proximity to teachers/faculty offices to the student learning spaces are vital to the learner-centred pedagogic approach.

Independence, interdependence and self-motivation:

The concepts of independence and interdependence imply that students need breakaway spaces for individual work as well as flexible furniture for collaborative work. It must be noted here that independent work is not merely at a desk in a classroom type of arrangement, but rather more akin to a “pod” in which self-reflection and focused learning may occur. Such space could be personalised in order to create a sense of “dwelling” or domain. This allows for both individual cognitive learning as well as space for reflective learning, which may be in the form of breakaway spaces. Breakaway spaces may also be used as social learning spaces in the form of peer group interaction spaces. As such the layout of the space has to be flexible enough in order to support individual learning activities as well as group/social learning.

Stimulation of deep levels of critical thinking:

The access to resources via Information Technology (IT) and multimedia afford students the opportunity to engage critically and deeply with problems as the access to research material is readily available on demand. This medium further connects learning within the broder global knowledge society; expanding worldviews. Within this virtual lerning space students may collaborate across the globe to enage with knowledge relating to similar problems elsewhere, as well as to contribute to the global knowledge society.

Student experiences, aspirations and interests are reflected:

Theory is linked to practice and contextualised in relevant problems, which draw on the experiences of students and that are relevant to their frames of reference. This approach is interdisciplinary as it requires the integration of different subject material and cultural experiences. The learning spaces have to be flexible and adaptable in order to encourage student work over various subject domains, across disciplines and over significant lengths of time. The learning space should also actively interface with teacher spaces that encourage teacher interaction across disciplines.

Assessment is integral to pedagogy:

Assessment and continuous feedback defines a formative approach to learning. This requires spaces for student-teacher consultation as well as virtual platforms for interaction between students and assessors. Knowledge is developed through reflective practice whereby formative assessment forms a vital mechanism for constructive critique; assessment itself is pedagogical.

Community and practice partnerships beyond the formal learning environment:

Community engagement contextualises problems in real life contexts. All learning is therefore based on practical problems. Further to students going out into communities or practices, the learning spaces are organised such that community role players and professional practitioners are brought into the learning spaces to engage with students. IT links further afford ease of links with practices and communities without any of the logistical or distance barriers that may otherwise compromise engagement.

Architectural education is characterised and based on the frameworks/models discussed above; this is due to the broad complexity of the discipline which requires the simultaneous engagement of different learning principles and pedagogic approaches. However, learning principles and pedagogies have to be supported by the appropriate learning space development. It is therefore necessary to analyse learning modes and pedagogy with the corresponding spatial configurations. Figure 7.2. indicates the different types of pedagogical activities with various behavioural modes of knowledge transmission, which are then related to the relevant learning space configurations – referred to as spatial icons. Figure 7.2. reveals that various pedagogical approaches are engaged, with different spatial configurations in order to effect learning. Architectural education is complex and therefore engages different types of learning modes as well learning spaces – flexibility and adaptability of learning modes along with the corresponding learning spaces is therefore essential. It is important to reiterate that as the design studio is the primary pedagogical approach in architectural education, linear transmission modes such as “delivering” should not form a significant form of pedagogical activity – collaborative learning environments are much more suitable.

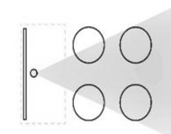
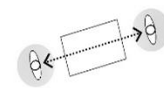
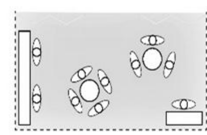
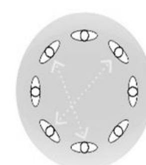
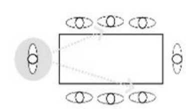
pedagogical activity	pedagogical attribute	process steps	behavioural premise	spatial icon
delivering	Formal presentations Instructor controls presentation Focus on presentation Passive learning	Prepare & generate presentation Deliver to an audience Assess understanding	Bring information before the public Instructor lead Knowledge is in one source	
applying	Controlled observation One-to –one Master & apprentice alternative control Informal Active learning	Knowledge transferred via demonstration Practice by recipient Understanding achieved	Learner-centered Apprentice model	
creating	Multiple disciplines Leaderless Egalitarian Distributed attention Privacy Casual Active learning	Research Recognise need Divergent thinking Incubate Interpret into product / innovation	Innovation or knowledge moved from abstract to a product	
communicating	Knowledge is dispersed Impromptu delivery Casual Active learning	Organise information Deliver Receive & interpret Confirm	Share information Provide quick exchange	
decision making	Knowledge is dispersed Information is shared Leader sets final direction Situation is protected Semi-formal to Formal Passive / active learning	Review data Generate strategy Plan Implement one course of action	Make decisions	

Table 7.2. Linking pedagogical activity to learning space icons (Fisher 2005: 2.02).

Figure 7.3 illustrates the different types of learning spaces that a student requires in a broad and multi-disciplinary field such as architectural education. Learning spaces are neither static nor disconnected. IT plays a great part in connecting remote locations such as the home base to resource spaces or virtual learning environments.

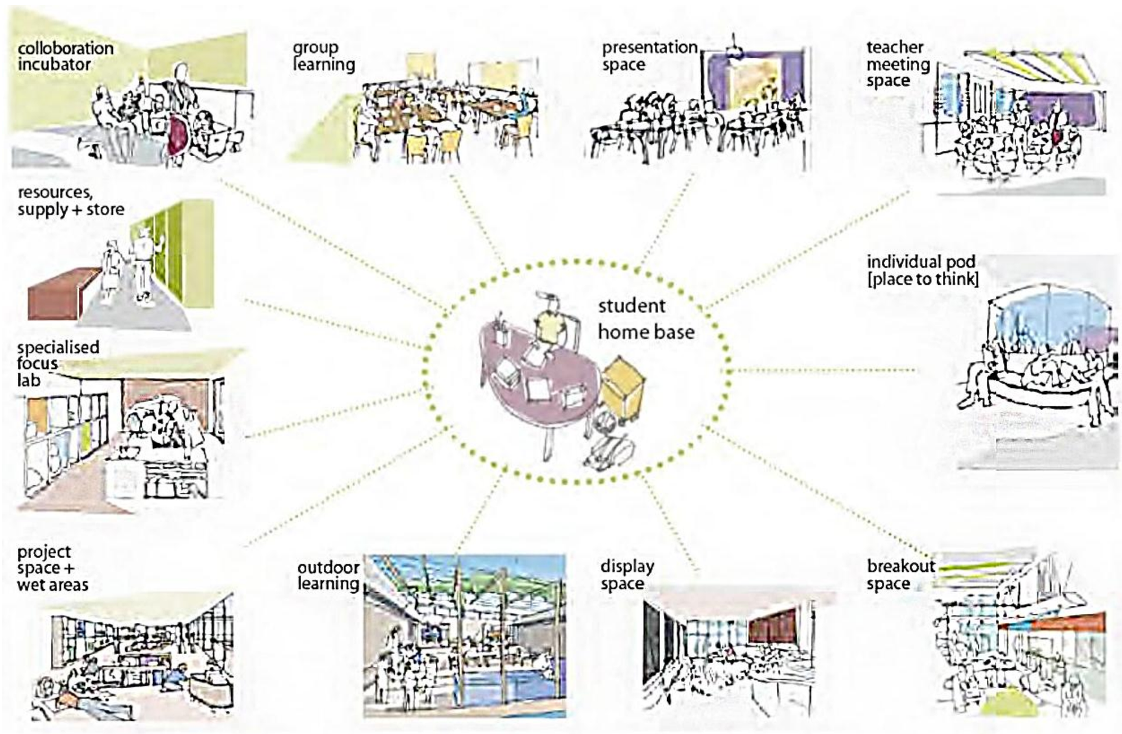


Figure 7.3. Diagrammatic sketches of different types of learning spaces (Fisher 2005: 2.03).

The student has access to a broad array of interconnected learning spaces, which defines a holistic learning environment. At the core of Figure 7.3. is the student's home base, which is where the student spends the majority of learning time. This is the student's own defined dedicated space, which is interpreted as his/her primary learning space. What is evident, though, is that this primary learning space is interconnected to many other formal, semi-formal and informal learning spaces; this defines the holistic learning environment of the student.

Architectural education is largely defined by a project-based approach to learning, which occurs primarily in the architectural design studio, which could also be regarded as the student home base. The nature of architectural projects often requires that the bulk of learning time is situated within one learning space, most commonly the architectural design studio, which is defined by a studio pedagogy. The different role-players step out of their respective domains and engage within the studio, which is the interdisciplinary space for collaboration; a sort of informal "think-tank". Interactive social learning dominates this form of studio, which stimulates the development of learning communities. A studio-based pedagogy is fundamentally interactive as learners and facilitators participate in the discussion of design scenarios and presentations. Learning is largely in the form of social interaction. Bickford and Wright (cited in Oblinger 2006) argue that a community paradigm is necessary to foster interactive social learning (refer back to Table 3.1.).

Reference is made to the discussion on social constructivism in Chapter 2, which broadly defines design studio pedagogy. According to Van Notte Chism (cited in Oblinger 2006), social constructivists posit that the social setting largely influences learning. Accordingly, the standard classroom or the drawing room is, therefore, inadequate as a learning space. Learning spaces rather have to be flexible, adaptable and learning may occur anywhere in the learning precinct, not necessarily only within confined spaces. This requires that the architectural design studio assumes the position of the "student home base", with reference to Figure 7.3., which has to be interconnected to various other spaces in order to define a holistic and participatory learning environment. The interconnections of spaces become vital in this regard; learning may occur en-route to the designated spaces; corridors and other transitional spaces all contribute to the overall learning environment. Human/learner-centred environments require that human comfort must be considered vital to effective student learning. This brings into consideration the informal learning environment and the concept of " incidental learning".

7.2.1. The concept of Incidental Learning

This thesis proposes "Incidental Learning" (IL) as a concept that refers to all learning that occurs beyond the structured curriculum and dedicated learning spaces; which happens inbetween planned lerning activities . It is argued that incidental learning is a spatial concept which depends on the co-incidental interactions between students and the peers; other students; academic staff; the narrative of built form and space; virtual space; the city; in transition spaces and anywhere that a student may inhabit or perceive. In this regard, due consideration is given to the "in-between" spaces such as corridors, foyers, lobbies, courtyards and leisure spaces. These spaces that were never traditionally considered as potential learning environments have become increasingly sought by students as learning environments; this is primarily because of their potential to foster collaboration with other learners. This is defined as the informal learning environment. The nature of the informal learning environment encourages collaboration between students of different levels of study as well as of other disciplines. In architectural education the inclusion of other opinions, intelligences and cultural values is critical in developing responsive architectural design and thinking. This has been elaborated upon in Chapter 3. IL, however, further extends possibilities of learning to include cognitive, social, conscious and subconscious learning environments and, therefore transcends active conscious learning to include the realm of subconscious learning.

This discourse on learning space development is critical as this research intends to develop a new model for architectural education at universities of technology in South Africa. It is, however, also necessary to critically review the spatial dynamics and nuances of the architectural education environment at universities of technology, which evolved from technikons. As pointed out earlier, technikons had been rather skills focussed and learning spaces were oriented towards a linear transmission approach to learning, placing the teacher at the focus and source of learning. The technikon learning environment was, therefore, defined by learning spaces such as dedicated classrooms, drawing rooms and laboratories and, consequently, the informal learning environment never featured as viable learning space.

The fact that technikons have evolved into universities and that the design curriculum has subsequently become the preferred form of architectural education, has resulted in a shift towards the design studio approach to learning. How then have the traditional designated and specifically defined learning spaces, that characterised technikons, transformed in order to reflect the nature of an entirely different pedagogic approach, that of the design studio? To answer this question, it is necessary to critically analyse the learning spaces of a sample of universities of technology and comprehensive universities. The main objective of this analysis would be to determine the extent to which studios have transformed to reflect the design studio pedagogic approach.

The analysis is based on a case study of site visits to the selected sample. The study includes analyses of spatial layout drawings, qualitative analysis of the learning spaces which are captured as photographic sources referenced in the text. This study together with the respective staff and student interviews in the following chapter, forms a comprehensive analysis of the current state of learning space development and pedagogic transformation of the sample institutions.

7.3. CASE STUDIES: The Analysis of learning spaces at Universities of Technology and comprehensive Universities in South Africa

This section is a continuation of the discussions on architectural education as evident in the case studies in Chapter 6. The sample of ALSs will be critically analysed with regard to their spatial qualities, infrastructure and impact on pedagogy. The sample includes two universities of technology, namely DUT and TUT, which comprise two of the three universities of technology offering architectural education, the other being CPUT which is housed in a temporary facility and therefore does not add value to this study. Both comprehensive universities offering architectural education, namely UJ and NMMU, have been included in the selected sample of ALSs. This sample is therefore adequately representative of the population.

Formal and informal learning spaces will be analysed. In this regard, the location of the ALSs within the respective campuses is important. Each of the ALSs will be individually analysed in order to determine their respective spatial and infrastructural qualities, and their relationship to the respective campuses. The analyses will focus on the following criteria:

- Typology of learning spaces and their related pedagogic impact, based on learning space theory as explained in the preceeding section and in Chapter 3. This criterion will focus on issues such as flexibility of layout, servicing and IT infrastructure, natural lighting and ventilation;
- spatial planning and spatial relationships within the ALS: formal and informal learning spaces;
- the relationship of the ALS to other allied disciplines;
- the location of the ALS within the broader university campus;

This section will conclude with a critical comparative analysis of the learning spaces of the ALSs in case in order to find areas of good design and to find gaps for improvement. This is vital to the learning space development of a new model for architectural education, to be developed in Chapter 9.

7.3.1. University of Johannesburg

7.3.1.1. Typology of learning spaces and impact on pedagogy


Figure 7.4. Collaborative Studio space


Figure 7.5. Lecture room space

The learning spaces at UJ combine both the design studio (Figure 7.4.) as well as the teacher-centred lecture room (Figure 7.5.), which are generally the types of learning spaces found at most schools of architecture. The main focus here is on the critical analysis of the studio spaces at UJ. The design studio configuration, as indicated in Figure 7.4., is analysed hereunder to assess the extent to which the layout and infrastructure of the space is conducive to a design studio pedagogy.

Modular work tables promote dialogue and peer interaction and are adaptable to different configurations as may be required. Note that there are also different shapes of furniture ranging from long wide tables to round tables, which facilitate different kinds of interaction. The long tables are good for working on projects in collaborative groups or even individually, with the added ability to share ideas across the table. The circular tables, on the other hand are perfect for discussing and debating scenarios, in break-away groups or even for brainstorming ideas; interdependence is facilitated with ease. Furthermore, technological devices such as multimedia projectors allow for sharing of ideas or discussion of various design scenarios. The whiteboard at the front of the studio further facilitates discussion and presentation of alternate design scenarios. The studio is equipped with wifi and students may access electronic resources using a range of technological devices. This space is therefore adequately interactive.

What is not evident is breakaway space for independent reflective thinking as there are no “pod” spaces or “dwelling spaces” within the studio or any form of movable screens for subdivision of the studio space where necessary.

The separation of dedicated CAD Labs (Figure 7.6.) may be required for the teaching of software programmes to lower level students, but these labs however, are inadequate as work spaces for design projects as they are not conducive to collaborative discussion. Working in this environment could be experienced as introverted space. The integration of computer workstations with the studio work spaces could be a more viable option for studio-based pedagogy.

Figure 7.6. Dedicated CAD Lab

7.3.1.2. Spatial planning and spatial relationships

Figure 7.7. Exterior view of Faculty of Art, Design and Architecture (FADA)Building Entrance

The main criticism of the studio spaces at UJ is the internalised nature of the spaces. There is no interlinking of studio spaces across levels of study nor are there links to outdoor spaces, other than visual links. Refer also to partial floor plan (Figure 7.8.) below and for the layout plan of the architectural department, which show the internalised/isolated studio spaces. The studio plan forms and proportions seem arbitrary, which suggests an “outside-in” approach to the building (Figure 7.7.) in which the form and aesthetic of the exterior of this new building seems to have been given much more attention than the internal layout and utility value of the various learning spaces and office spaces.

Although the faculty offices are in close proximity to the studios, there is no free access to staff by students as the reception point acts as a point of controlled access, which is assumed to be necessary for security reasons.

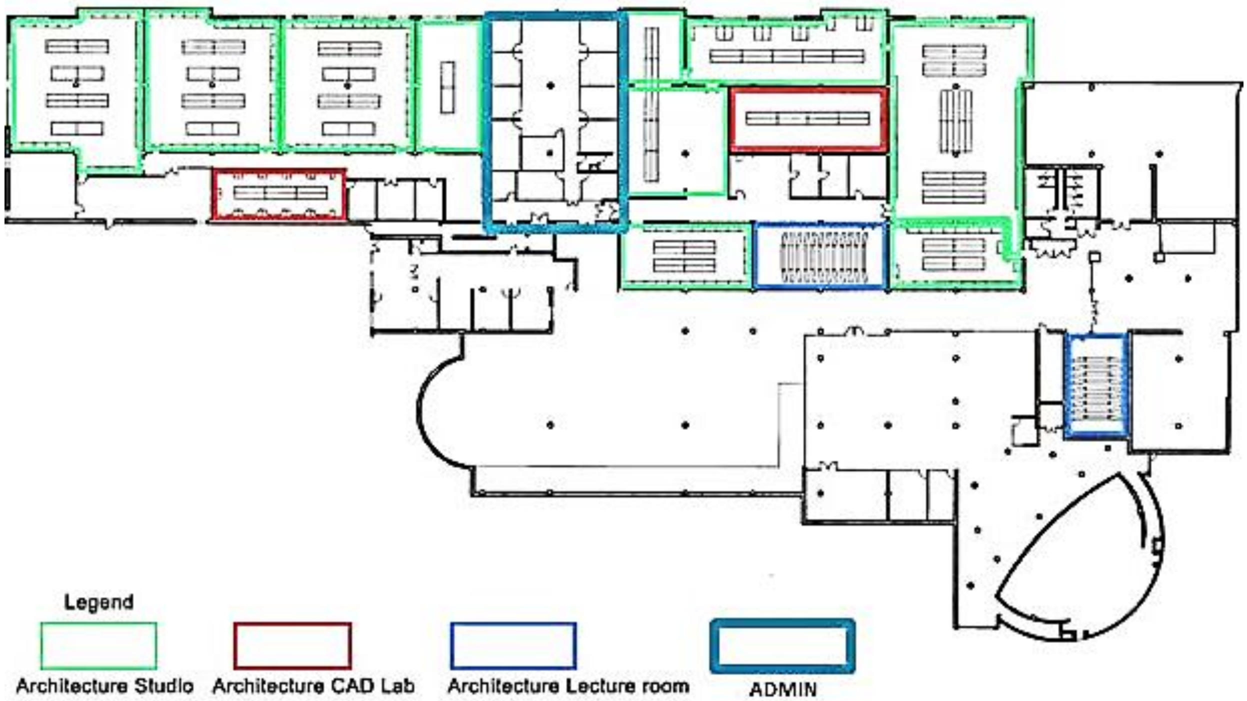


Figure 7.8. Plan of Architecture Department at UJ

Besides the lack of inter-level connection for articulation of learning, the spaces are generally unsuitable as studio spaces as the lack of natural light and ventilation severely compromises the quality of the learning environment. Furthermore, the lack of views to the outside in many studios, exclude the psychological benefits of links with nature. This all leads to the feeling of being isolated from the broader campus and society. This problem is compounded as the learning and administrative spaces cannot benefit from "incidental interaction" in semi-formal and informal spaces, largely due to the introverted and individualistic spatial typology of this school.

7.3.1.3. Relationship of the ALS to other allied learning spaces and broader campus and the impact on architectural education

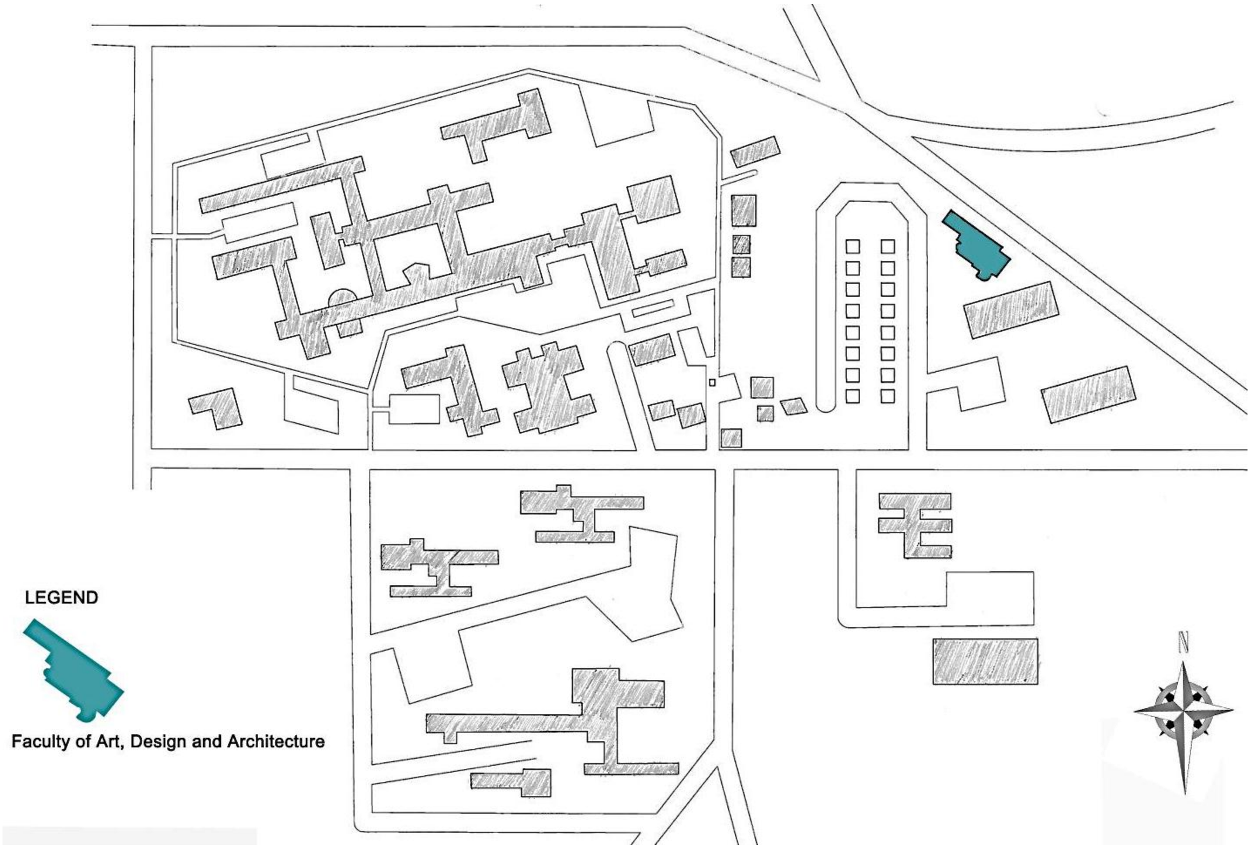


Figure 7.9. Location of Architecture Department at UJ

Figure 7.9. shows the location of the Architecture Department on the UJ campus. This department is located within the new building that houses the Faculty of Arts, Design and Architecture (FADA). The following departments are accommodated within this building: Architecture, Graphic Design, Interior Design, Industrial Design, and Jewelery Design. The engineering and built environment departments are located in another faculty on another campus. Therefore, there is no synergywith the allied built-environment departments. This is perceived as a weakness of the UJ Department of Architecture, especially given the fact the interview with Saidi (ANNEXURE G) refers to community engagement and the implementation of technology in contextually responsive architecture.

7.3.2. Nelson Mandela Metropolitan University (NMMU)

Figure 7.10. Post Graduate Architecture Studio

Figure 7.11. BTech Architecture Studio

7.3.2.1. Typology of learning spaces and impact on pedagogy

The learning spaces at NMMU generally comprise deep, square-form studio spaces with moveable furniture (Figures 7.10. & 7.11.) and are therefore conducive to a studio-based pedagogy. The post graduate architecture studio (Figure 7.10.), is typical of the studio quality at NMMU. However, furniture inherited over many years is generally heavy in weight and not easily moveable; this seriously compromises the ease of spatial re-configuration,which hinders peer group learning and collaborative break-away group learning. The studio space, however, is defined by individual student domains, very similar to the traditional *atelier* typology.

This is typical of studio spaces at the traditional universities, which are defined by individualised domains for intuitive creative work. This studio is characterised by "individualised student pods" separated by filing cabinets, which promotes the intuitive or introverted epistemology. Although the individualised workspaces are visually interconnected, there is no space for interdependence or collaborative group work within the studio. This type of studio, based on the traditional *atelier* typology, is devoid of multimedia facilities, interactive boards and other such technological devices that characterise contemporary learning environments. As such the opportunities afforded by technological devices, with particular regard to collaborative learning, have not been implemented.

The BTech studio (Figure 7.11.), on the other hand, is more akin to contemporary learning environments. Furniture is lightweight and modular, which allows for ease of reconfiguration. This in turn promotes different modes of learning such as peer group learning; a high level of collaboration and interaction is possible. The rows of parallel work stations with fixed desktop computers, however, compromises the flexibilty of the space. Note that a food and beverage preparation area is part of the studio (Figure 7.12.), which further enhances the space, especially after hours and when students work overnight.

Figure 7.12. BTech Architecture Studio – Food & Beverage area

7.3.2.2. Spatial planning and spatial relationships

The learning spaces at the NMMU school of architecture are located within a deep square footprint with the opposite external walls approximately 40m apart (Figure 7.13.). This plan configuration results in some spaces being deep with poor natural light (Figure 7.10.) while others are well lit due to their proportions and proximity to external walls (Figure 7.11.) Deep spaces that are lit by high level windows, generally only on one external wall, severely compromises the quality of natural light required for studio spaces. Furthermore, the depth of the space does not promote natural ventilation and air flow. The floor plan (Figure 7.13) illustrates the unreasonable and inadequate building floor plate proportions – discussed further below.

The BTech Studio (Figure 7.11.), on the other hand is a narrow and long space that enjoys a wall of windows to the exterior. This space is visibly brighter and defines a pleasant learning environment. Studio furniture is light and easily reconfigured. Computers are integrated with the workstations which enhances multi-media processes and interactive learning in virtual space, although the ease of reconfiguration is compromised by desktop computers.

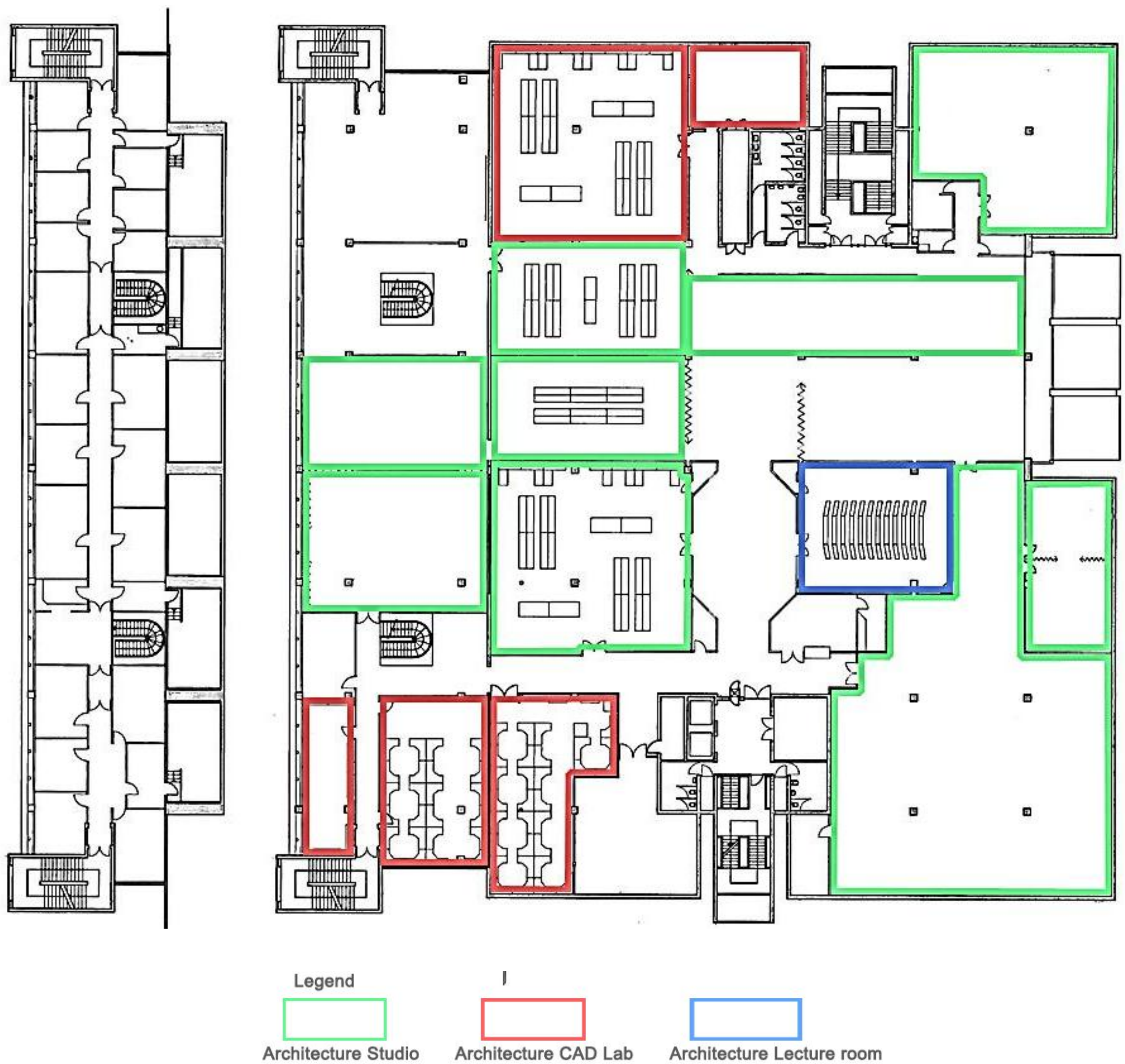


Figure 7.13. Floor Plans – NMMU Department of Architecture

The floor plan (Figure 7.13.) reveals a rigid square geometry and the consequent extensive depth/width of the floor plate which has resulted in many internal studio spaces. These spaces are not at all naturally lit or ventilated and are visually cut-off from the external landscape. This results in poor quality learning spaces, which are somewhat unstimulating and introverted.

The one advantage of the deep square form, though, is that there is a high level connectivity between different levels of study as the various learning spaces become transitionary spaces to access adjacent learning spaces.

7.3.1.3. Relationship of the ALS to other allied learning spaces and broader campus and the impact on architectural education

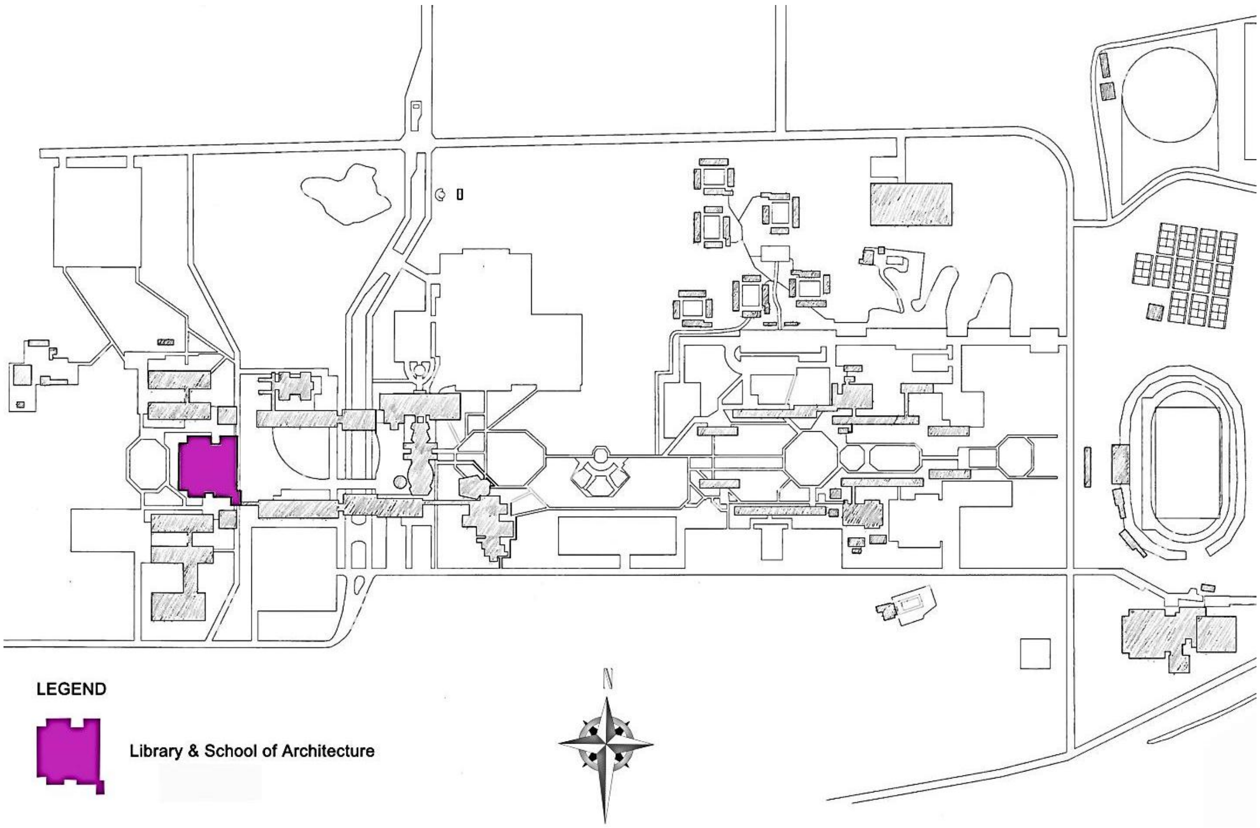


Figure 7.14. Location - NMMU Department of Architecture

The NMMU School of Architecture is located within the Faculty of Arts and, physically situated on the fourth floor of the central library building. This disconnects the school at many levels to allied disciplines including the other design departments, the built-environment departments as well as the greater university community. This severley compromises the possiblities of interdisciplinary engagement within the studio spaces. The access to the school is via a small entrance lobby about 1m below ground level and then via an enclosed elevator to the foruth floor – an intimidating approach.

7.3.3. Durban University of Technology (DUT)

7.3.3.1. Typology of learning spaces and impact on pedagogy

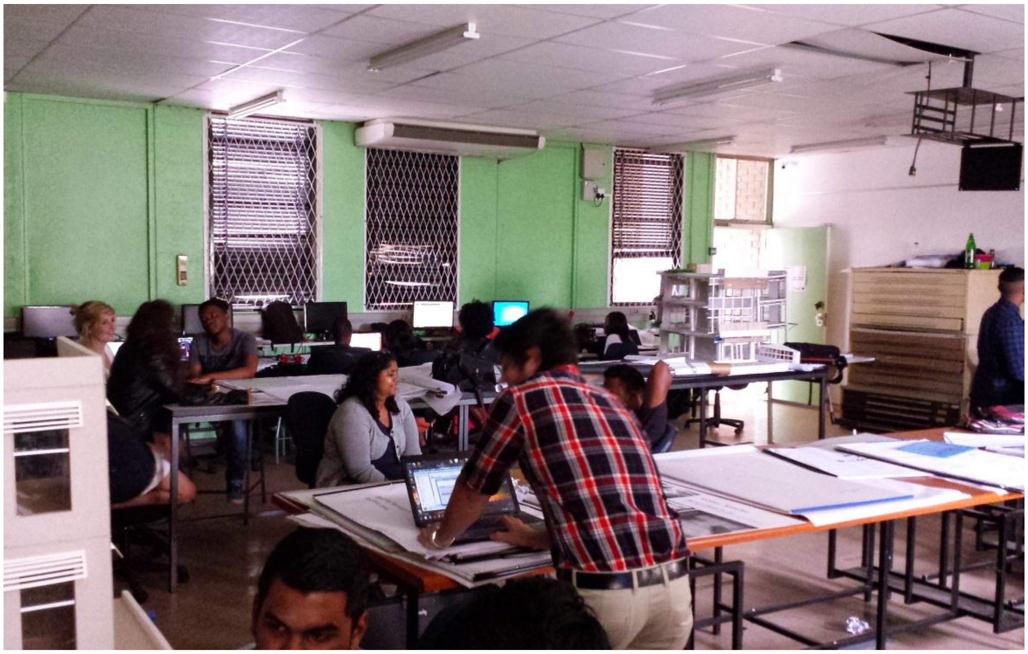


Figure 7.15. Typical Studio Space

Figure 7.16. Multimedia Lecture Room Space

Learning spaces at DUT comprise both the design studio (Figure 7.15.) as well as the teacher-centred lecture rooms (Figure 7.16.). The main focus here is on the critical analysis of the studio spaces at DUT. Studio furniture is all light weight and loose-fit, which allows for various configurations that facilitate different modes of learning. Modular work tables promote dialogue and interdependence through peer interaction and are adaptable to different configurations as may be required. These specially design modules are light weight and can easily be reconfigured to suit different purposes. The studio spaces at DUT often double-up as either seminar rooms or even lecture rooms – the modular units are easily reconfigured. This, in turn, promotes various kinds of leaning experiences ranging from independent individual work to small and large interdependent collaborative groups.

7.3.3.2. Spatial planning and spatial relationships

Figure 7.15. illustrates the multimedia lecture room, the only one at the department of architecture, which is used for formal lectures and presentations. This space is wi-fi enabled and has projection and display facilities as well. Due to the rigid layout with long fixed worktops, this space is not adaptable. The departmental seminar room, on the other hand, comprises a “loose-fit” arrangement in which light weight furniture affords the opportunity for many configurations ranging from a classroom to large seminar space to smaller workgroups within the space (Figure 7.17.).

Figure 7.17. Seminar Room

There are no longer any dedicated CAD Labs as computer stations are incorporated within the work spaces in the studios (Figure 7.15.).

The negative attribute of the overall configuration of spaces is that the different levels of studios are arranged in a cellular configuration, individually accessed from an external walkway. This arrangement hinders inter-level connectivity as the transitional space is an external walkway which also serves as a fire escape; this differs from the transitionary spatial layout of NMMU.

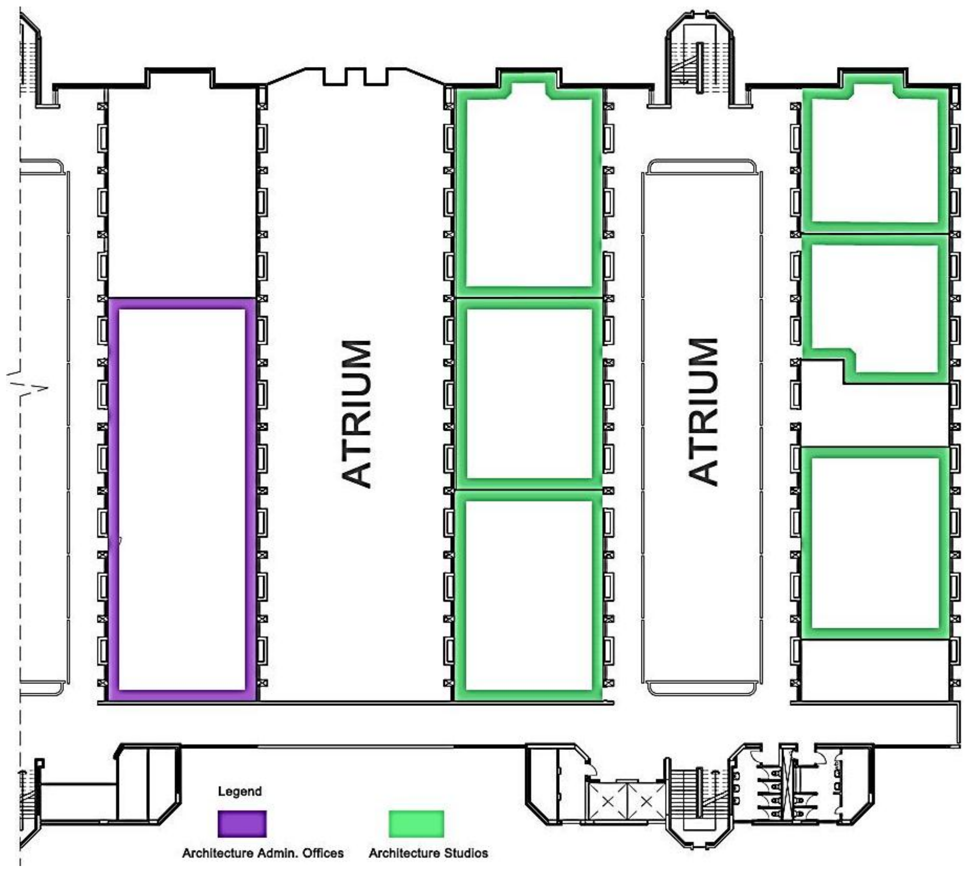


Fig 7.18. Floor Layout showing relationship of Learning Spaces to Admin.

One of the negative aspects of the school, from a pedagogic perspective, is that the admin offices of the department, which accommodates the acadademic staff, is disconnected from the studio spaces (Figure 7.18.). This compromises 'incidental interaction with staff'. Another feature of the school is that it is disconnected at different levels within the building (Figure 7.20b).

Figure 7.19. Floor Layout showing Studios

The studio spaces at DUT occur on one floor level, which allows for a greater degree of synergy between different years of study (Figure 7.19.). Note that there are no dedicated computer labs as all studios integrate computers into the studio work spaces (refer also to Figure 7.15.). The studios are all arranged along single-banked corridors (Figure 7.18. & 7.19.) with opposite walls having large windows. Natural light and ventilation, and a view to the exterior are thereby achieved in all studios. The proximity to corridors affords possibilities to extend the studio activities into the corridors as outdoor workspaces and display spaces.

The studios are all equipped with wifi and students may access electronic resources using a range of technological devices. Furthermore, movable and fixed pinboards and white boards/chalkboards and projection screens allow for easy sharing of ideas as well as for the division of space to create individual pods or domains.

7.3.1.3. Relationship of the ALS to other allied learning spaces and broader campus and the impact on architectural education

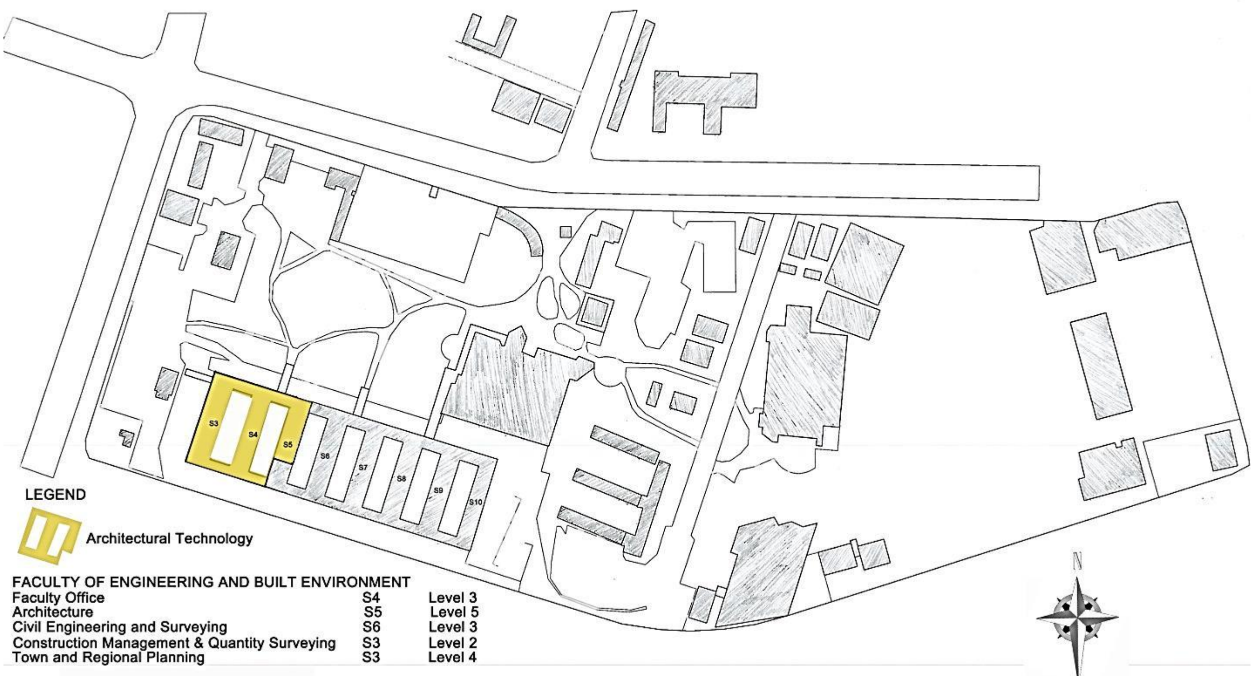


Figure 7.20a. Location - DUT Department of Architecture on campus

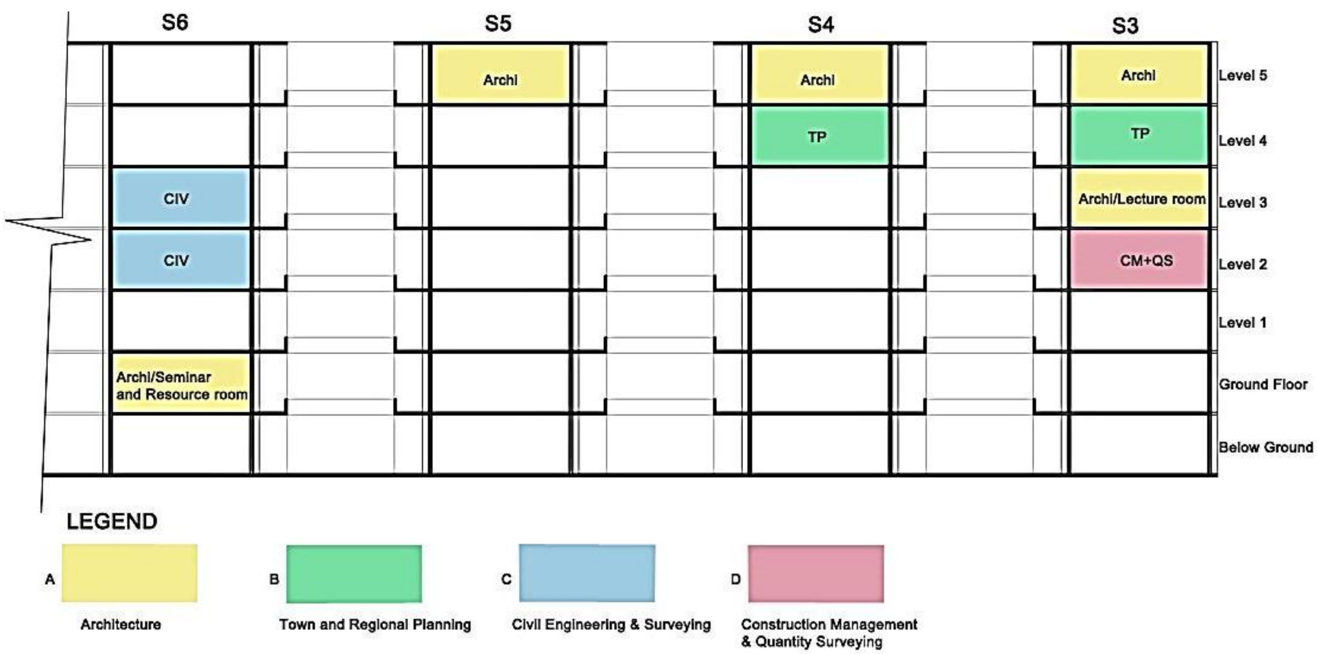


Figure 7.20b. Location - DUT Department of Architecture on campus

The Department of Architecture is located within a building that accomodates all the Engineering and Built-Environment departments (Figure 7.20a&b). Therefore, although on the one hand, the department is spread over different floor levels, it has a high level of potential for synergy and interdisciplinary collaboration with these allied departments. Furthermore, the building accomodates many of the applied sciences and technology departments which afford further opportunities for collaboration. Therefore, the seminar rooms and lecture rooms of the Department of Architecture, being spread throughout the building at different floor levels, become ‘in-between’ shared space for collaborative engagement with other disciplines.

The department is, however, disconnected from the broader campus as it is primarily located on the fifth floor. This further hinders students’ access to campus amentities such as the food court and social spaces at ground level.

7.3.4. Tshwane University of Technology (TUT)

7.3.4.1. Typology of learning spaces and impact on pedagogy

The Architecture Department at TUT is housed in a new building specifically constructed for the school. This is a completely different scenario to the three preceding cases in which the architectural learning spaces were housed in buildings that had previously accommodated other disciplines. The design of the building reflects the nature of architectural learning spaces, defined by a high level of interconnectivity of spaces. Figure 7.21. illustrates the interconnected mix of different spaces such as a studio at mezzanine level overlooking the library and lower floor circulation/display space.

Figure 7.21. Interconnected spaces

The essential difference of the architectural learning spaces at TUT is that it maximises the utilisation of volume, thus allowing for interconnectivity and flexibility in the arrangement of related spaces. Figure 7.22. shows the interrelation of three different, yet related, spaces in triple volume, namely lower foyer digital learning environment, mid-level student lounge and the studio at upper mezzanine level. This arrangement fosters incidental interaction between students at various levels of study which encourages a 'vertical studio' integrated curriculum pedagogic approach.

Figure 7.22. Interconnected spaces in triple volume

Another deliberate design feature of the building was to enhance its tectonic narrative by exposing the structure and the expression of technology and materials as well as the juxtaposition of space in three dimensions. The building hence becomes a living / organic exhibition. The possibilities for IL are therefore premium.

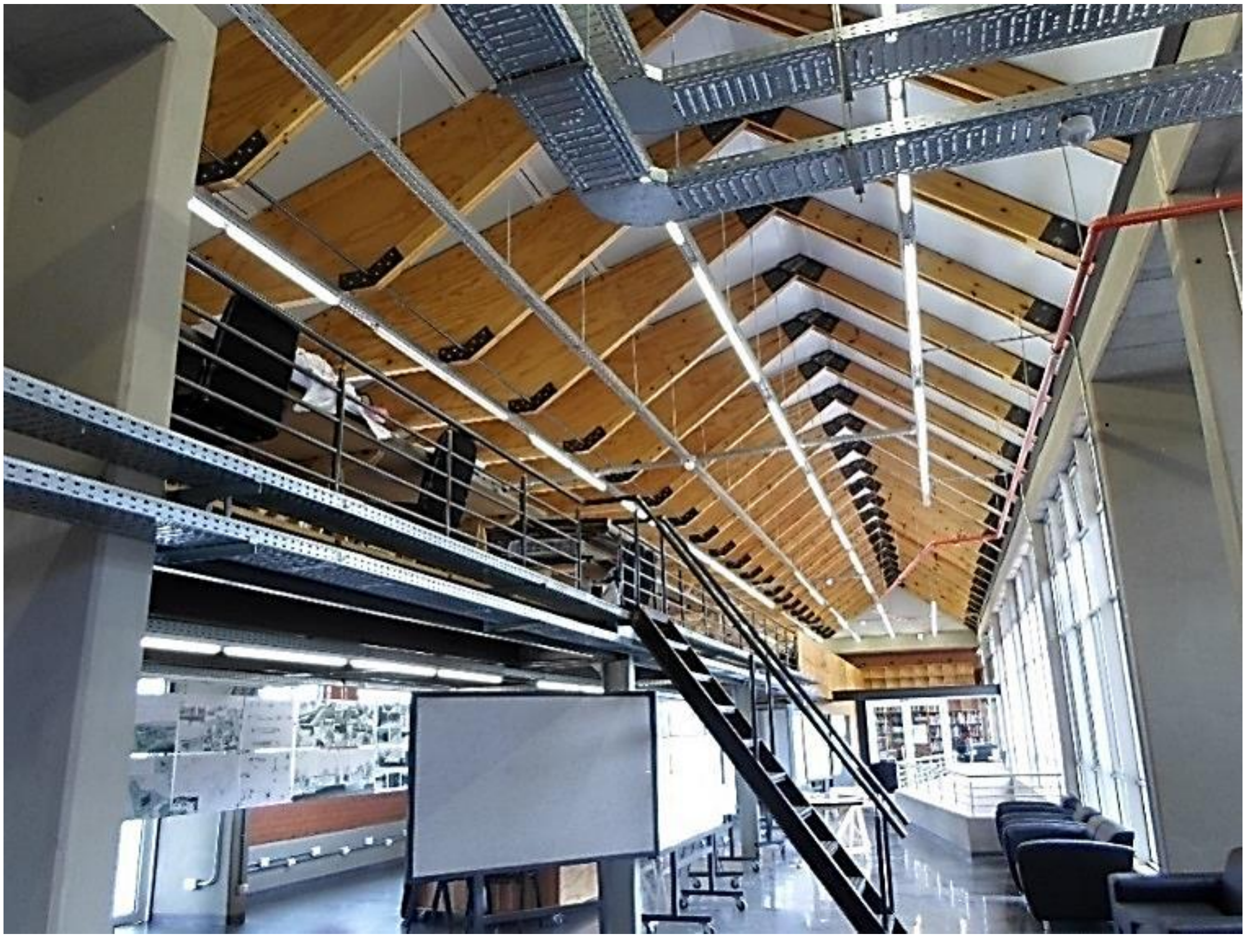


Figure 7.23. Pluralistic circulation spaces and tectonic expression

TUT is the only architecture school in South Africa that has a fully equipped digital interactive learning auditorium, which is located on the west end of the building (Figures 7.22. – 7.26.). The IT infrastructure in the space affords extensive possibilities for collaborative work within the learning space as well as via digital links to other learning environments.

This state of the art learning space will be further elaborated upon.

Figure 7.24. Interactive Virtual Learning auditorium

The possibilities offered by IT infrastructure transformed what was originally an auditorium into a Virtual Learning Auditorium affords an environment for various types of learning, including design critique. The interactive whiteboards and overhead high-focus roving cameras allow for sharing of design critique within this collaborative learning space, as well as “podcasts” to adjacent spaces and remote learning locations. The options afforded by such technology offers unlimited potential for collaborative learning.

7.3.4.2. Spatial planning and spatial relationships

The spatial configuration of this linear building is centred along a central corridor of sufficient width to be utilised for various informal functions such as exhibitions, guest lectures, awards functions, demonstrations and multimedia projections and ‘pause’space, amongst other functions. This pluralistic central spine extends upwards in multiple volume, flanked by learning spaces, staff offices, meeting rooms, relaxation pods and many other functions associated with an ALS.

Furthermore, a significant success of the design of the building is the intentional pluralistic nature of circulation and foyer spaces, such as the ‘digital pod’ in Figure 7.20. This activation of the major circulation spaces further promotes inter-level learning as well as a high level of interaction between students and staff. Figures 7.25.–7.27. illustrate the scale of pluralistic circulation spaces that connect the different specialised functional spaces. The staff offices flank the ground floor circulation space (Figure 7.25.), which afford ease of consultation and interaction between staff and students.

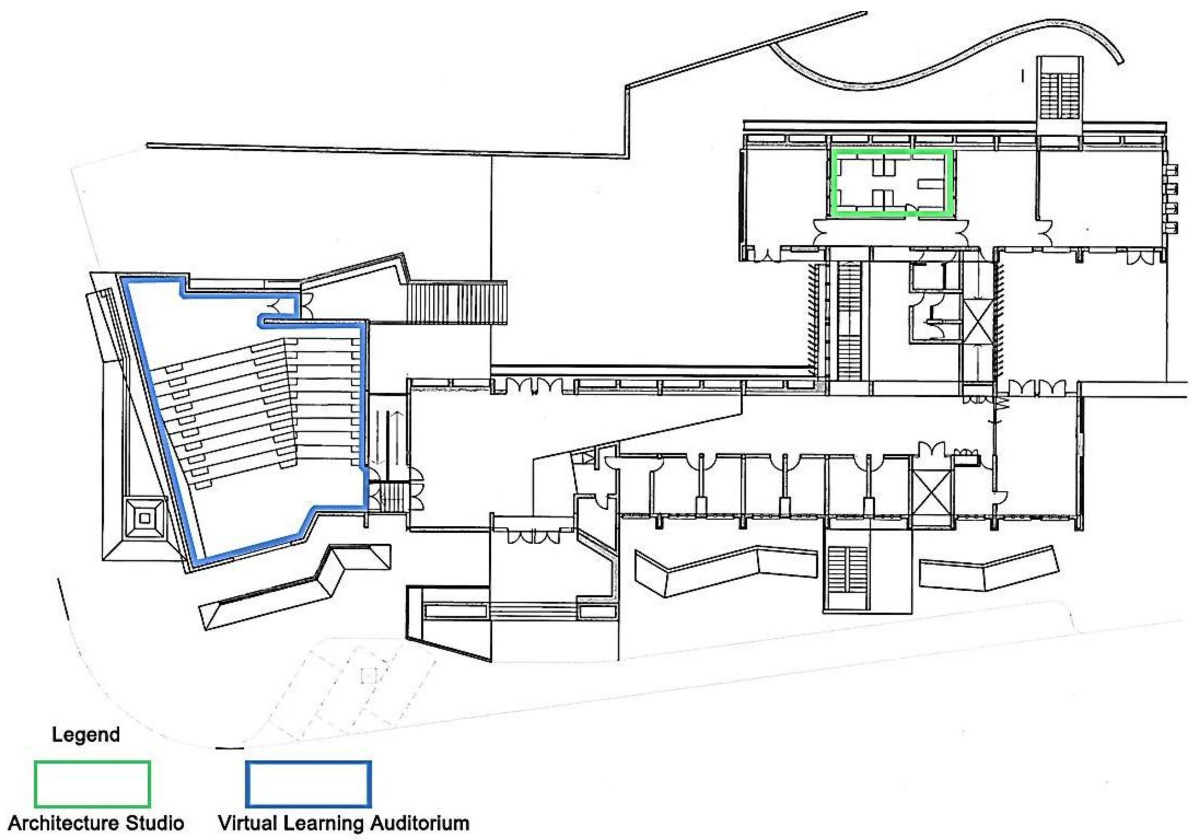


Fig 7.25. Ground Floor Plan

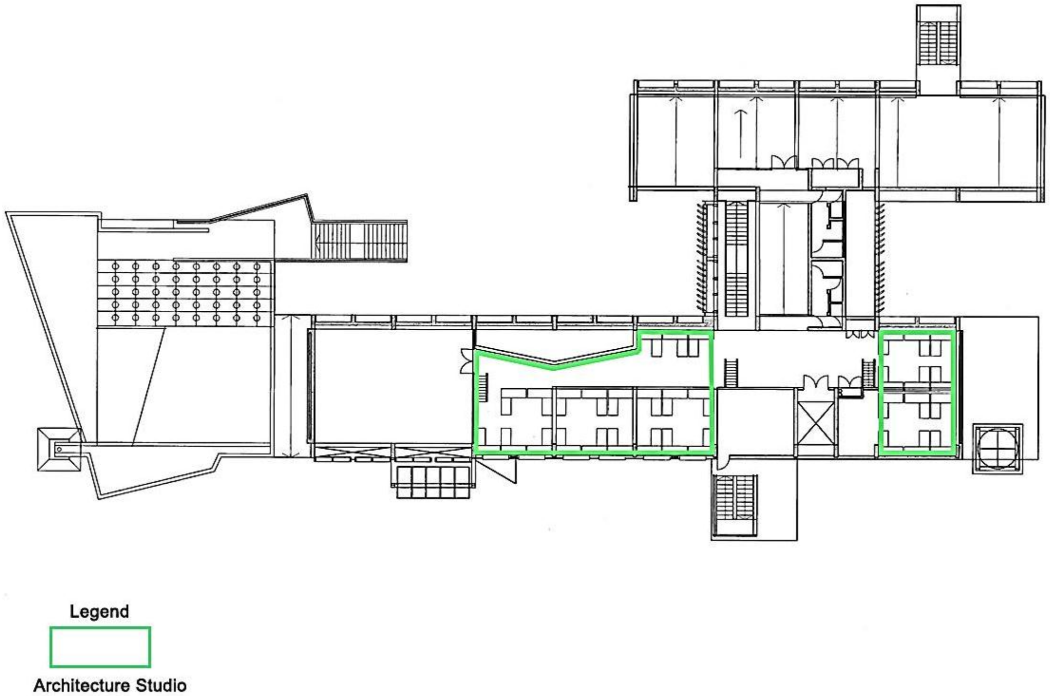


Figure 7.26. First Floor Plan

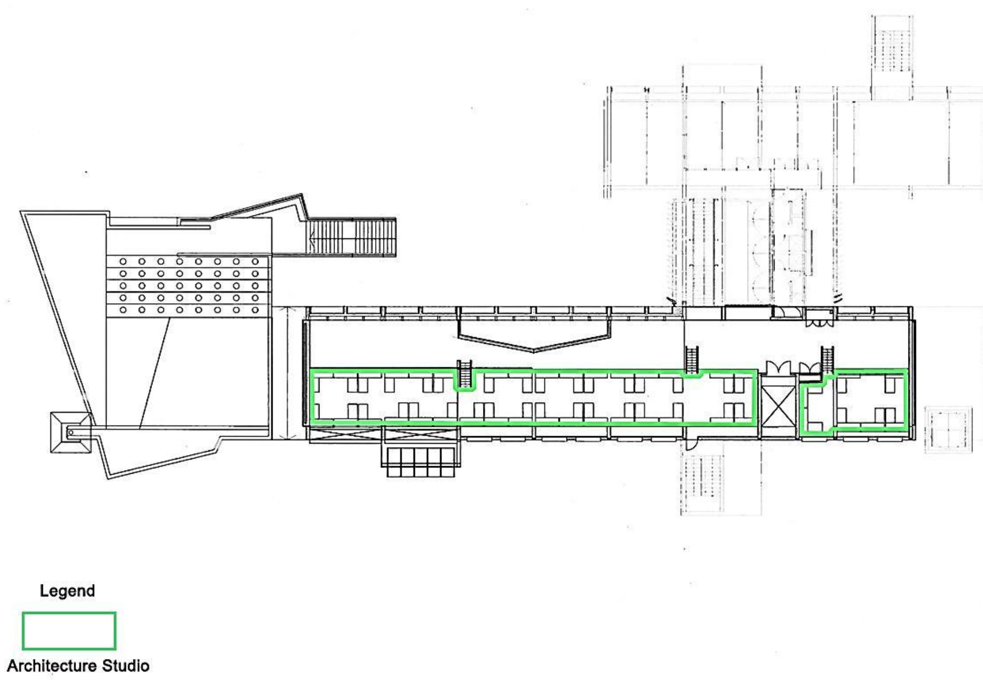


Figure 7.27. Mezzanine Floor Plan

7.3.1.3. Relationship of the ALS to other allied learning spaces and broader campus and the impact on architectural education

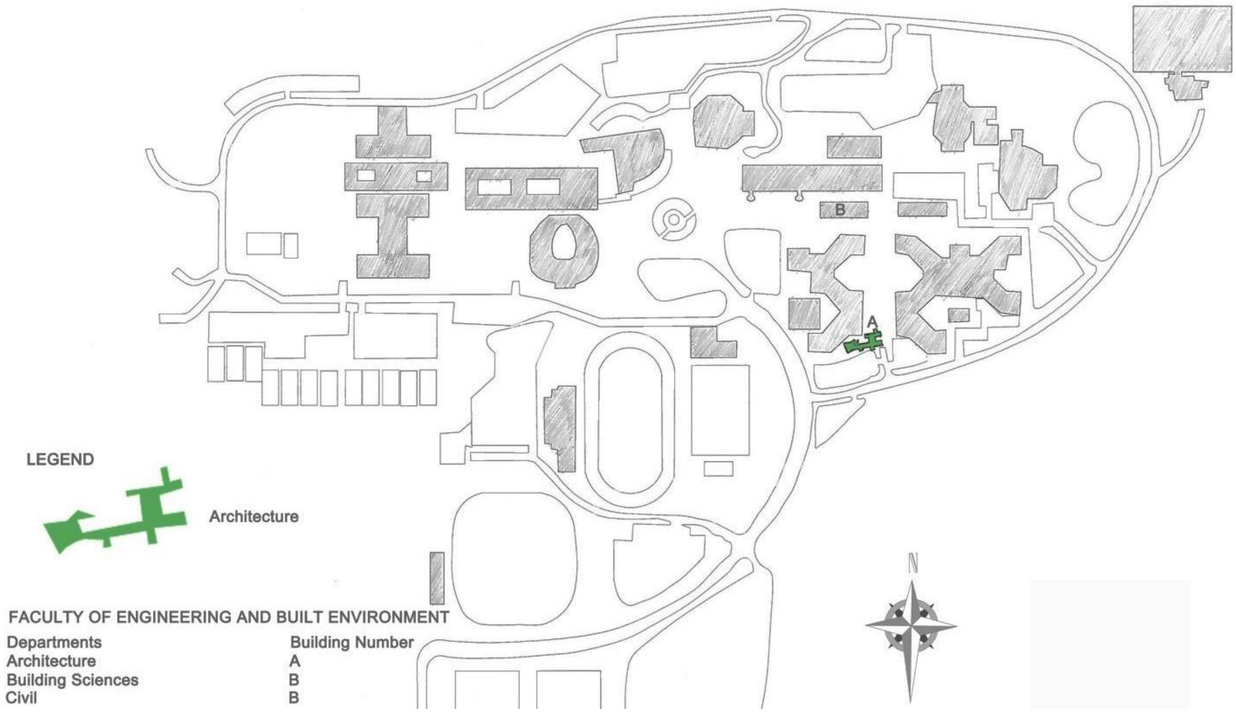


Figure 7.28. Location - TUT Department of Architecture

The location of the Department of Architecture at TUT is well positioned in close proximity to allied building science departments and engineering departments (Figure 7.28.). The potential for interdisciplinary collaboration is great. Furthermore the building is built up from ground level, which makes interaction with the broader campus relatively easy.

Of the four preceding case studies, TUT seems to be in the best position overall with regard to the quality of its learning environment. It is well facilitated and designed as a 21st century learning environment, defined by a high level of connectivity through its advanced IT infrastructure.

7.4. Comparative analysis of learning spaces at the sample Universities of Technology

This section synthesises the analyses of the individual schools in order to draw on the positive aspects of their respective learning spaces. The evaluation of each school is tabulated hereunder (Table 7.3.)

ALS	**Most pertinent features for learning space development**	**Critical Comments**
University of Johannesburg (**UJ**)	• Modular workstations – adaptable to different configurations – promotes collaborative and individual work. • Different shapes of furniture – promotes different types of learning. • Technological devices such as multimedia projection facilities and wifi – promotes interactive learning.	• Internalised/isolated studio spaces. • Lack of integration across studios. • Poor quality of natural lighting and ventilation. • Lack of break-away space for reflection. • Lack of integration of computers at studio workstations.
Nelson Mandela Metropolitan University (**NMMU**)	• Individualised domains in postgraduate studio – made possible by cabinets and screens. • Integration of computers at workstations in the BTech studio – facilitates multi-media engagement with design. • Food and beverage preparation space – alleviates the need to	• Difficult to reconfigure postgraduate studio due to the weight of furniture – compromises collaboration. • Poor quality of natural lighting and ventilation in all studios other than the BTech studio.

	leave the school, especially at night.	
Durban University of Technology (**DUT**)	• Modular tables – affords ease of reconfiguration. • Space can easily adapt to different needs, such as studio or seminar room – made possible by lightweight furniture. • Outdoor workspace and display space – afforded by adjacent circulation corridors. • Sufficient natural light and ventilation and views to the outside. • Wifi enabled studios and lecture spaces – promotes interactive learning and access to resources.	• Corridors are not wide enough to maximise the potential for outdoor work and displays. • Cellular segregation of studios and levels of study • Disconnected from social and leisure amenities.
Tshwane University of Technology (**TUT**)	• High level of interconnectivity of different types of spaces through the utilisation of volume – promotes holistic interactive learning as well as incidental learning. Easy facilitation of "vertical" integrated studio. • Pluralistic circulation spaces and foyers – affords multiple uses – sufficient width to accommodate different functions. • Staff offices flank circulation spaces and foyers – promotes	• The ease of access to faculty staff may be disruptive to staff need for "quite space". • This school is not directly linked to the allied built environment disciplines, which are housed in separate buildings.

	accessibility to faculty staff for consultation, as well as informal interaction. • Tectonic expression of structure and spatial juxtaposition – the building becomes an exhibition in itself. Aids incidental learning of technology and materials, as well as environmental influences. • IT infrastructure in auditorium – promotes a high level of collaboration and interaction in a space that would not, otherwise, facilitate such modes of learning.	

Table 7.3. Evaluation of architectural learning spaces at the sample universities

Table 7.4. summarises the preceeding discourse in order to illustrate the changing patterns of learning space development over time, co-related to the discussions in Chapter 6. The typology of space, their functions and impact on pedagogy are based on the curricula objectives, pre-transformation and post-transformation.

INSTITUTION	PRINCIPLE LEARNING SPACE: Pre-transformation	NEW PEDAGOGIC OBJECTIVES	FUNCTIONAL IMPACT ON LEARNING SPACE DEVELOPMENT: Post-transformation
UJ	Drawing Rooms with rows of fixed furniture	Exploratory design and interdisciplinary learning spaces. Collaborative learning. Virtual learning. Contextually responsive design.	Lightweight, loose-fit furniture, smartboards. Wifi. In need of informal and social learning spaces.
NMMU	Studios with heavy furniture defining individual student “pods”.	Inter-level integration and integration across programmes. Higher level of collaboration.	Lightweight, loose-fit furniture, smartboards. Wifi. In need of informal and social learning spaces.
DUT	Drawing Rooms with fixed furniture.	Greater level of project-based learning. Higher level of research. Contextually responsive design.	Lightweight, loose-fit furniture, smartboards. Wifi. In need of informal and social learning spaces.
TUT	Drawing Rooms with fixed furniture	Integration of ‘design’, ‘theory’ and ‘construction’ on projects. Collaborative learning environment, virtual learning environments.	Lightweight, loose-fit furniture, smartboards. Wifi. Technologically enhanced learning spaces. Good informal and social learning spaces.

Table 7.4. Evaluation of influence of new strategic objectives on the transformation of learning spaces at the sample ALSs.

Chapter Summary

This chapter briefly explained various aspects of learning space development by linking pedagogy to learning spaces and *vice versa*. The aspects of holistic, student-centred learning were explained, and this set out the frame of reference for the analysis of learning spaces at the sample of ALSs, as case studies. Incidental Learning (IL) is a concept that this thesis proposes as a vital constituent of a holistic learning paradigm.

The second part of the chapter focused on the critical analysis of a sample of ALS with regard to the quality of their respective learning spaces, in the form of case studies; these were to be read in conjunction with the case studies in Chapter 6. A comparative analysis of the cases critically illustrated strengths as well as areas for improvement, for each of the ALSs, as indicated in Table 7.1. The chapter concluded with an evaluation of the influences of new strategic objectives on the transformation of learning spaces at the sample ALSs.

The next chapter is a continuation of the case studies of a limited sample of ALSs, in the form of student questionnaires, in order to determine the impact of pedagogical approaches and learning space development on students. The findings will be valuable in the development of the new model in Chapter 9.

CHAPTER 8:

ANALYSIS OF STUDENT QUESTIONNAIRES

This chapter briefly examines student perceptions relating to the pedagogic approaches and learning space developments of each of the sample architectural learning sites (ALSs). This information is important to test the application of the various learning theories and learning space theories and concepts that were discussed in chapter 3, as well as the analysis of the case studies in chapters 6 & 7. This information is considered necessary in the development of an appropriate model for architectural education at universities of technology in South Africa.

8.1. Purpose of the questionnaire and selection of the population sample

A sample of three ALSs, which represent the different forms of institutions, was selected for the purpose of collecting data related to student experiences. The University of Johannesburg (UJ) represents a comprehensive university that inherited only one architecture department, that of the former Technikon Witwatersrand. The Durban University of Technology (DUT) is representative of a university of technology that inherited two different architecture departments and their respective programmes, that of the former Technikon Natal, and the ML Sultan Technikon. Nelson Mandela Metropolitan University is a comprehensive university that inherited two entirely different departments, namely the University of Port Elizabeth Department of Architecture, and the Technikon Port Elizabeth Department of Architectural Technology and Interior Design.

The student questionnaires specifically targeted students at first exit level, or those who spent at least a year at the respective ALS; this is in order to reasonably assess student experiences at the respective institutions. The questionnaires were designed such that they picked up pertinent issues that could be constructively correlated with the theoretical and conceptual framework, as well as the case studies, while being able to be completed within a time of 15-20 minutes – to improve number of responses.

The purpose of the questionnaire was to evaluate student experiences in relation to the curriculum, pedagogic approaches, learning space quality, and infrastructure of the respective ALSs. The responses will be correlated with learning, and 'learning space theories as discussed in chapters three, six and seven, in order to understand the spatial and pedagogic relationships that affect student experiences, hence learning. This analysis is vitally important to the development of an educational model that not only relies on theories and philosophies, but crucially on student needs. In this way a holistic, learner-centred model will be developed.

8.2. Methodology of data collection and data analysis

The relevant questionnaires were emailed to the students via the Heads of the respective ALSs. The students had a period of two weeks in which to return the questionnaires. All questionnaires, per ALS, were collated and ranked according to the level of study. These questionnaires formed the basis for informal interviews with students during the subsequent site visits to the ALSs.

The questionnaire comprises three parts (Figure 8.1.). The first part - questions 1-10, refers to teaching, learning and research; the second part - questions 11-22 examines responses to learning space quality, and the third part, questions - 23-26 refers to financing. All these areas of focus are vital to the development and very importantly, the implementation and modes of delivery of the proposed new education model for architectural education.

The 'teaching, learning and research' section of the questionnaire is necessary in order to determine the relevance of the curriculum, as perceived by students and to determine the pedagogic approaches of each sample ALS, which are either 'learner-centred' or 'teacher-driven'. This section of the questionnaire therefore correlates with chapter 3 which focused on learning theories and pedagogic approaches.

The 'learning spaces' section of the questionnaire deals with various aspects of a learner-centred learning environment. The questions probe issues related to human comfort, access to resources, infrastructure and the facilitation of collaborative learning and social interaction. This relates to learning theories as well as the spatial impact on pedagogic approaches. The incorporation of technological devices in learning also forms a significant part of this section with reference to the development of 21st century technology enabled and participatory learning environments.

The third part of the questionnaire relates to financing and funding of the respective students' studies. This is important to transformation of architectural education, in the South African context. The data captured will be analysed in order to gauge the financial commitments of the sample of students, in order to assess whether the current architectural education model is able to accommodate these challenges, and how the implementation and delivery of the proposed new model may be more accommodating and responsive to the financial challenges of students.

The following section outlines the methodology of data capturing and the illustration of such data to ease reading thereof.

8.2.1. Sample of the Questionnaire

QUESTIONNAIRE to Students

PhD Research Title: The transformation of architectural pedagogy and learning space development towards a new model for architectural education at Universities of Technology in South Africa.

Researcher's Contact Details: Mr Yashaen Luckan, Email: yashaen.ylarch.luckan@gmail.com,

Name of School ....

Degree / Diploma:……………………………………………………..Level of study (eg 2nd year):……

Note: Tick the relevant box. Rating between 1 – 5 1 = strongly disagree & 5 = strongly agree

Research Question	1	2	3	4	5
Teaching, Learning and Research					
1. Do you generally find the coursework relevant?					
2. Are you encouraged to express your own ideas or state your own observations?					
3. Are your lecturers supportive of your own interpretation of project problems?					
4. Are you encouraged to discuss ideas with your colleagues?					
5. Is debate and academic argument encouraged by your lecturer?					
6. Do you learn from project critique / portfolio assessment?					
7. Do you generally feel confident after project critique / portfolio assessment?					
8. Do you have prescribed textbooks?					
9. Are you issued with lecture notes for most of your subjects?					
10. Are you expected to find information on subject matter on your own?					
Learning Spaces					
11. Are your classrooms / studios thermally comfortable?					
12. Is there enough natural light in the studio for project work and presentation?					
13. Do your classrooms / studios make discussion and group interaction easy?					
14. Can classroom / studio furniture be easily rearranged?					
15. Do you have access to computers in your studio?					
16. Do you have to use a separate lab to do CAD drawings?					
17. Do you use electronic learning management systems such as "blackboard"?					
18. Are you able to access coursework electronically?					
19. Are you able to access coursework from remote locations?					
20. Can you share ideas and notes / drawings electronically when off campus?					
21. Do you prefer to present projects in electronic format?					
22. Is it easy to access breakaway social spaces?					
Financing					
23. Do you work part time?					
24. Do you fund your own studies?					
25. Would you prefer to attend evening part time classes?					
26. Do you have any dependents?					

Thank you for taking the time to fill in this questionnaire.

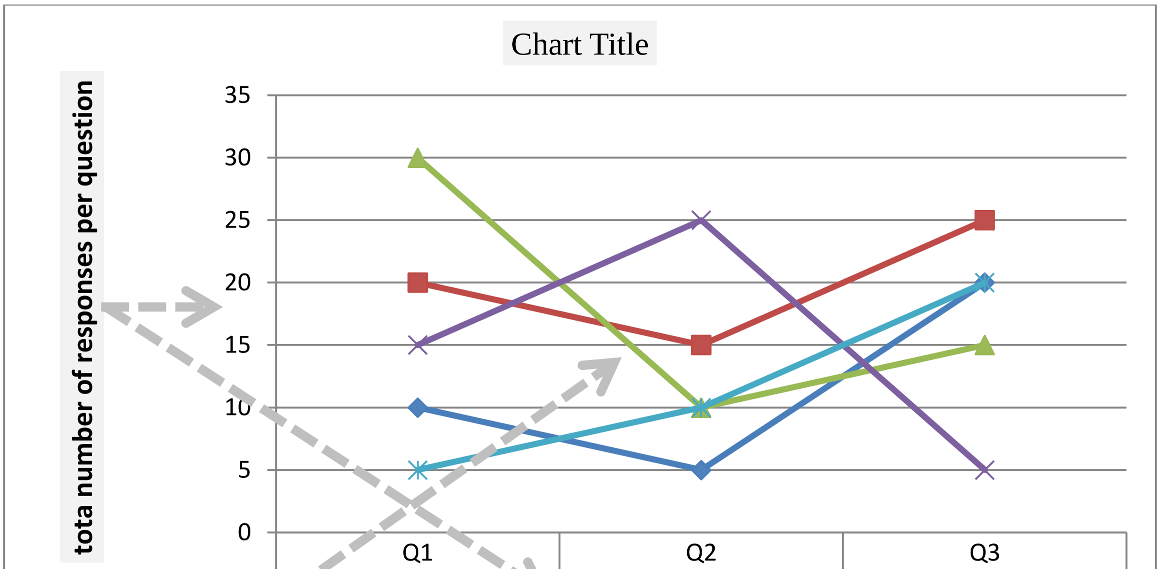
Yashaen Luckan (PhD Candidate)

Figure 8.1. Sample of blank student questionnaire

8.2.2. Method of data capturing

The sample of students filled in questionnaires in hardcopy, which were then emailed back to the author – refer to ANNEXURE M. This information was collated and electronically transferred onto spreadsheets, upon which the respective graphs were generated– refer to Figures 8.3. – 8.11. below, to ease reading and interpretation of data.

A combined spreadsheet and corresponding graph has been developed for each ALS. The extreme left column of the spread sheet (Figures 8.3 - 8.11) correlates with the respective question numbers on the questionnaire. The second row from the top reflects the student, each denoted by a number as all respondents were anonymous. The rest of the cells in the spreadsheet indicate the rating score from 1 to 5, for each respective question, based on the entire sample cohort of students per ALS.



	Q1	Q2	Q3
Rating Score 1	10	5	20
Rating Score 2	20	15	25
Rating Score 3	30	10	15
Rating Score 4	15	25	5
Rating Score 5	5	10	20

Figure 8.2. Example of ‘generic’ combined spreadsheet and graph (Author 2014)

Figure 8.2. illustrates the method of data capturing on a ‘generic’ sample of the combined spreadsheet and graph.

8.2.3 Method of data analysis

Data is analysed using quantitative and qualitative methods. The quantitative method analyses rating scores, 1-5, as per the questionnaire, in order to illustrate the range of responses; this will be used to determine a general average response per question. The rating scores are to be interpreted as follows:

- A Rating Score of 1 – 2 reflects a strong disagreement with the respective question
- A Rating Score of 3 reflects a neutral response, which suggests either a level of uncertainty, as in Question 1, for example. A Rating Score of 3 may also indicate that a certain event or condition may occur occasionally, not regularly, for example, as in Question 23 which relates to part time work.

A quantitative method of analysis is used to determine the average tendencies of the cohort of student responses per question, which is useful in determining the preferences and requirements of students in general.

Readings of the spreadsheets and graphs will be further subjected to qualitative analysis that will take into consideration other factors such as context and resourcing pertaining to the respective ALSs, and certain intrinsic factors that are not evident in numeric data. Qualitative analysis will also refer to the previous theoretical discussions on pedagogy and learning space development, as well information obtained from case studies and interviews, in order to achieve an in-depth understanding of the responses to the various questions.

The first part of the data analysis process will be specific to each ALS and thereafter, a qualitative comparative analysis will be done in order to formulate a general understanding of student experiences. This will be co-related to pedagogic theories and learning space theories, which will all be critically analysed and synthesised in order to develop the new model for architectural education in the following chapter. The chapter will conclude in the form of a critical comparative analysis of the three ALSs in order to extract the elements and components that will be factored in the development of the new model for architectural education at universities of technology in South Africa.

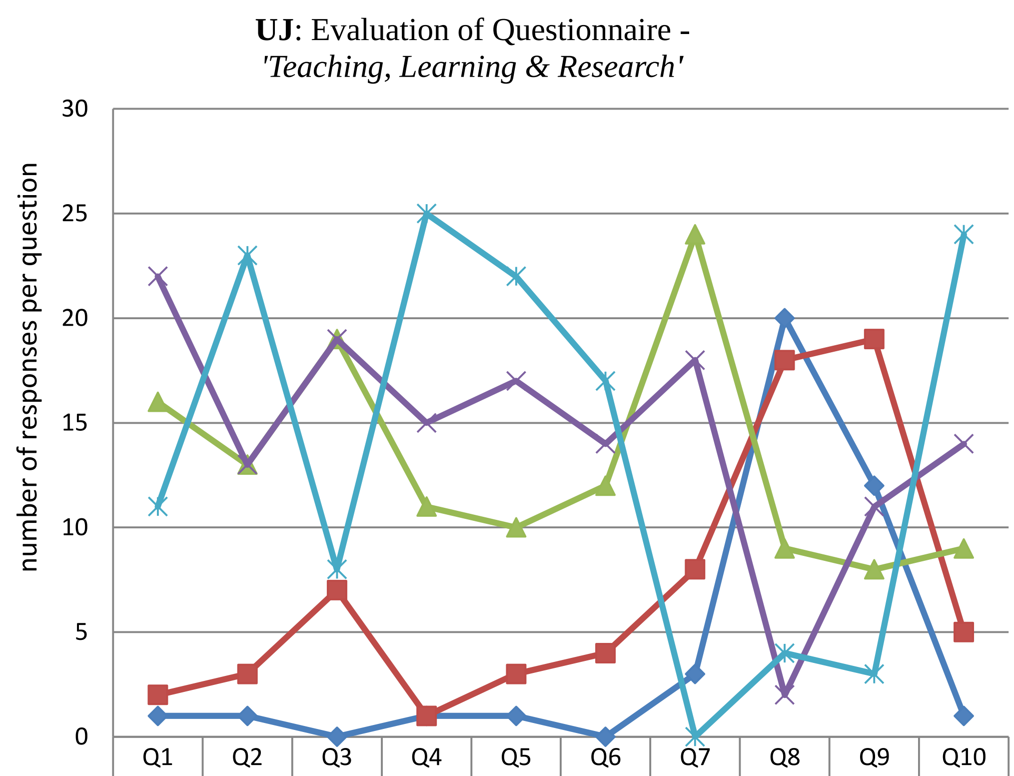
8.3. Analysis of questionnaires per ALS

8.3.1. University of Johannesburg (UJ)

Number of completed questionnaires received: 53

Number of undergraduate exit level students: 51

Number of postgraduate exit level students: 2



	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Rating Score 1	1	1	0	1	1	0	3	20	12	1
Rating Score 2	2	3	7	1	3	4	8	18	19	5
Rating Score 3	16	13	19	11	10	12	24	9	8	9
Rating Score 4	22	13	19	15	17	14	18	2	11	14
Rating Score 5	11	23	8	25	22	17	0	4	3	24

Figure 8.3. Evaluation of part questionnaire 'Teaching, Learning and Research', UJ

Analysis

Q1: Relevance of curriculum

62% of the responses were at rating level 4-5, a strong indication that the curriculum is generally seen to be relevant, while 30% of the respondents were not certain.

Q2 & 3: ‘Active learning’

While 68% of the responses, at a score level of 4-5, in Q2 are a strong indication that students are encouraged to express their ideas and observations, only 51% felt that their lecturers supported their ideas or interpretations of the problem. This is an indication that either students do not properly articulate their views or that the lecturers may have pre-conceived ideas about the projects, which compromise their ability to evaluate the students’ intentions in an objective manner. This is problematic as, while a student is encouraged to express him/herself (Q2), on the other hand, his/her input is not supported (Q3). As a consequence, the self-efficacy beliefs of such student may be negatively affected, which could lead to a solution or response based on what the lecturer is perceived to be expecting.

Q4 & 5: ‘Constructivist learning mode’

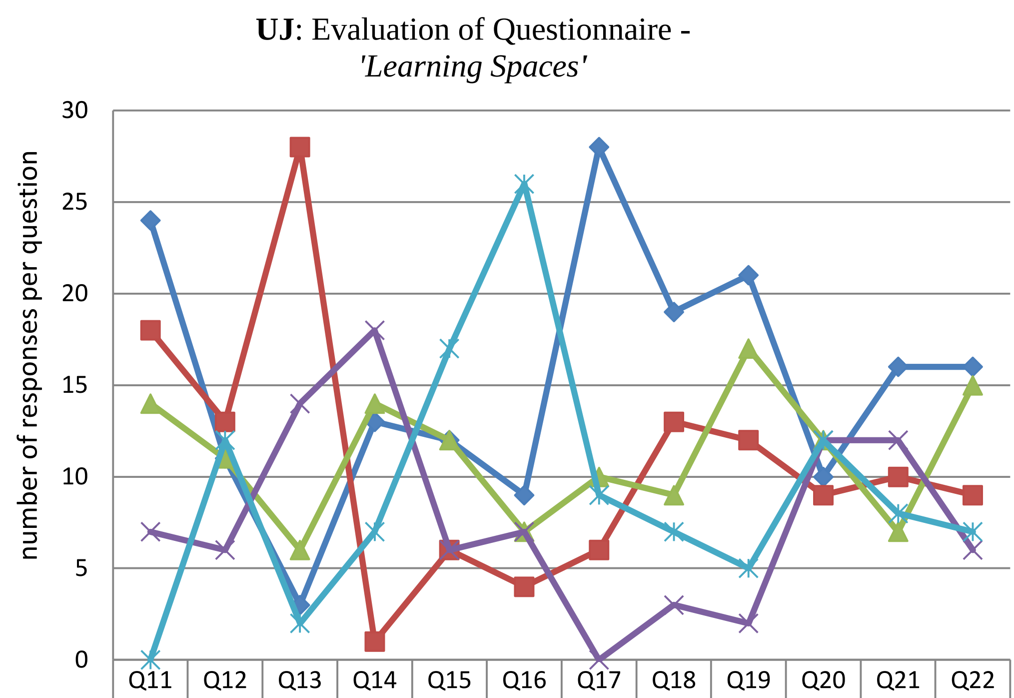
The students scored highly, 75% for both questions Q4 and Q5, indicating that the construction of meaning and design responses through social collaboration was encouraged; this is consistent with the findings in Q2.

Q6 & 7: Portfolio and critique

58% of the responses, at level 4-5, in Q6 is a good indication that portfolio and critique were considered as effective for learning. The response in Q7 however indicates that there is a high level of uncertainty regarding students’ confidence after portfolio evaluation or critique; this relates to the Q3, where students feel that their ideas and interpretations are not supported by lecturers.

Q8, 9 & 10: Independent studies and research

As expected, the response to Q8 was 72% on a low rating score 1-2, as prescribed text books are not common in architectural education, especially at the higher levels of study. Q9 also scored low, indicating that notes are not issued for most subject modules. Q10, 72% at score level 4-5, indicates that a high level of independent studies and research is required of the students; this is in line with the general nature of architectural education, being project / problem-based.



	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22
Rating Score 1	24	11	3	13	12	9	28	19	21	10	16	16
Rating Score 2	18	13	28	1	6	4	6	13	12	9	10	9
Rating Score 3	14	11	6	14	12	7	10	9	17	12	7	15
Rating Score 4	7	6	14	18	6	7	0	3	2	12	12	6
Rating Score 5	0	12	2	7	17	26	9	7	5	12	8	7

Figure 8.4. Evaluation of part questionnaire 'Learning Spaces', UJ

Analysis

Q11 & 12: Human comfort

Approximately 60% of responses at a low score level of 1-2, indicates a high level of discomfort in the studios, both thermally with regard to the quality of natural light. This is consistent with the discussion of learning space development pertaining to the case study of UJ in chapter seven.

Q13 & 14: 'Flexible space' and collaboration

Q13 reveals that 53% responses were at score level 1-2, indicating that students did not consider their learning spaces to be conducive to social collaboration and participation; only 30% of responses were in the 4-5 score range. Q14 indicates that 47% found the spaces to be easily reconfigured, while 26% were uncertain. This finding contradicts the assumption in chapter 7 that the studio spaces at UJ were conducive to collaborative learning, based purely on the analysis of the spatial layout and type of furniture in the studios. This is an indication that the potential that exists in the space and that is afforded by the type of furniture has not been realised at the ALS.

Q15 & 16: Computers and software

Q15 indicates that there is a relatively balanced response as there is no significant different between the lower rating scores, about 33% at score levels 1-2, and the higher level response at 43% for score levels 4-5. It may therefore be assumed that not all studio spaces are equipped with computers. Furthermore, Q16 shows a 63% response at score level 4-5 as the majority of the sample of students is required to use separate CAD labs. This is confirmed by the learning space analysis in chapter 7, which shows dedicated CAD labs as spaces for production of drawings, especially for the lower levels of study.

Q17 -19: 'Technology-enabled' learning environment

An average combined response for these three questions, of 62%, at a low score level of 1-2 indicates that the electronic or virtual learning environment afforded by advances in IT, has not been well implemented at the ALS. Access to electronic sources and the possibilities of interaction in virtual space, have therefore been missed.

Q20: 'Technology-enabled' learning environment

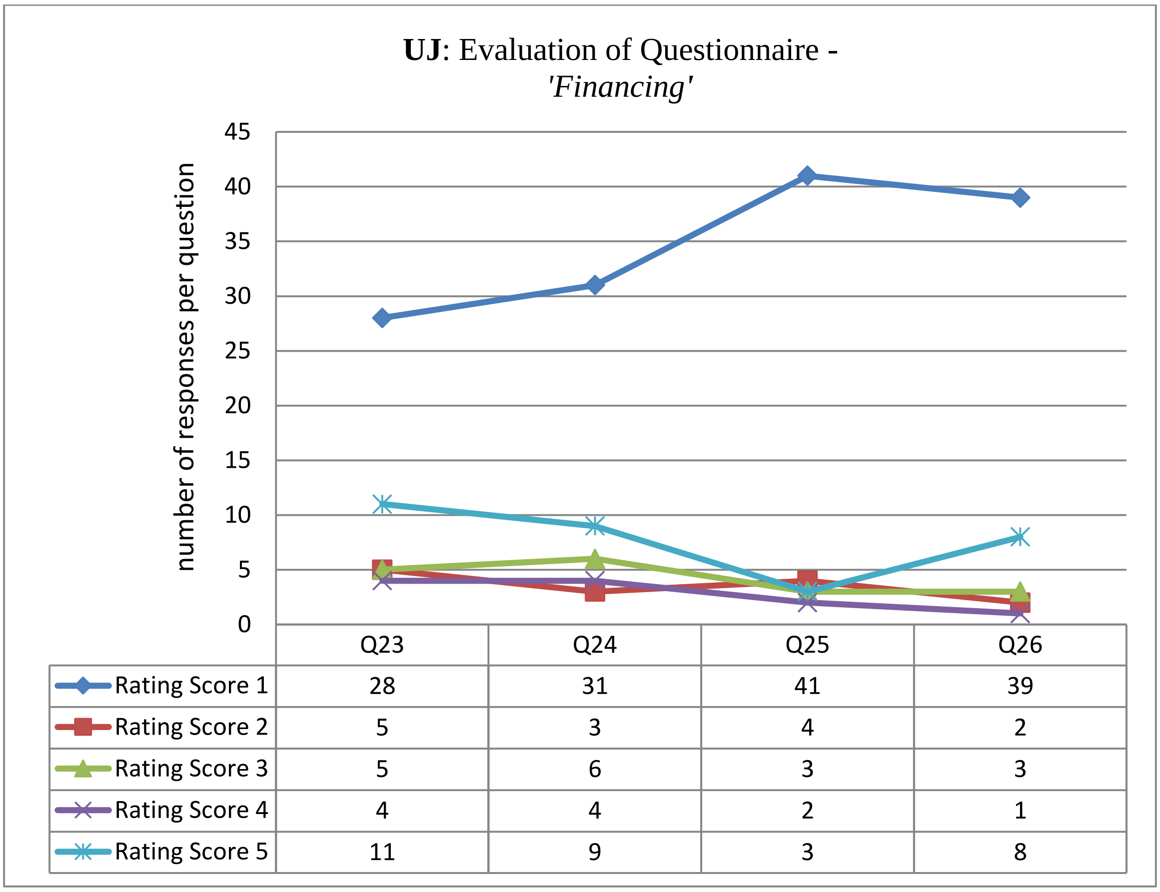
A score of 45% at level 4-5 and 36% at level 1-2 indicates that there is a balanced response regarding the access to collaboration using digital platforms for sharing ideas and drawings. This may be an indication that students have different means and resources, which affects their accessibility to electronic platforms for collaboration.

Q21: 'Technology-enabled' presentation

Q21 shows a 38% response at level 4-5 and a 68% response at level 1-2, which indicates that the majority of the sample is not in favour of electronic submission of projects.

Q22:

The responses reveal that there is a serious lack of access to social and break-away spaces as, only 25% of the responses were in the score level 4-5, while 47% were in the low score range 1-2.



	Q23	Q24	Q25	Q26
Rating Score 1	28	31	41	39
Rating Score 2	5	3	4	2
Rating Score 3	5	6	3	3
Rating Score 4	4	4	2	1
Rating Score 5	11	9	3	8

Figure 8.5. Evaluation of part questionnaire ‘Financing’, UJ

Q23 - 26: Financing

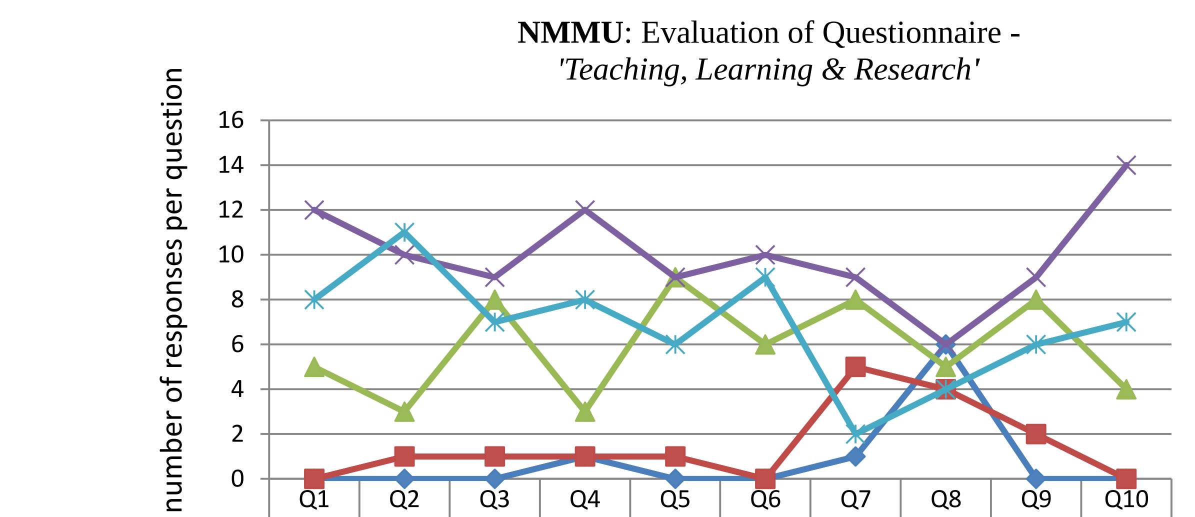
The responses indicate that most students are not self-funded, nor have dependents and are therefore not favourable to night or part-time studies. 66% of the responses fall within this category, at score level 1-2. However, 20% are self-funded or need to work part-time to fund their studies, and most of this group have dependents to support. 20%, in this regard, represents a significant proportion of students that face financial challenges.

8.3.2. Nelson Mandela Metropolitan University (NMMU)

Number of completed questionnaires received: 25

Number of undergraduate exit level students: 19

Number of postgraduate exit level students: 6



	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Rating Score 1	0	0	0	1	0	0	1	6	0	0
Rating Score 2	0	1	1	1	1	0	5	4	2	0
Rating Score 3	5	3	8	3	9	6	8	5	8	4
Rating Score 4	12	10	9	12	9	10	9	6	9	14
Rating Score 5	8	11	7	8	6	9	2	4	6	7

Figure 8.6. Evaluation of part questionnaire 'Teaching, Learning and Research', NMMU

<u>Analysis</u>

Q1: Relevance of curriculum

80% of the responses were at rating level 4-5, a strong indication that the curriculum is relevant, while 20% of the respondents were not certain.

Q2 & 3: 'Active learning'

80% of the responses were in the high score range 4-5 for Q2 and Q3, which indicates that students are encouraged to express their ideas, interpretations and observations, while also being supported by lecturers in this regard. This suggests a strong 'active learning' pedagogic approach, and in which students' self-efficacy beliefs are developed.

Q4 & 5: ‘Constructivist learning mode’

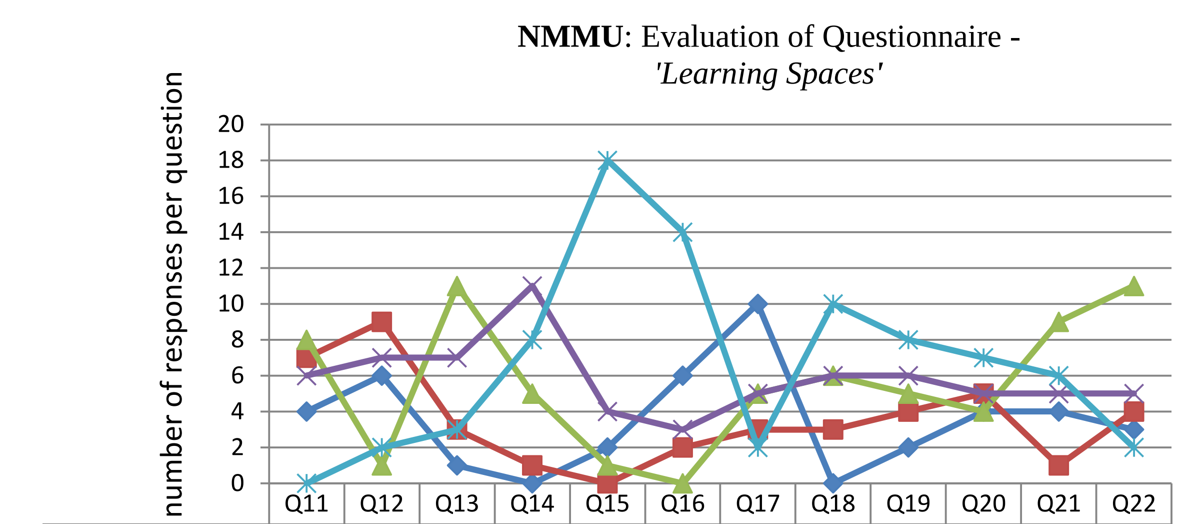
The students scored highly, 80% in Q4, and 60% in Q5. This indicates a strong focus on developing solutions and proposals to design problems through the construction of solutions based on social collaboration. This supports the interpretation of data in Q3 & 2.

Q6 & 7: Portfolio and critique

80% of the responses in Q6 were in strong agreement that portfolio and critique were effective for student learning. The response in Q7 however indicates only 44% of students feeling confident after a critique or portfolio session, 20% feeling less confident at a score of 1-2, and 32% not certain. This may be an indication that portfolio assessment and project needs revision in order to build on the strengths of Q2 –Q5.

Q8, 9 & 10: Independent studies and research

These questions examine the degree of independent studies or research in the curriculum. Q8 indicates that there is an exact same number of responses at 40% on the high score level of 4-5 as well as on level 1-2. This may be due to a misinterpretation of the question or incorrect scoring. Q9, scored much higher at 60% on score level 4-5, indicating that lecture notes are issued in a significant number of subject modules. Q10, at 80% on score level 4-5, indicates that a high level of independent studies and research is required of the students; this is in line with the general nature of architectural education, being project / problem-based.



	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22
Rating Score 1	4	6	1	0	2	6	10	0	2	4	4	3
Rating Score 2	7	9	3	1	0	2	3	3	4	5	1	4
Rating Score 3	8	1	11	5	1	0	5	6	5	4	9	11
Rating Score 4	6	7	7	11	4	3	5	6	6	5	5	5
Rating Score 5	0	2	3	8	18	14	2	10	8	7	6	2

Figure 8.7. Evaluation of part questionnaire ‘Learning Spaces’, NMMU

<u>Analysis</u>

Q11 & 12: Human comfort

44% of responses at score levels 1-2, and 32% at level 3, is indicative of a high level of thermal discomfort in the studios. A score of 60% at level 1-2 indicates a poor quality of natural light in most of the studio spaces. This is congruent with the analysis of the NMMU learning spaces as discussed in chapter seven.

Q13 & 14: ‘Flexible space’ and collaboration

Q13 reveals that 40% of responses were at score level 4-5 while 44% was at level 3, which indicates that the learning spaces were considered to be conducive to collaboration and participatory learning. Q14 indicates that 80% of respondents found the spaces to be easily reconfigured. These factors combined, strongly support the constructivist pedagogic approach as indicated in Q4 &5.

Q15 & 16: Computers and software

Q15 reveals 88% responses at score level 4-5, which indicates that most students had access to computers in the studios. Q16 however reveals that 68% of the respondents indicated that they had to use separate CAD labs. This most probably is due to misinterpretation of the question or incorrect scoring. The survey of learning spaces in chapter seven confirms that there were dedicated CAD labs in the school, as well as computers in the studios, especially at higher levels of study.

Q17 -19: 'Technology-enabled' learning environment

Q17 shows that 52% of responses were at score level 1-2, indicating that they do not use an Electronic Learning Management System, while 20%, at score level 3, used such system occasionally. Q18 indicates 64% of responses at score 4-5, which suggests that electronic resources are readily accessible. Q19 indicates that 56% of respondents find easy access to coursework from remote locations, while 24% cannot easily access courseware from remote locations; this may be due to a lack of resources on the part of the student.

Q20: 'Technology-enabled' learning environment

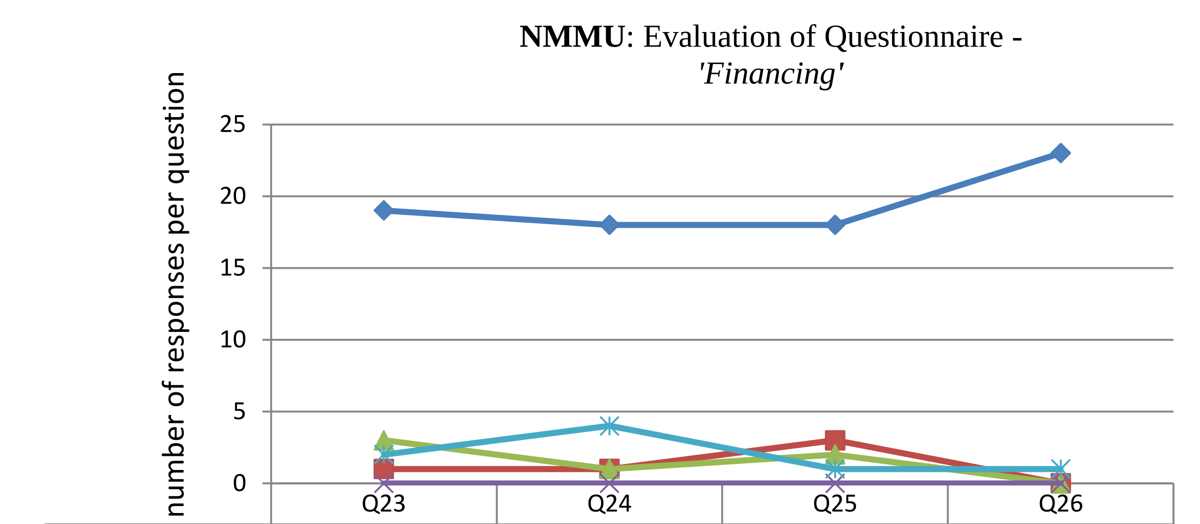
A score of 48% at level 4-5 and 36% at level 1-2 indicates that there is a balanced response regarding the access to collaboration using digital platforms for sharing ideas and drawings. This may be an indication that students have different means and resources, which affects their accessibility to electronic platforms for collaboration.

Q21: 'Technology-enabled' presentation

A 44% response at score level 4-5, compared to 20% at level 1-2, indicates that students generally prefer project submissions in electronic format.

Q22:

There is generally a mixed response to the issue of access to social and break-away spaces as 28% of the responses were in the score level 4-5 and 28% were in the low score range 1-2; the balance of 44% being uncertain.



	Q23	Q24	Q25	Q26
Rating Score 1	19	18	18	23
Rating Score 2	1	1	3	0
Rating Score 3	3	1	2	0
Rating Score 4	0	0	0	0
Rating Score 5	2	4	1	1

Figure 8.8. Evaluation of part questionnaire 'Financing', NMMU

Q23 - 26: Financing

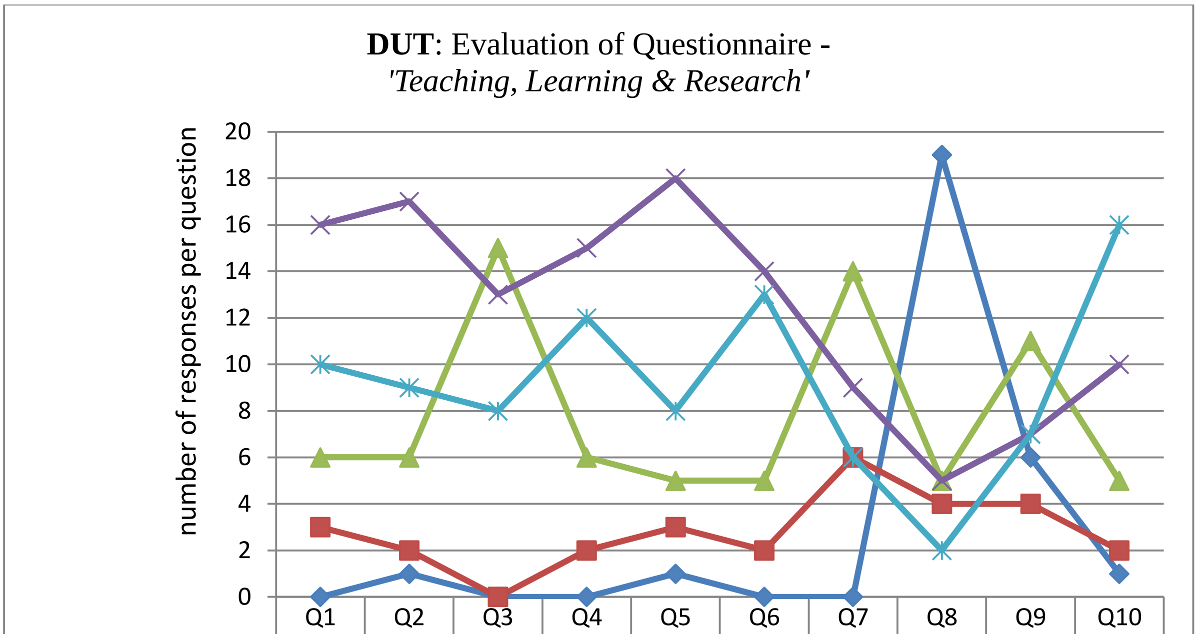
The data reveals that most students are not self-funded, nor have dependents and therefore are not favourable to night or part-time studies; 78% of the responses fall within this category, at score level 1-2. 8% are self-funded or need to work part-time to fund their studies, and most of this group have dependents to support. This does not constitute a significant proportion of the sample of students that face financial challenges.

8.3.3. Durban University of Technology (DUT)

Number of completed questionnaires received: 35

Number of undergraduate exit level students: 35

Number of postgraduate exit level students: 0 (DUT does not have a postgraduate degree as yet)



	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Rating Score 1	0	1	0	0	1	0	0	19	6	1
Rating Score 2	3	2	0	2	3	2	6	4	4	2
Rating Score 3	6	6	15	6	5	5	14	5	11	5
Rating Score 4	16	17	13	15	18	14	9	5	7	10
Rating Score 5	10	9	8	12	8	13	6	2	7	16

Figure 8.9. Evaluation of part questionnaire 'Teaching, Learning and Research', DUT

<u>Analysis</u>

Q1: Relevance of curriculum

74% of the responses were at rating level 4-5, a strong indication that the curriculum is relevant, while 6% of the respondents were not certain, and 3% found the curriculum irrelevant.

Q2 & 3: 'Active learning'

67% of the responses were in the high score range 4-5 for Q2 and Q3, which indicates that students are encouraged to express their ideas, interpretations and observations, while also being supported by lecturers in order to develop their ideas and interpretations. 34%, at level 3, of respondents were uncertain. This suggests a strong 'active learning' pedagogic approach.

Q4 & 5: 'Constructivist learning mode'

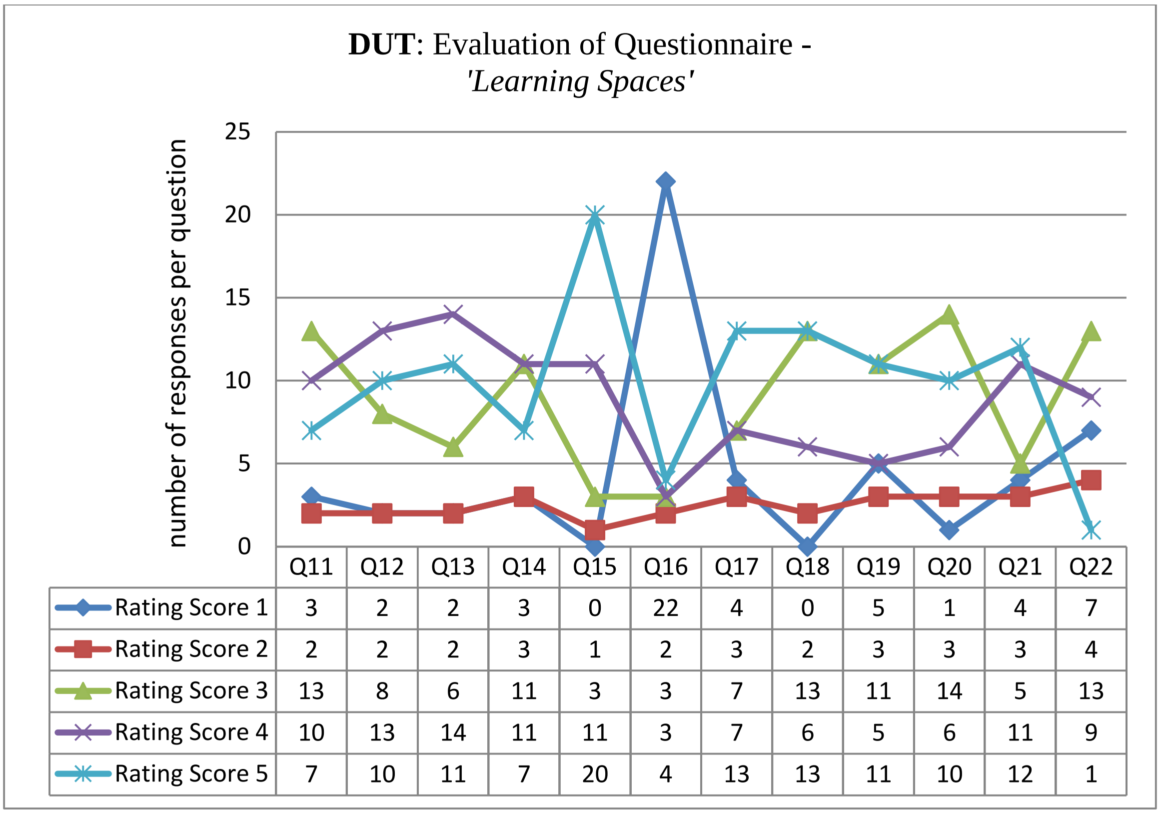
The students scored highly, 77% in Q4, and 74% in Q5. This indicates a strong focus on developing solutions and proposals to design problems through the construction of solutions based on social collaboration.

Q6 & 7: Portfolio and critique

77% of the responses in Q6 were in strong agreement that portfolio and critique were effective for student learning. The response in Q7 however indicates that only 43% of students feel confident after a critique or portfolio session, 17% feeling less confident at a score of 1-2, and 40% not certain.

Q8, 9 & 10: Independent studies and research

These questions examine the degree of independent studies or research in the curriculum. Q8 reveals that 66% scored at level 1-2, indicating that prescribed textbooks were not used by the majority. Q9 reveals a 40% response at score level 4-5, indicating that lecture notes are issued in a moderate number of subject modules. Q10, at 74% on score level 4-5, indicates that a high level of independent studies and research is required of the students; this is in line with the general nature of architectural education, being project / problem-based.



	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22
Rating Score 1	3	2	2	3	0	22	4	0	5	1	4	7
Rating Score 2	2	2	2	3	1	2	3	2	3	3	3	4
Rating Score 3	13	8	6	11	3	3	7	13	11	14	5	13
Rating Score 4	10	13	14	11	11	3	7	6	5	6	11	9
Rating Score 5	7	10	11	7	20	4	13	13	11	10	12	1

Figure 8.10. Evaluation of part questionnaire 'Learning Spaces', DUT

<u>Analysis</u>

Q11 & 12: Human comfort

44% of responses being at score levels 4-5, and 37% at level 3 are indicative of a generally satisfactory level of thermal comfort in the studios. A score of 66% at level 4-5 indicates a generally good quality of natural light in most of the studio spaces. This is congruent to the learning space analysis of the DUT case study in chapter seven.

Q13 & 14: 'Flexible space' and collaboration

Q13 reveals that 71% of responses were at score level 4-5 while 17% was at level 3, which indicates that the learning spaces were considered to be very conducive to collaboration and participatory learning. Q14 indicates that 51%, at score level 4-5, found the spaces to be easily reconfigured. These factors combined, strongly support the constructivist pedagogic approach as indicated in Q4 &5.

Q15 & 16: Computers and software

Q15 reveals 89% responses at score level 4-5, which indicates that most students had access to computers in the studios. This is supported by Q16, which shows a 68% response at level 1-2 indicating that the majority of students did not have to use separate CAD labs.

Q17 -19: ‘Technology-enabled’ learning environment

Q17 shows that 57% of the respondents, at score level 4-5, indicated that they use an Electronic Learning Management System, while 20%, at score level 3, used such system occasionally. Q18 indicates that 54% of respondents scored 4-5, while 13% scored 3, which suggests that electronic resources are readily accessible. Q19 indicates that 46% of respondents find easy access to coursework from remote locations, while 23% cannot easily access courseware from remote locations, and 31% occasionally access courseware from remote locations.

Q20: ‘Technology-enabled’ learning environment

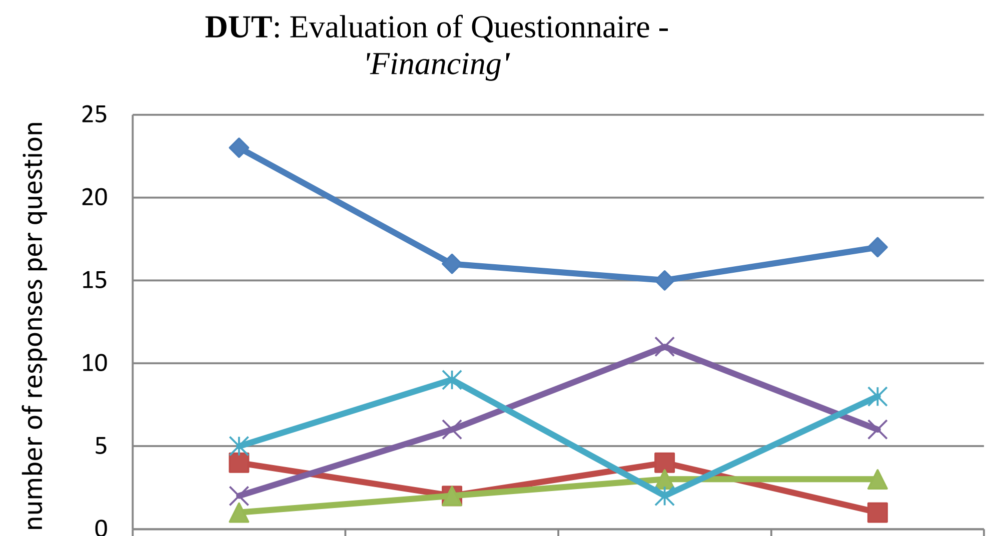
A score of 46% at level 4-5 and 40% at level 3 indicates that the students generally have access to digital platforms for sharing ideas and drawings.

Q21: ‘Technology-enabled’ presentation

66% at score level 4-5, compared to 20% at level 1-2, indicates that students generally prefer project submissions in electronic format.

Q22:

Reveals that there is a mixed response to the issue of access to social and break-away spaces as 29% of the responses were in the score level 4-5 and 32% were in the low score range 1-2; the balance of 39% being uncertain.



	Q23	Q24	Q25	Q26
Rating Score 1	23	16	15	17
Rating Score 2	4	2	4	1
Rating Score 3	1	2	3	3
Rating Score 4	2	6	11	6
Rating Score 5	5	9	2	8

Figure 8.11. Evaluation of part questionnaire 'Financing', DUT

Q23 - 26: Financing

59% of students, at score level 1-2, are not self-funded, nor have dependents and therefore are not favourable to night or part-time studies. 35% at score level 4-5 are self-funded or need to work part-time to fund their studies, and most of this group have dependents to support. This is a very significant proportion of the sample of students that face financial challenges.

8.4. Comparative analysis of the three sample ALSs

8.4.1. ‘Teaching, Learning and Research’

NMMU and DUT revealed a high level of active learning and a strong constructivist pedagogic approach. This learner-centred approach resulted in a generally higher level of satisfaction during interaction with lecturers and at critique sessions. The data referring to UJ, on the other hand indicated that, while students were encouraged to express their ideas and interpretations, these were not adequately supported by lecturers. These students also responded less favourably to portfolio and critique. The responses from all three ALSs were similar in that there was a high level of independent studies and research required in architectural studies.

8.4.2. ‘Learning Spaces’

The responses in this section, for all three ALSs were very much congruent with the findings of the respective case studies in chapter 7. The analysis of the spatial quality in respect of environmental factor affecting human comfort was confirmed by the student questionnaires. DUT, in this regard, had the most favourable responses.

The only exception to the general alignment of the student responses to the analyses in chapter 7 pertains to the ‘flexibility’ of learning spaces at UJ. The assumption, based on spatial layout and furniture configuration, was that the space was highly conducive to collaboration and participatory learning. While this is certainly the case in terms of the spatial qualities, the UJ student responses indicate that the potential of the space to inculcate a high level of student collaboration has not been realised.

The UJ responses were also weak in regard to the implementation of ‘technologically-aided’ learning environments. The student responses were generally aligned to the traditional modes of learning, collaboration and project submission. NMMU and especially DUT responses were much more in favour of ‘technology-aided’ learning environments.

There was a generally low level score rating on the ‘social and break-away spaces’ item on the questionnaire for all three ALSs. This is particularly important to note in the discussion of different types of learning spaces, including the formal and the informal, which have to be interrogated in order to develop appropriate learning spaces for the new model of architectural education, in the following chapter.

8.4.3. 'Financing'

The majority of student responses suggested that they were not self-funded. NMMU data indicated that only8% of students were self-funded. However, 20% of the respondents at UJ indicated that they were self-funded, worked part-time and may have dependents that they cared for; this is a significant proportion of the UJ sample. The responses at DUT revealed a very serious issue of financial challenges, as 35% of the sample indicated that they were self-funded, worked part-time and may have dependents that they cared for. This poses a serious concern to architectural education, which is vital to the development, delivery, and implementation of the new model for architectural education.

Chapter Summary

The student questionnaires were valuable in assessing the pedagogic approaches, learning space development and issues of student finances, with regard to the sample of ALSs, which included UJ, NMMU, and DUT. The critical analysis of the responses to the questionnaire will be cross-referred to the theoretical discourse of this dissertation, and the case studies in chapter 6 and chapter 7, in order to inform the development of a conceptual framework for a new model of architectural education at universities of technology in South Africa, in the following chapter.

The data analysis will also inform the conclusions as well as recommendations for the implementation and further development of the proposed new model.

The following chapter will focus on the framework for the proposed new model of architectural education at universities of technology in South Africa.

CHAPTER 9:

CONCEPTUAL FRAMEWORK FOR A NEW MODEL OF ARCHITECTURAL EDUCATION AT UNIVERSITIES OF TECHNOLOGY IN SOUTH AFRICA

The preceding chapters analysed the theoretical, philosophical and practical frameworks that defined architectural education over time and which defines its present form, with particular reference to universities of technology. What emerged from the research was that an alternate model for architectural education needed to be developed to reflect the unique identity of these relatively new institutions while building on their historic strengths.

9.1. Defining the need for a new model.

Chapter 1 outlined the research problem, which highlighted that the change in political dispensation from apartheid to a democratic South Africa unearthed many pressing social and economic realities, which required urgent attention. In response, the democratic government, since 1994, had developed various strategies, frameworks and policies to address these challenges, which highlighted an urgent need for socio-economic transformation. Central to the transformation agenda was the issue of redress; to understand the impact of the injustices of the apartheid regime in order to enable socio-economic development of historically marginalised communities. The relevant policy frameworks to this thesis were: The Freedom Charter, the Constitution and the Bill of Rights; the Higher Education Act; the Higher Education Qualifications Sub Framework; the Architectural Professions Act; and the National Development Plan. Among various aims of the NDP, is one of spatial transformation, which is most important in the context of this research. These all have significant impact on architectural education and practice, which have not made adequate progress in meeting the transformation objectives and targets of government, albeit 22 years into democracy. Demographic data of registered professionals within the architectural profession is unacceptably skewed, reflecting a gross underrepresentation of historically disadvantaged groups.

Access to architectural education was near impossible to non-white communities during the apartheid era, which resulted in a dire lack of professional architects residing in these communities. Historically disadvantaged communities, therefore, had virtually no access to the services of professional architects and as a consequence, remained generally unaware of the social and cultural value of architecture. The consequences of this failure of the architectural profession to engage with the historically disadvantaged communities continues to be evident in the visibly poor quality of the built environment within areas demarcated for non-white groups. Further to the visible qualities of the built environment are the invisible layers, defined by challenging social and economic realities, as well as underdevelopment of basic services and infrastructure which continue to plague these communities albeit 22 years into democracy. On, the other hand, the affluent communities, who benefitted from the inequitable distribution of wealth during the apartheid era, continue to develop and flourish; they continue to attract higher property prices, development infrastructure, spatial upgrades and investment from the private and public sectors.

The consequences of such 'exclusive practice' on the architectural profession were twofold: firstly, as mentioned above, the historically disadvantaged communities generally had no resident professional architects which compromised spatial transformation and, secondly, the youth in schools had no exposure to work of architects in their communities, which resulted in a lack of awareness of the profession. This lack of awareness severely compromised the demographic transformation of the profession as the architectural learning sites struggle to attract well prepared students from historically disadvantaged communities; the demographic data of registered professionals and candidates with SACAP bears testimony to this. Government, via the Department of Public Works and the Council for the Built Environment (CBE) has exerted pressure on the built environment councils, including SACAP, to present transformation statistics and explain the reasons for the slow pace of such, while producing evidence of strategies to overcome this situation (interview with O'Reilly 2016).

The government, however, has approached this condition in a kind of "pipeline" evaluation, which focuses on the number of students entering and exiting the formal higher education system. While the general response to this problem is to recruit, and graduate more students from these communities at universities, this thesis poses a firm critical stance in arguing that the current norms within the formal system of higher education are inadequate in meeting the respective transformation objectives due to the lack of resources to support students from vastly disparate schooling backgrounds and social contexts. The argument extends further to industry, in which there is a critical mass of employed practitioners, predominantly from historically disadvantaged communities, who are in need of mid-career 'upskilling' to better their lives and uplift their communities. Many of these practitioners, for social and economic reasons, could not advance their knowledge and skills, as full-time study was not an economically viable option. A vital consideration therefore is to include this population of practitioners in need of mid-career articulation, without them having to give up their employment for fulltime studies at university.

The preceding discussion raised various concerns that compromise the potential role of architectural education and practice in addressing some of the most pressing issues of democratic South Africa. While socio-economic redress raised the need for alternate methods of architectural education and training, spatial transformation raised the reality of the quality of built environments in the historically disadvantaged communities. As a consequence of the two issues raised, the vitally important issue of identity emerged.

Issues of identity affect both redress and spatial transformation, which impact heavily on architectural education and practice. As such, the complex issues of institutional identity and cultural identity emerge, which reveal some of the most challenging identity dilemmas being: the definition of “technology” in defining the institutional identity of universities of technology, and the tensions of local cultural identity within the global society. The theoretical and conceptual framework in Chapter 3 interrogated these issues and provided clarity in defining the proposition of this thesis toward an alternate model for architectural education at universities of technology in South Africa.

9.2. Defining the proposition of the thesis.

The main proposition of this thesis is to develop an alternate model of architectural education at universities of technology, based on engaged practice, in order to address the socio-economic realities and needs of democratic South Africa. Four key components define the proposition: socio-economic redress, spatial transformation, cultural identity and institutional identity.

<u>9.2.1. Socio-economic Redress through a differentiated education and training system</u>

The demographic transformation of industry and the professions is of serious concern in the context of redress in South Africa. The architectural profession in South Africa, since 2000, is in a globally unique position wherein four categories of professional registration have been recognised as outlined in Chapters 1 and 5. This, at the time, was a bold attempt at redress.

However, the demographic statistics, as revealed by the SACAP register of professionals, indicates that the majority of persons from historically disadvantaged communities are still registered in lower professional categories, while having no means to advance their qualifications without having to give up their employment. Architectural education has failed to factor in the skills sets developed through work experience and has thereby ignored this key socio-economic reality. Full-time study at a recognised university is the only option to qualify as a professional architect. This thesis will develop an alternate education strategy to meet the needs of this critical mass of registered practitioners, with a view to expediting socio-economic redress within the architectural profession in South Africa.

9.2.2. Spatial Transformation through knowledge transfer

As a consequence of the lack of qualified professionals, resident in historically disadvantaged communities, knowledge and technology transfer to historically disadvantaged communities is significantly compromised. Furthermore, the lack of demographic representation of academics, positions education aloof from the complexities of developing contexts. Another challenge to spatial transformation is that very few students form these communities, who may enter university, actually graduate within the minimum time, or at all. Interviews with students and academic heads at universities has revealed that the disparities in high schooling has not adequately prepared these students for architectural studies. Could there not be a better support system within the universities?

The learning difficulties by students, have largely been due to the lack of engagement of architectural education with the realities of their historically marginalised communities; students find it difficult to relate their education to their own social contexts. A strong proposition of this thesis, therefore, is that architectural education engages with historically disadvantaged communities in a diversified way as follows:

- Recognise the skills-sets developed in practice in order to advance knowledge of mid-career practitioners who may be resident in these communities;
- Support students from marginalised communities by way of mentorship programmes in partnership with practices / industry;
- Situate project-based learning within historically disadvantaged communities. This will allow students form these communities to establish relevance of the curriculum to their own social contexts. Architectural studio pedagogy has to be flexible and therefore not

be statically locked within the confines of institutions. On- site learning / design-build projects within these communities will be vital in establishing relevance of the curriculum.

9.2.3. Cultural Identity in the context of the global knowledge society

The review of theories, ideologies and pedagogic approaches outlined in Chapter 3, highlighted the need for the inclusion of contextual nuances through socially engaged practice. It was established that architectural education had to look beyond a product-focused, industrialised pedagogic approach towards socially engaged practice. The critical position of architectural education and practice in context is recognised and enhanced. In this regard, it is proposed that architectural pedagogy locates itself within the critical space between ideology and culture / society. Michael Hays (1981) argued that critical architecture emanates in the space between culture and form, while Rendell (2006) referred to the “interdisciplinary space” which exists between art, architecture and critical theory. This suggests an integrated human-centred approach to education which focuses on the nuances of multicultural and complex contexts while bridging disciplinary divides in curricula and pedagogy.

The integrated ideology of Neo-humanism emerged as most relevant in order to achieve a human-centred responsive approach to education. Response to communities within a vastly heterogeneous cultural context of South Africa pose challenges to architectural education, in order to factor in diversity and complexity. This discussion suggests a necessary rethinking of architectural education, which could be better differentiated in order to include diversity, complexity and multiculturalism within the system. Ultimately, a heightened social conscience becomes a priority in the graduate attributes of architectural professionals. However, in accordance with neo-humanist principles, this thesis proposes that contextual response not be myopic and that engagement with the broader global knowledge society is vital in developing solutions to globally common problems such as climate change, poverty and economic crises among others. Furthermore, in the context of South Africa, the historic lack of access to resources means that there is a great need for an expansion of worldviews among students and practitioners alike.

9.2.4. Institutional Identity within a transformed higher education and professional paradigm

The main proposition of this thesis is based on the position that architectural education at universities of technology, building upon their strengths in the areas of knowledge transfer and student diversity, needs to be flexible in order to adapt to the rapidly changing needs of industry and society. This intention, however, cannot be achieved by merely changing curricula; the thesis therefore proposes that the design studio, as the core of architectural education, be reconfigured in order to achieve the objective of a responsive, flexible model of architectural education. Such model includes mid-career practitioners who are in need of academic and professional development to advance their professional competence and status, in order to improve their livelihoods. This will in turn enhance knowledge transfer to the historically disadvantaged communities wherein the majority of these practitioners reside, which will thereby contribute to spatial transformation.

The historic identity of the universities of technology, as former technikons, face a further identity dilemma within the contemporary South African context: the tension between art / humanities and science / technology. The position of this thesis is that this dilemma is rather unnecessary, as technology is considered a cultural construct, and therefore cannot be separated from the arts or humanities. Interviews with the relevant stakeholders revealed that there were different interpretations of “technology”, however, there was a general consensus that knowledge transfer, to industry and society, was the main distinguishing factor between universities of technology and traditional universities.

A further argument of this thesis is that it is not as important to define a unique identity which is limited to the curriculum, but that the historic strengths of these institutions, with particular regard to knowledge transfer via industry and community engagement, as well as their diverse student populations be enhanced in order to define their unique identities. In this regard, it was found that the pedagogic transformation to strengthen the characteristics of knowledge transfer and the inclusion of cultural diversity, upon change in institutional type, did not receive much attention except for the university of Johannesburg, which incorporated diversity through the establishment of the “unit system”, which encourages socially critical design problems, and the active input of leading architectural practitioners. The UJ system could be generally associated with the Bartlett School pedagogy at the University College of London.

This thesis postulates that pedagogic transformation cannot be effected without the transformation of the related learning environment. Therefore, a question emerges as to how learning space development could facilitate transformative pedagogy in order to incorporate diversity and complexity, while enhancing knowledge transfer to effect spatial transformation. Central to pedagogic transformation, therefore, is the need to transform the principal architectural learning space – the design studio. A further requirement, in an initiative towards socio-economic redress, is to include a large proportion of the historically disadvantaged practitioners in need of mid-career development, which will redefine the extent and character of architectural learning spaces. This space therefore includes formal, informal, work-based / experiential and the virtual learning spaces.

The thesis ultimately proposes a new model for architectural education, which will address the needs of a diverse range of students, within a differentiated system in order to expedite transformation of the profession and the built environment. This will, in turn, inject a new diversity and complexity within the system, in which critical spatial practice may be possible due to the effect of the multicultural context on architectural practice, rather than the prevalent "top-down" approach of architectural education and practice. Engaged practice across all domains is therefore absolutely vital in the development of the conceptual framework of this new model.

9.3. Developing a conceptual framework for an alternate model of architectural education at universities of technology in South Africa

Although the long-established linkages with industry and society has been acknowledged as a strong defining characteristic of education at universities of technology, it is argued that knowledge transfer cannot be in the form of a linear transmission process. In this respect, research and technology developed in the academic domain cannot not transfer to industry or society in a linear sequence; the position of this thesis is that knowledge transfer is rather a multidirectional process in which knowledge is built through active engagement across all relevant disciplines and domains. These domains include the individual cognitive domains; the collective cognitive domain, which factors in multiple intelligences; the social domains; and the transdisciplinary domains.

Central to this objective is the concept of engaged practice, which I relate to four basic principles emanating from a neo-humanist perspective: context; culture and identity; education for sustainable development; and transformative pedagogy.

9.3.1. Context

The research has highlighted the importance of context in defining responsive pedagogy and practice. However, in the contexts of the developing nations such as South Africa, a growing tension between local and global culture poses a critical challenge regarding contextually responsive architecture and cultural identity. Globalisation is often associated with cultural penetration and dominance by the West (Bussey 2009).

Education, however, cannot disregard global influences; it is argued that the knowledge society is expansive and not limited to the nuances of local cultures. As such, some of the most serious challenges and opportunities facing the developing world are actually being experienced and addressed at a global level. Climate change; economic crises; instability in international relations and the rapid growth of the eastern economies pose numerous challenges as well as opportunities to education and professional practice. These realities have directly affected the global knowledge society, which redefines contemporary education priorities. P.R. Sarkar (in Bussey 2010) argued against dualist East-West interpretations of context, wherein he stated that no country should offer a limited human experience, as both the East and the West have much to offer each other. In this regard the generally extrovert scientific approaches of the West and the introvert intuitive / philosophical approaches of the East are both fundamental as complimentary to the epistemological balance needed in architectural education. Given the inequity in socio-economic circumstances in South Africa, the vast majority of students could benefit immensely from a broadened worldview. This thesis therefore proposes that the alternate model for architectural education at universities of technology in South Africa that actively pursues international linkages.

9.3.2. Culture and Identity

The issue of cultural identity manifests at various layers at South African institutions. Cultural identity in fact extends beyond the social and ethnic attributes into the realm of curriculum and pedagogy; this is most evident in the identity dilemma effected by the tension between perceptions of technology and the arts at universities of technology. The question that this thesis asks is whether the energy and debate around establishing a unique institutional identity based on such tension is actually not counter-intuitive and counter-productive; could such narrow focus not actually compromise education due to self-imposed structural limitations on the potential for engagement within the global knowledge society?

Bussey (2009: 130) affirms that structural limitations, imposed by the weight of their own histories, compromises the sustainability of education at institutions and further impedes their ability to transform in response to contextual changes. He further comments on the impact of the IT revolution on education, which is challenged at its very core. While IT has offered numerous possibilities of engaging with the broad knowledge society, education has been greatly lagging behind due to structural and organisational limitations. Richard Slaughter (in Bussey 2009: 130) refers to this phenomenon as the "flatland" mentality, which leads to a business as usual approach in education systems, which are characterised by individualism and materialism. Within this paradigm of introversion, the core purpose of education in expanding human potential is compromised.

Reference is therefore made to Sarkar's Progressive Utilisation Theory (Prout), which extends neo-humanist ideology, in advocating the freeing of human potential from the limitations of local cultures while, at the same time, not losing the core essence of such local culture. Sarkar affirmed that education embrace the best of the West and East and therefore not promote geo- or socio-sentiment (Bussey 2010: 10). Despite the wrath of British rule in India, he acknowledged the importance of what the British brought to the education system in India, without entirely rejecting it as colonial imposition, while he also argued for culturally appropriate schooling such as the *Ashramic* system.

To create a sustainable model of architectural education, implies a shift from structurally limited, to broad level engaged pedagogy. However, the historical hegemonic and industrialised approaches to education, in general, continue to impact on the very core value of architecture as a process, which compromises its potential in spatial transformation. This has brought into question the value of architectural education with regard to sustainable development.

9.3.3. Education for sustainable development (ESD) and the neo-humanist interface

The preceding discussion leads to the position that any sustainable model for education cannot be locked into a paradigm bound by hegemony, geo-philosophy, geo- or socio-sentiment. In order to achieve the most out of education, its role as a catalyst for social change is to be promoted. The role of architecture in the sustainable development of the built environment cannot therefore be compromised by historic systems of education that are defined within the limits of product-driven / industrialised pedagogies.

A process-driven approach in education is proposed, in which culture and society are intrinsically engaged. Within this paradigm the neo-humanist approach of synergy between individual / unit consciousness and the collective may promote the generation of new ideas through the process of critical creative thinking. Marilyn (2008 in Bussey 2008: 2) affirms the neo-humanist view of creativity in her statement: "…process over product; a holistic encounter with open vistas; the rejection of habit and conditioning; a spiritual tool for unlocking humanity; a potentiality to be fostered and not legislated; a diminution of ego-separateness; and a commitment to paradox and humour…" Marilyn further refers to ESD as essentially transdisciplinary within which there may be numerous overlaps; intersections with the individual and the collective; and the interplay between historic reflection and futures thinking. This process can never be linear but rather relational, cyclic and iterative. Bussey (2008: 3) refers to such systems as inclusive of general systems theory, complexity theory and chaos theory. He further goes on to state that although human systems may generate disciplinary boundaries, these boundaries are always in a state of flux and never determinate. Creative solutions emerge as collective consensus through wide engagement of many intelligences and experiences / layers of human existence – engaged transformative practice. Within this paradigm, critical consciousness between individual and the collective rejects any notions of purist production and promulgates responsive creation of hybrid forms through engaged practice.

It is necessary therefore, to look into the pedagogic approaches that may define an alternate model of architectural education through engaged practice – a transformative pedagogy.

9.3.4. Transformative pedagogy

According to Inayatullah (2016: 82) partnership and co-operation define neo-humanist pedagogy, which challenges the masculine, dominator-model of the generally prevalent pedagogic approaches. This pedagogy of partnership is in direct contrast with the prevalent 'industrial' pedagogic approaches characteristic of contemporary education based on the efficiency of production rather than the healing culture that education has to offer society. Giroux (in Inayatullah 2016) refers to the need for a radical pedagogy which looks beyond the immediate future, and which is based on a strong vision for the betterment of the future.

Inayatullah (2016: 85) looks essentially to a Prout vision in order to define an alternative pedagogy which is more focused on: sustainability instead of industrial expansionism; global governance instead of nation-state; gender partnership instead of male dominance; respect for nature and not the dominance of humanity over nature; spirituality instead of religion; communication and understanding as central to problem solving instead of the techno-fix; and technology as embedded in nature and evolution instead of being used as a neutral tool. Within such model is an implicit break away from a dominator model to a gestalt, holistic model of identity. The approach suggested in Prout factors in neo-humanism and therefore multiculturalism and the inclusion of trans-civilisation in dealing with the common problems facing humanity. This process includes, but is not exclusive to non-western, indigenous and Gaian ways of understanding. Inayatullah (2016) emphasises the value of IT in connecting the global knowledge society in critical dialogue toward finding common solutions to global threats as well as factoring in, and adapting knowledge to local cultures. Classrooms and other learning spaces have, however, been slow on the up-take and are therefore lagging far behind in the potential offered by IT, which is still very much viewed as a tool for production rather than a vital process of collaborative engagement within the global knowledge society.

The principle proposition of this thesis is founded on a neo-humanist approach to architectural education, which is naturally based on co-operation and collaboration at multiple layers inclusive of the local and global contexts. While the architectural curriculum may be revised, a collaborative pedagogic approach may only be achieved through optimisation of the studio as the fundament of architectural pedagogy. It is argued that the development of architecture is not a linear or unidirectional process but rather a cyclical, iterative process of engagement with various key role-players and stakeholders. Interdisciplinary engagement thereby becomes vital to the process of critical thinking in the development or making of architecture.

Prout principles together with the respective embedded neo-humanist principles provide a relevant framework for the conceptual development of a new model for architectural education, especially at universities of technology in South Africa. Neo-humanist principles therefore support the main proposition of this thesis, which is an alternative model for architectural education based on the transformation objectives of South Africa, through widely engaged practice; the expanse of the learning space is vital to the success of the proposed model.

9.3.5. The evolution of studio pedagogy towards engaged practice.

The evolution of the architectural studio from its former designation as a technical drawing studio up until the mid-1990s, has raised the need for pedagogic transformation through spatial redefinition. The drawing studios at former technikons were very much about skills training, focusing on draughtsmanship and related technical subjects, similar to the technical colleges of today. This training happened within the institution, with a requirement that a semester of in-service training in an architectural practice was supplemented for each semester of training at the Technikon; this defined the vital link between formal and work-based training (Figure 9.1.).

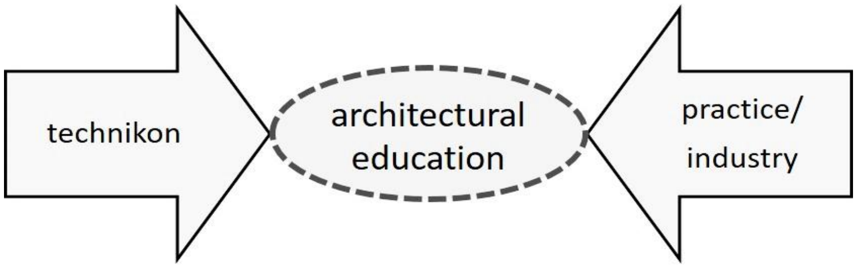


Figure 9.1. Architectural education at the former Technikons

During this period, there was no active engagement with the social and environmental context; training was solely for the purpose of employment.

Upon the introduction of new qualifications, as evident in the NATED 151 report, subjects such as architectural design and theory were introduced, which meant that the former drawing rooms would serve a new purpose as architectural studios, similar to those at the traditional universities. However, although universities of technology have had strong links with industry and society, the spatial configuration and limits of their architectural studios could not optimise the value of this strength. Fundamental to this problem was the nature of the studio, which had to change from one that provided vocational skills training for application in industry, to one that engaged more actively with society in a synergistic way. This thesis therefore proposes that the studio expands beyond the limits of the formal learning space to include the broader context in which complex problems are situated (Figure 9.2.).

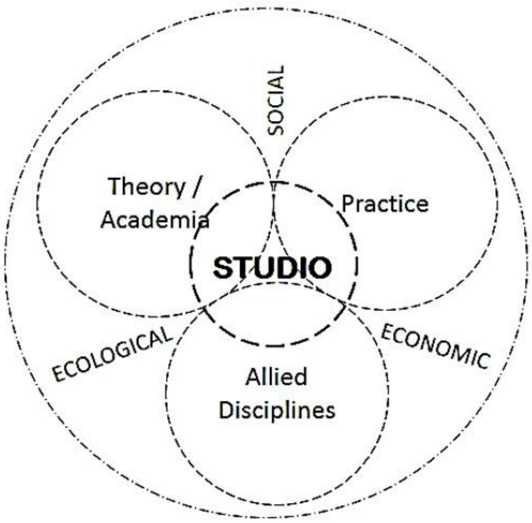


Figure 9.2. The architectural studio within the broader context (Author 2014)

These contexts are naturally complex and diverse, which invariably produce many conflicts and contradictions that challenge the existing cognitive schema of learners. Within such learning paradigm, the critical understanding of contextual nuances forms the basis of finding appropriate design responses. This will, however, require broad level engagement across disciplines and include societal engagement, whereby the architectural studio could transform from an introverted silo into a multi-faceted experiential, interactive and reflective space. This learning space critically engages with the societal context, in which design problems are situated.

9.3.5.1. The studio as multicultural, critical space

The application and testing of design studio solutions to real-life, context-situated problems requires that the studio transforms from an introverted, intuitive silo to an interdisciplinary collaborative space. The conceptual framework for a new model of architectural education, as postulated in this thesis, hinges around the studio as a multifaceted and multicultural environment to effectively facilitate the development of responsive and relevant architectural and built environment solutions. The architectural design studio cannot therefore, exclusively serve the interests of the architectural discipline in isolation anymore; the studio has to expand in order to include all role-players in the resolution of architectural problems, which requires the inclusion of all societal stakeholders in addition to the allied professional disciplines. End-users and societal representatives become vital to the success of such studio.

It is argued that, while knowledge is transferred to society through the application of professional practice, society in turn, may inform and contribute to knowledge generation. According to Borden and Rendell (2001) everyone involved in architecture and all that inhabit architecture, has to be involved in the making of architecture. This is an important point of departure and it is therefore that this thesis argues for the inclusion of society representation within the formal learning space, wherein the ideological boundary of the studio becomes permeable, allowing for natural synergy between theory, society and practice.

A further proposition is that the architectural learning environment be decentralised, as and when necessary, in order to engage directly within social contexts. The engaged studio therefore extends beyond the confines of institutionalised physical learning space to include the built environment context as a laboratory for knowledge generation. Society and industry will, hence, become part of the process of knowledge generation and not exist as mere recipients of a top down, aloof and linear paradigm of knowledge transfer.

The proposed new model will further extend context to include the global knowledge society. While student and academic staff exchange programmes have been in existence, this needs to be further stimulated. However, international exchange programmes do come at a significant cost to institutions. Furthermore, the co-ordination of semesters between the northern and southern hemisphere institutions pose many logistical challenges. This is where the exploitation of the potential afforded by IT is absolutely necessary. Rapid advancement of IT and social networking platforms, during the recent past has afforded opportunities for social collaboration that never existed before. Collaboration and social participation across various domains has become easy and possible in real-time, making it possible to bridge geographic and cultural divides and boundaries across the globe. IT cannot, therefore, be restricted to architectural production, however, be regarded as a facilitator of critical dialogue through social networking and online live collaboration platforms. There is great potential, therefore, to draw on many diverse experiences and intelligences in the process of design, without necessarily engaging in physical space. This requires, even more than ever before, that architectural educators and students develop rational, analytical and logical skills to optimise the potential of IT.

The preceding discussion highlighted the critical areas of focus and the respective conceptual approaches in addressing such in order to develop a new model for architectural education at universities of technology in South Africa. However, a critical review of the evolution of these institutions form their former status as technikons to their present status as universities is necessary in order to define the principles required for the development of the new model.

9.4. A critical perspective of universities of technology in South Africa

Despite the opportunities offered by legislative changes and the advancement in IT, architectural education at universities of technology is still struggling to define its unique identity. The reason for this is that the universities of technology, as emerging new institutions, did not allow adequate time in redefining their unique new identities. As evident in Chapter 6, architecture programmes at these institutions generally simply fused the curricula and methods of the traditional universities into their historically developed programmes, which ultimately resulted in a critical dilemma in identity. It is therefore necessary to illustrate the change in pedagogic character from the former technikon to university of technology; a graphic method makes for easier interpretation.

9.4.1. The historical pedagogic model – former technikons

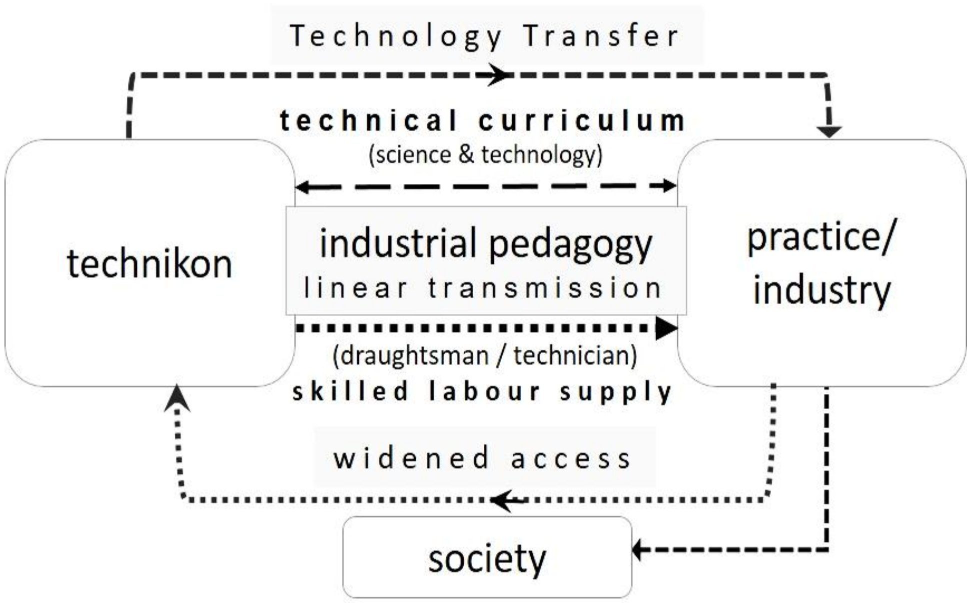


Figure 9.3. The historic model of architectural education at the former Technikons

The historic model of architectural education (Figure 9.3.) reflects an emphasis on producing skilled labour, in the form of draughtsmen and technicians, for employment in industry. These skills sets were generally subservient, in the case of the architectural profession, to the professional architect. There was a strong focus on a science and technology, albeit at lower NQF levels – the principle output would be the ability to apply technical skills in the production of working drawings and construction details. Within this curriculum there would be very minor focus on theory and design. An industrial pedagogic approach prevailed, based on technical training, defined by intermittent periods of studies at the technikon with work-based training in industry. Technology transfer was in the form of linear transmission between the technikon and industry; within this industrial pedagogic paradigm there was no direct relationship between the technikon and society.

A positive feature of this model was the affording of widened access, which included persons in full time employ who may be in need of upgrading their qualifications. The intermittent periods of study, of a maximum of six months, while in employment made this possible. Most of the experienced practitioners in industry, largely from historically disadvantaged communities, benefitted from this model. However, training was of a technical nature, geared for subordinate employment.

The advent of universities of technology in the mid-1990s led to a significant change in the model, which had many positive benefits in developing professional skills and the possibility of articulation to higher level qualifications. Figure 9.2. illustrates the existing model of architectural education at universities of technology in South Africa.

9.4.2. The existing pedagogic model – universities of technology (UoTs)

While the historic model of architectural education (Figure 9.3.) illustrates a focus on producing skilled labour and technology transfer for employment in industry, the existing model (Figure 9.4.) at universities of technology offered a broader curriculum, within a studio pedagogic mode, which allowed for education and training as professional technologists and even professional architects. The curriculum was much broader and included a significant number of credits in theory and design modules, at higher NQF levels. The model allowed for a greater level of knowledge and technology transfer to industry as well as society, as graduates would be skilled to practice as professionals.

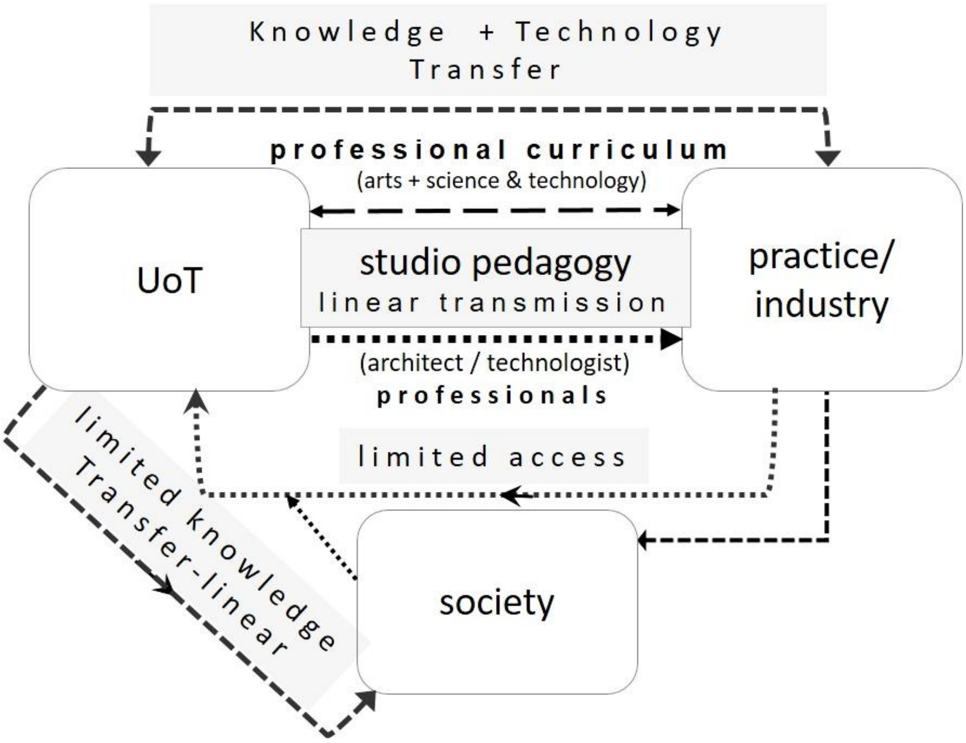


Figure 9.4. The existing model of architectural education at universities of technology

This model was, however had a down side; being much more formal and academic in nature, it required full time studies at the respective institution supplemented by a limited period of training in industry. Typically, the shortest period of study would be three years, which compromised the future careers of those persons in full time employ in need of upgrading their qualifications. The change in curriculum and pedagogic approach at universities of technology tended to become similar to that of the traditional universities, which had been met with resistance from industry, which would no longer be supplied with a technically skilled and competent subordinate workforce. Resistance also came from the traditional universities, who felt that their domain was being infringed upon; who were generally of the opinion that universities of technology continue to serve their original purpose as institutions of technical education and training.

As a consequence, the universities of technology reacted to the pressure by spending much energy and time to define their unique identities, while continuing to offer qualifications at the same level of the traditional universities – this led to a critical dilemma in identity.

9.5. The critical dilemma at universities of technology in South Africa.

Architecture programmes at universities of technology, although having transformed since the mid-1990s, have not managed to enhance their strengths in being connected to industry and society; they have rather been overtly focused on defining a science and technology curriculum which would be different to the traditional universities. This resulted in finite definitions of the term ‘technology’, which had generally been perceived as a device for production rather than a cultural construct. This myopic interpretation of technology led to an unnecessary dilemma wherein art and technology were seen as separate, mutually exclusive subject streams. This was done in an attempt to differentiate the university of technology curriculum with that of the traditional university. As a consequence, the epistemological balance necessary for responsive architectural practice was not given much attention, nor was there much learnt from international precedent. The UK polytechnic precedent, in this regard, provides valuable insight into how technical institutions could transform into universities while continuing to maintain their unique identities, without having to limit their foci narrowly to science and technology. Rather, their situation in the social and economic contexts defined their respective institutional identities and cultures.

The value of the art of architecture therefore needs reaffirmation as a responsive process in producing critical architecture, which sits between society, industry and the humanities. In this way, art may break out of the “silo” studio and begin to engage with society. Art may thereby re-establish itself in architecture, which becomes an expression of the cultural aspirations of society, wherein technology materialises such art in the making of architecture. This thesis postulates that art in architecture is not assumed to be an entirely intuitive process, but rather becomes a product of socio-cultural engagement. In this way, art is positioned in the critical space between theory and society, whereby the making of architecture becomes as a result of the technological process of active artistic creation.

Architecture, as a response to context is based on the balanced synergy between creating (art) and making (technology), therefore opting for one or the other is not a sensible option. Universities of technology have generally found themselves in a space between science and technology; art and philosophy; and industry and society – the place that architecture naturally occupies. Within this hybrid critical space lies great potential for a unique educational model to emerge as architecture programmes at universities of technology have the ability to inculcate the epistemological balance that is necessary to produce relevant and responsive architecture, due to their historic strengths of industry and society linkages.

The above argument presents many challenges and conceptual possibilities for transformation of the principle pedagogic space in architectural education - the architectural design studio. While pedagogic transformation will enhance the value of architectural education at universities of technology in society and industry, there is also a need to build on their historic strength of widened access, which is considered to be fundamental to the proposed new model.

Widened access to historically disadvantaged individuals who could not, for economic and socio-political reasons, access university education had been a defining feature of the former technikons (Figure 9.1.). However, the changes in curricula and programme delivery at universities of technology since the mid-1990s, has made it more difficult for mid-career practitioners, predominantly from historically disadvantaged communities, to access these institutions. This has consequently compromised the broader national transformation agenda with regard to socio–economic redress, including spatial transformation. A vital question hence emerges: how can architectural education at universities of technology be transformed in order to enhance knowledge transfer while also addressing the socio-economic transformation agenda of South Africa?

9.6. The recognition of prior learning (RPL) as a strategy for redress in South Africa

Universities of technology have gained much recognition for their historic commitment to widened access, however, the recognition of industry experienced practitioners who are in need of mid-career improvement in their qualifications, has not been given much consideration. SACAP has considered RPL as its key transformation driver in order to improve the representation of historically disadvantaged practitioners at higher categories of professional recognition on its register (O'Reilly 2016). It is important to recall that SACAP has four categories of architectural registration where the professional architect is at the highest level. As previously outlined, a segregated higher education system within a regime characterised by disparate socio-economic circumstances, resulted in many historically disadvantaged individuals obtaining technical qualifications, part-qualifications or even work-based training alone. As a result, a large proportion of registered professionals practice in categories lower than their actual competencies may suggest. However, despite these competencies there are no mechanisms for advancing their qualifications other than full time studies at an institution of higher learning, which may further exacerbate their economic challenges.

While RPL policies exist at most universities of technology, none have developed part-time, or specialist modules to address the high demand from architectural practitioners who are in full time employment. Two important developments have occurred as a response to this serious transformation issue.

Firstly, the SACAP commitment to developing an RPL framework for professional articulation and, secondly, the RPL policy developed by the South African Qualifications Framework (SAQA) which allows for the advancement of academic qualifications (SAQA 2013). These frameworks outline the requirements for the implementation of RPL, but universities of technology have been slow on the uptake, largely due to an inflexible pedagogic mode that cannot respond to these RPL policies. A vital proposition of this thesis is therefore that the alternate model for architectural education include RPL as key strategy towards professional transformation through redress.

The preceding discussion outlined the key propositions of this thesis, however, the research needs to be synthesised in order to develop a set of conceptual principles for the development of the new model.

9.7. Principles defining a new model for architectural education at universities of technology in South Africa

The research has highlighted the most urgent and vital conditions affecting the nature of architectural education at universities of technology in South Africa. It has been established that the respective challenges have also revealed many opportunities for transforming the existing pedagogic model in order to develop a new responsive model. However, in order to do so, it is necessary to establish a framework of guiding principles that emanated from the research (Table 9.1.).

PROPOSITION	**Relevant ideology / theory / strategy**	**Guiding PRINCIPLE**
REDRESS	• The Freedom Charter • The NDP • Prout (Progressive Utilisation Theory)	• RPL • Widened Access
SPATIAL TRANSFORMATION	• Neo-humanism • Critical Theory • The NDP	• Knowledge (& Technology) Transfer • Education – a function of Culture & Society • Order in Chaos
PEDAGOGIC IDENTITY	• Prout • Neo-humanism	• Holistic Model • Pedagogy of Partnership • Transdisciplinary • Unit/Collective Consciousness • Bridge Building • Healing Culture • Synthetic Rationality

Table 9.1. Guiding principles for the new model

9.8. The New Model

The guiding principles defined above are synthesised into the new model as a holistic approach to architectural education (Figure 9.5.).

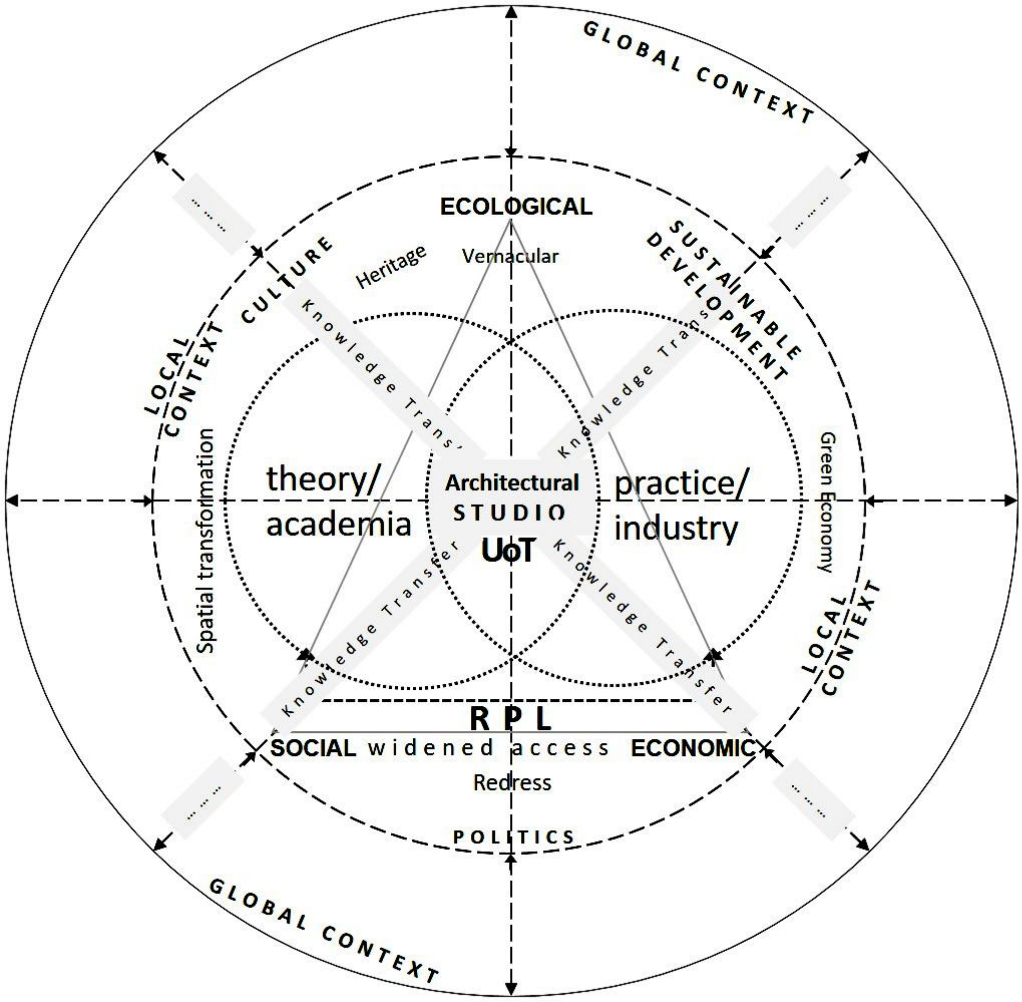


Figure 9.5. A New Model for architectural education at universities of technology in South Africa (Author)

The new model places the architectural studio as an interstitial space between theory, practice and society. This facilitates participatory and transdisciplinary pedagogic approaches, wherein knowledge transfer is multidirectional. The model advances the potential of learning space development by situating learning in context, whereby society becomes a vital part of knowledge generation, which constantly challenges the cause of architectural education; inculcating responsivity through what I refer to as the people-place-time dynamic. Note that the broken lines in the model, indicate the extension of the architecture studio to the local and global society, bridging the micro with the meta context – the arrows thereupon are bidirectional, indicating the synergy between education, practice and society at large. The broken-line circle defining context illustrates that the local context is permeable and engaging within the global knowledge society / context – not bound by nation state identity. Similarly, the dotted circles defining theory and practice, which defines the studio as an in-between space, are permeable indicating that education and practice are functions of culture and society.

This society is characterised by numerous variables and conditions such as vernacular, heritage, the green economy, cultural practices and political interests among others which are in a seemingly constant chaotic flux. However, the order within this system is defined by dynamic and indeterminable relativities between the various variables. It is posited that context as a system, is akin to ecosystems, which may adapt in response to needs, threats or opportunities, whereby the order of the variables changes to cope with, or advance potentiality. This requires that education and practice be flexible and adaptable - never static or hegemonic. The rationality of the system in its entirety, which is the new model, cannot be absolute or finitely defined, however its fundaments are engagement, collaboration and synergy – a synthetic rationality defined by an infinite number of opportunities for incidental learning (IL). This extends the learning environment beyond the university into the broader community, which includes work-based learning as part of the learning space development. It further engages cognitive learning space through IL, in which the subconscious learning faculties are catalysed in a holistic learning continuum. IL is vital to the objective perception or expressive qualities of architecture and space, but more so to the subjective perception and interpretation of socio-spatial dynamics. IL is based on active-passive engagement; conscious and subconscious; objective and subjective; unit consciousness with the collective, which deepens the level of architectural design thinking whereby conceptual design emanates from the objective and subjective engagement with context.

The unique characteristic of the model, in the context of South Africa is the inclusion of RPL as transformative pedagogy towards socio-economic redress, which is defined by a work based learning environment. I argue that RPL will unlock a critical mass of competent practitioners in industry, which could result in an exponential rate of transformation within the profession; RPL is therefore a key strategy for transformation and redress.

Any RPL model, however, has to be based on a complex system, which can factor in different levels of learning gained through work experience and be able to somehow rate / grade such experience. The traditional methods of assessment at educational institutions cannot meet this challenge, therefore an entirely new system needs to be developed. This is developed as a sub-system of the proposed new model, which needs further explanation regarding its conceptual development framework. The following section will discuss the development of the RPL sub-model as a key strategy for socio-economic redress; which is unique to the architectural profession in South Africa. The main question that arises is: how can a model be developed to handle a large number of differently skilled and competent practitioners, within a single system, while ensuring quality of competence for professional and academic advancement?

9.8.1. The RPL – Sub-Model

RPL is applicable to professionals in registered in categories, other than professional architect. This recognition of other categories for professional registration is unique to South Africa, which is commendable in that historically disadvantaged individuals who could not register as professional architects are able to register as professionals, albeit in lower categories with a more limited scope of works. These categories include, in descending order: Professional Senior Architectural Technologist; Professional Architectural Technologist; Professional Architectural Draughtsperson. While each category relates to a specific NQF level, as outlined in Chapter 6 defining the requisite qualifications, there is no framework for RPL that ranks professional competence gained through work experience. This is a major hindrance to socio-economic redress, and is a primary reason for the low number of registered architects from historically disadvantaged backgrounds.

The RPL model seeks to promulgate a framework that will facilitate articulation to higher levels of professional registration, which is based on work experience. The challenge to such model is the large number of potential applicants for RPL, which could potentially range between 3500 – 4000 based on the SACAP register of professionals. It is proposed that IT 'smart systems' technology be implemented in the design of the RPL application and evaluation system. The attributes and design of the smart system has been discussed with IT software developers and is rather easy to design and implement – this, however, is beyond the scope of this research. Essentially, the smart system will comprise a front-office interface and a back-office interface. The front-office will be accessible to applicants, while the back-office comprises electronic evaluation software rubrics, referred to as the knowledge matrix. The system could be administered in-house at the respective ALS or SACAP.

While SAQA has an RPL policy for academic institutions, these institutions have no framework to facilitate RPL and therefore there has not been much consideration given to RPL by the architectural learning sites (ALSs). This thesis posits that SACAP may be able to facilitate RPL for professional articulation, which may then guide the ALSs in awarding qualifications, based on RPL. The following section looks at the key challenges and principles that will guide the development of an RPL model (Table 9.2.). The three main challenges in developing the RPL model are: How to process a potentially large number of applications; how to determine and capture the different skills-sets / competencies; and to determine the most suitable assessment strategy to ensure quality standards.

Challenge	**Proposition**	**Guiding PRINCIPLE / concepts / strategy**
Large number of RPL applicants	Use IT 'smart systems' to process the potentially large number of applications	• Electronic applications with unique numbers for tracking.
Different levels of competence / skills sets	Create an electronic log to capture skills sets of individuals, based on a general knowledge matrix of SACAP competencies aligned with the respective skills sets and NQF levels.	PART 1: • Self-declaration of skills sets / competencies developed through experience. • Electronic uploading of evidence: portfolios, references etc. PART 2: • Authentication via portfolio interview
Assessment strategy to ensure	Develop assessment rubrics – electronic and for portfolio assessment	• Back-office electronic assessments of competencies – identification of skills / learning gaps

quality standards		• Produce feedback sheet outlining learning gaps and possibilities to bridge these • Assessment rubric for portfolio interview

Table 9.2. Guiding principles for the new RPL sub-model

The propositions with the associated guiding principles defined above, are synthesised into the new RPL sub-model. RPL is positioned as part of the holistic learning paradigm, which overlaps with theory, practice and society within the global knowledge society (Figure 9.6).

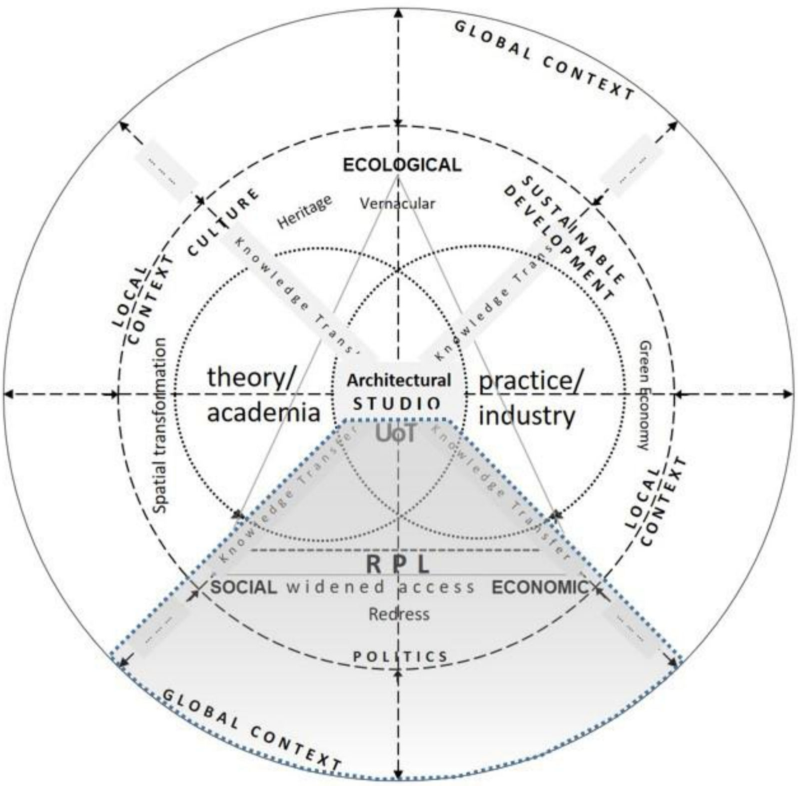


Figure 9.6. The position of RPL on the New Model (Author)

Figure 9.6. situates RPL as a pedagogic approach which would traverse academia, practice and society / context. As such it forms part of a holistic learning paradigm that correlates experiential learning in practice, with academic learning at the university of technology (UoT). The implication of this is that the learning attributes developed in practice somehow be

matched with graduate attributes; as such learning 'gaps' may be revealed, especially in theoretical modules. It is therefore necessary that the new RPL sub-module develops a mechanism to match these graduate attributes, in order to mitigate learning gaps.

The following section looks into developing a framework for RPL. The framework has to factor in various stages in the RPL process, which begins at the stage of application, until the award of the RPL credits.

9.8.1.1. Defining the RPL framework

The RPL sub-model is developed in accordance with the three challenges listed in Table 9.2.: processing a potentially large number of applications, allocating credits to different skills and competencies developed in practice, and the development of assessment rubrics. This requires the design of the broader system (Figure 9.7.), prior to defining the details of the RPL assessment.

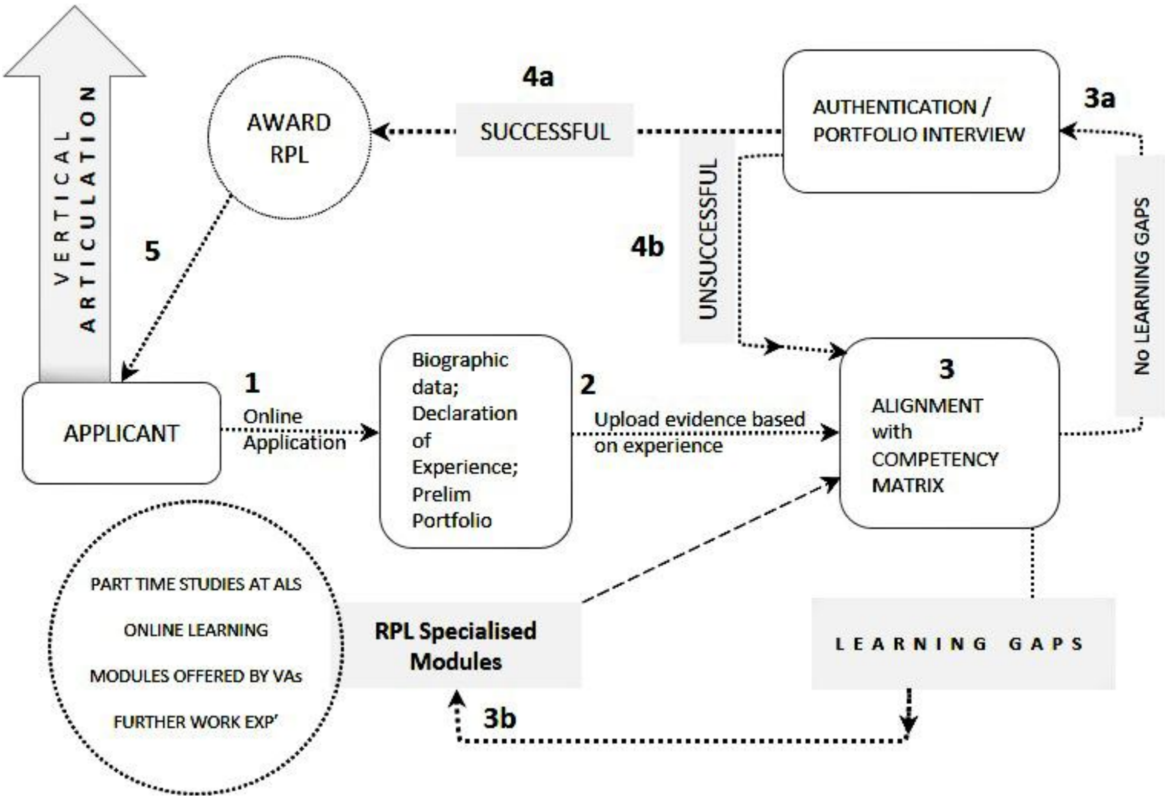


Figure 9.7. The RPL sub-model (Author)

The RPL sub-module Figure 9.7.) consists of a five-stage process from initial application to award:

Step 1: Application

The applicant fills in an online form in which he declares his biographic details, summary of work experience / CV and a concise portfolio which are uploaded onto a “smart system”.

Step 2: Self-declaration of competence logged onto the Competency Matrix

The applicant logs in his / her experience on a template in which the relevant experience is aligned to predefined competencies, as per the SACAP schedules of competencies commensurate with the requirements of the category being applied for. These competencies will be horizontally articulated with the exit level outcomes as per the respective NQF levels.

Step 3: Competency Matrix Assessment

This information is assessed online via the “smart system” on a point scale declaring a range of achievement. Where the applicant achieves the minimum combined score, he / she would proceed to the next level – authentication (3a); this will be explained further down. Where the applicant does not achieve the minimum score, the respective learning gaps will be highlighted. Interventions to bridge these learning gap will be in the form of RPL specialised modules.

Step 3b: RPL Specialised Modules

RPL specialised modules may be taken part time at accredited learning sites (ALSs); may be taken as continuous development courses / conferences organised by the various Voluntary Associations (VAs) or as online modules developed by the ALSs or VAs, or may be in the form of more work experience to make up for learning gaps in areas such as project administration or design on a broader range of projects. Upon completion of this, the applicant may update the Competency Matrix. This process may be repeated until the applicant meets the requirement. The assessment up to this stage is entirely via the digital “smart system” and therefore no additional resources or expenditure is incurred by the RPL accreditor – the ALS or SACAP. This is constructive and fair to the registered professional in advancing knowledge and skills sets.

Step 3a: Authentication of declarations and evidence

This is the first stage where human assessment is factored in. the authentication is via a portfolio interview by a panel comprising academics and practitioners higher qualified than the applicant. This assessment is via rubrics and the issue of a report. Where the applicant successfully passes the interview (4a), he / she will be recommended for award of the qualification or professional designation (5). Should he / she be unsuccessful (4b), the highlighted learning gaps may be gained via RPL Specialised Modules or, more likely, an improvement of the portfolio via extended work experience or guided mentorship in practice.

9.9. Ensuring Quality Standards

It is important to reiterate that RPL is an alternate pedagogy for academic / professional articulation. This transformative pedagogy is to be subjected to a similar rigour to educational qualifications at university, albeit in a different learning environment. The question around quality standards being maintained, and the assurance thereof is valid. How then could quality standards be determined and maintained while education happens through experiential learning?

I posit that the RPL evaluation and assessment framework includes an alignment of professional competencies with academic standards - the 10 competency levels required of SACAP registered professionals, as per the Identification of Works framework (Figure 9.9.) would be horizontally articulate to the NQF levels of the respective professional category being applied for (Figure 9.8.). RPL hence assumes the position of an autonomous pedagogic interface between practice and academia.

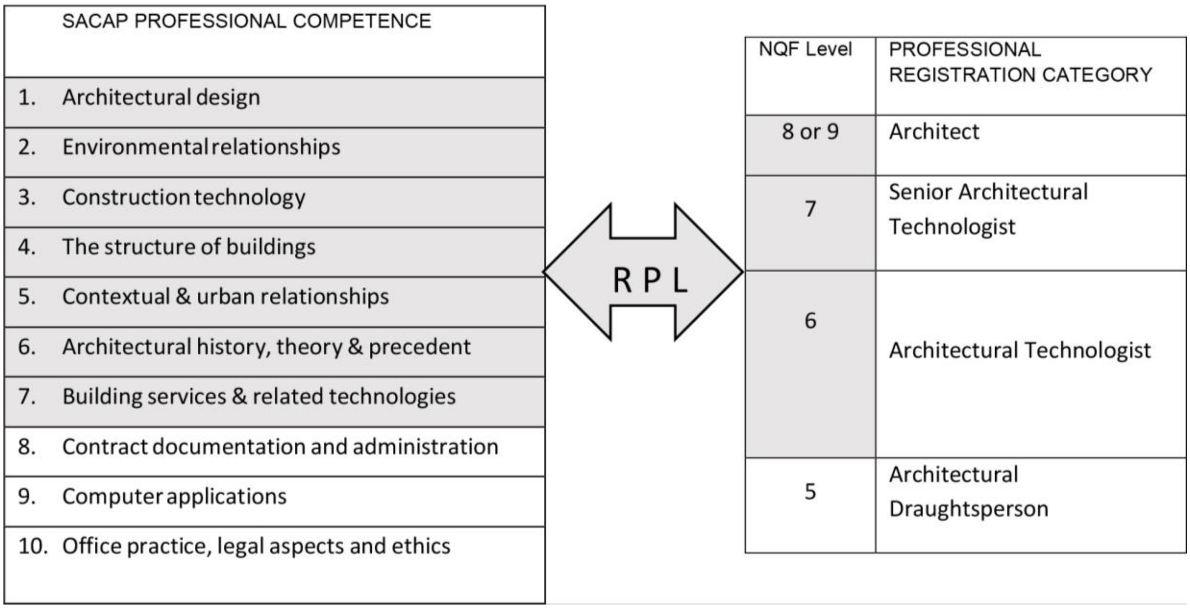


Figure 9.8. RPL as the pedagogic interface between Professional Competence and NQF Qualification level (Author).

Professional competencies range from 1-10; note that competencies 8,9&10 are equally applicable to all categories of registrations as these cover matters of professional practice and office administration. Professional competencies 1-7, listed as i-vii, in Figure 9.9., are aligned with theory, design and technological competence; these vary according to qualification NQF levels which the different categories of registration are aligned to.

Professional **Registration** Category	**NQF Level** of the relevant Professional Qualification		**Requisite Rating (A,B or C)** correlated to complexity *Factors* according to the relevant Professional **Competency**						
			i.	**ii.**	**iii.**	**iV.**	**V.**	**Vi.**	**Vii.**
			1. Architectural design	2. Environmental relationships	3. Construction technology	4. The structure of buildings	5. Context and urban relationships	6. Architectural history, theory and	7. Building services and related technologies
Architect	8 or 9		A	A	A	A	A	A	A
Senior Architectural Technologist	7		B	B	A	B	B	B	A
Architectural Technologist	6		C	C	B	B	C	C	B
Architectural Draughtsperson	5		C	C	C	C	C	C	C

Professional competency rating values:

A: High Competency **B**: Medium Competency **C**: Low Complexity

Figure 9.9. Complexity of knowledge ratings based on Professional Competence and NQF Qualification levels of each registration category (extrapolated from SACAP IDOW Draft Framework).

Note that the first level of RPL starts at Draughtsperson to Technologist. The RPL process is an alternate pedagogy which is meant to be developmental, towards increasing competence and knowledge, while recognising learning gained in practice.

It is important to note that the system factors in the application of as many of the official South African languages to afford a fair opportunity to most of the potential applicants, who would probably not have English as their first language or preferred language of communication. Language continues to be a barrier to students and practitioners from historically disadvantaged backgrounds, the transformative model therefore includes devices to overcome this. Architectural communication via diagrammes, symbols, icons and possibly, short videos would go a long way in overcoming language barriers.

The inclusion of the RPL process, completes the definition of the new model for architectural education at universities of technology in South Africa. This model meets the national objectives of redress and spatial transformation; the socio-cultural objective of knowledge transfer for the advancement of human potential; ultimately building on the historic strengths of the universities of technology by enhancing their synergy with industry and society within a broader paradigm of pedagogic partnership through engaged practice within the broader global knowledge society.

The model as a whole is entirely new in the context of architectural education in South Africa, and with the inclusion of RPL to address professional articulation within a stratified professional registration system it is possibly unique in the broader context of architectural education and practice. The model is defined by flexibility and adaptability to context and may therefore be implemented to suit such – it is not a fixed pedagogic model. The reading of the model, therefore, may reveal further interpretations that may have not specifically been mentioned in the text – the graphic of the model and sub-model provides the principal method in illustrating its pedagogic flexibilities.

Chapter Summary

The framework for the development of an alternate model for architectural education at universities of technology was defined in response to some of the strategic objectives of the transformation agenda of South Africa as well as to reflect the unique identity of architectural education at universities in South Africa. Socio-economic redress, spatial transformation, cultural identity and institutional identity hence emerged as the main drivers in the development of the new model.

Architectural education at universities of technology, having enjoyed strong historic ties with industry and society, with the added benefit of multiple exit levels with at lower NQF qualification levels. This meant that widened access and mid-career advancement were possibilities that could be factored in as vital constituents of the new model. RPL as a sub-model was designed as a pedagogic interface between academia and practice, which meets the demand for mid-career advancement.

What emerged was a model based on engaged, transdisciplinary practice situated within the global knowledge society while addressing the transformation objectives of the local context. The model is defined by the reconfiguration of various variables in response to contextual changes – a flexible and adaptable model that defines order as not fixed or hegemonic, but in the form of a synthetic rationality. The position of the architectural design studio in the critical space between academia, practice and society affords a constant interface between individual cognition / consciousness and the collective; underpinned by neo-humanist ideology and the progressive utilisation theory (Prout).

The following chapter will draw conclusions on the research and present recommendations for further research / development.

CHAPTER 10:

CONCLUSIONS AND RECOMMENDATIONS

The thesis was developed in response to the challenges and opportunities facing universities of technology in South Africa within a new democratic state. Changes in legislative frameworks have afforded these institutions numerous opportunities, however, the rapid pace of change has resulted in them faced with an identity dilemma: what is it that distinguishes universities of technology from the traditional universities?

This dilemma has in fact arisen through a deeply entrenched historical identity which emanated from a segregated educational and professional landscape during the apartheid era. Universities of technology evolved from institutions of higher learning, known as technikons, which existed in a binary system of education during the apartheid period. These institutions were focused on technical skills training for employment, while the traditional universities educated professionals. As a consequence, the systems, curricula, pedagogic approaches, including the character of learning spaces were vastly different to traditional universities - generally defined by an industrial pedagogy. Technikons were predominantly focused on science and engineering disciplines, with the purpose of training a technically skilled workforce. One of the greatest strengths of the technikon education system, however, was the strong ties with industry; formal study was alternated with in-service training within industry. As the technikons evolved and started to offer degrees and higher degrees, technology transfer and technology-driven research became a strong defining characteristic of the universities of technology.

Architecture programmes started to refocus to include a broader based education, which departed from training skilled labour for industry, to encompassing a much broader view of society at large. In doing so, they would virtually adopt the traditional university curricula and pedagogies. This has attracted much criticism from industry, who would no longer benefit as much from skilled labour, as well as the traditional universities who felt that their domain was being infringed upon. The universities of technology, seemingly in haste, have reacted by trying to distinguish their identity through the curriculum. Interviews with key stakeholders attested to the view that these institutions should develop a distinctly science and technology curriculum which distinguishes itself from the liberal arts curriculum. This thesis presents a strong counter argument that architecture is by its very nature, transdisciplinary and a manifestation of culture and society; the disconnection of the curriculum into disciplinary silos, will further disconnect architecture from society. The thesis alternately proposes that the pedagogic approach of universities should define their unique identity, by building on their historic strengths, being: strong ties with industry and society through knowledge transfer, and widened access to historically disadvantaged communities.

Due consideration to these two strengths address the two most important post-apartheid initiatives, the context of this research: spatial transformation and socio-economic redress. Architectural education and practice has the potential to relate these two transformation objectives towards nation building.

Spatial transformation, is an important objective implicit in the National Development Plan, which focuses on nation building and the betterment of society in all aspects. The architecture curriculum has an ethical duty to serve the aspirations and needs of society and therefore cannot be exclusively focused on science and technology. Knowledge transfer at these institutions could be greatly enhanced by contextualising education in society and culture; a break away from the linear technology transfer mode characteristic of the industrial pedagogy.

The thesis posited a participatory pedagogy that would engage theory, practice and society within a broader learning paradigm which would expand to the global knowledge society. A key proposition of the thesis was therefore to transform the linear pedagogic approaches, characteristic of technical institutions, into an engaged theory-practice-society learning paradigm, with the objective of transforming society and advancing human potentialities. This paradigm would be informed by neo-humanist ideology which promulgates the connection of self with the collective, transdisciplinarity, a layered philosophy based on pragmatism, a distinctive epistemology and an evolutionary ontology. These formed some of the principles upon which the new model was developed.

With reference to redress, a strength of the former technikons which, to a lesser extent, still prevails at universities of technology was the offering of widened access to include historically disadvantaged individuals who could not access traditional university due to various social and economic challenges. With the change of institution from technikon to university the intermittent periods of in-service training were highly compromised; so was the shorter terms of exit qualifications. The first exit level at universities of technology typically require a three-year period of full time studies; this completely shut off access to a large cohort of persons in industry who aspire to mid-career advancement of their qualifications. The bulk of such persons would be from historically disadvantaged communities. The fact that many of these persons practice in their private capacity, servicing their own communities, meant that these historically marginalised communities would continue to remain neglected by highly qualified architectural professions; spatial transformation would thereby be severely inhibited. The alternate model had to look into the possibilities of integrating this critical mass of persons into the education system, while they continued to work in practice.

The new model exhibits an engaged pedagogic approach based on synthetic rationality, whereby learning is flexible and adaptable to dynamic nuances of context and the global knowledge society. This further afforded the opportunity of developing alternate architectural learning spaces other than the formal design studio, characteristic of architectural schools. In this regard, the informal / social learning spaces, work-based learning, community based learning and the virtual learning environment would all benefit the holistic learning paradigm. The potential of IT had to be intrinsic to the new model, which bridges the divide between the architectural studio at universities of technology, practice, society and the global knowledge society.

While the engaged learning paradigm proposed in the model connects theory to practice and society, the Recognition of Prior Learning (RPL) sub-model developed as a response to the national objective of socio-economic redress, which factors in those persons in need of mid-career 'upskilling'. The South African architectural profession is unique in that it is characterised by four tiers of professional registration. RPL affords vertical articulation for improvement of academic qualifications via an alternate pedagogy, as well as for professional articulation to higher categories of registration.

The new model therefore addresses the national imperatives of transformation through a pedagogic model based on engaged practice, inclusivity and situated learning within a holistic learning paradigm. Furthermore, this thesis introduced the concept of 'Incidental Learning' (IL), which broadens the learning paradigm beyond the aforementioned spaces, to include the subconscious assimilation of knowledge. While the principal model may be applied in various contexts, the RPL sub-module makes it unique in addressing the socio-economic needs for mid-career advancement in the South African context.

Recommendations:

Architectural education and practice requires constant rethinking as a dynamic response to the rapidly changing South African and global context. This necessitates a departure from hegemony to the advancement of human potentiality and society; a strengthening of social ethics in architectural education and practice is fundamental.

The proposed model illustrates a broad framework inclusive of numerous variables that may adaptively respond to different contexts and conditions; it therefore cannot be read as a static objective ideal, but rather a flexible pedagogic system. It is recommended that the model be interpreted and implemented to suit the different architectural learning sites, particularly the universities of technology, who are in a better position to implement and benefit from the model due to reasons outlined in the research.

The RPL sub-model should be further developed by SACAP and the respective architecture schools in order to effect transformation through socio-economic redress. The RPL sub-model is also a general framework that may be adapted according to context, however it is strongly recommended that the application thereof aligns with the *SAQA guidelines for RPL implementation*. A further recommendation is that RPL be viewed as an alternate pedagogy and not be restricted by existing programmes or curricula at the architecture schools. Essentially, RPL is a stand-alone alternative to formal education, however, with a vital practice-theory interface.

The need for further research

The development of the model is to be interpreted as an ongoing response to the constantly changing socio-economic and ecological context. The cultural nuances of local contexts necessitates further research in order to further develop the model and inform curriculum development.

This thesis has responded to the nuances of the South African context, while committing to active engagement within the global knowledge society. South Africa is characterised by rich multi-layered contexts consisting of vast differences in culture and traditions which exist at micro, macro and meta scales. As such, numerous opportunities emerge for the advancement of contextually responsive research in architectural education. The diversity and complexities of the South African contexts could catapult contribution to the global knowledge society and to discourses around architectural education and practice. South Africa therefore has much to offer the developing world, however, a greater interest in critical research on architectural education and practice is needed.

There is a need to further research comparative work across different post-colonial countries in Africa and abroad, notably in South-East Asia as well as South America. The adaptation of colonial knowledge to the nuances of the socio-economic, political and environmental contexts may greatly contribute to the body of knowledge within which this thesis is situated.

While the new model responds to the nuances of a transformed South African context, architectural educators, have generally applied the methods that they themselves were exposed to during the pre-democratic era. As such, there may be great value in research towards developing training programmes for educators. In addition, systems of accreditation / validation of architectural educators is another possible are of future research. The competence of educators with reference to the model developed in this thesis, in line with national frameworks governing education and RPL, is a further possibility for research.

The research is intended to further contribute to, and fuel the debate around decolonisation of higher education and the "fees must fall campaign" in South Africa. While this research will generate papers and articles on these subjects, there is a need for in-depth interdisciplinary research in this regard.

While this thesis has developed a new model for architectural education in South Africa, which responds to the nuances of a transformed social and professional context, it is the intention that the thesis catalyses further research in the areas outlined above as well as in new areas of research that may consequently emanate. Ultimately, the development of post-colonial models of architectural education would require much more research in order to contribute to the global body of knowledge society engaging with this important area of research.

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