TRANSFORMATION ISSUES IN THE TEACHING OF ARCHITECTURAL DESIGN

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Abstract

As a teacher of architectural design in the first year of the Bachelor of Architectural Studies degree at the University of the Witwatersrand, I found that the attrition amongst certain groups of "previously disadvantaged" students was noticeably higher than amongst white students. It became my focus to empirically adapt my teaching to try to facilitate the potential for a successful outcome for all students. This paper describes the course before 2009, the pedagogical interventions that were made from 2009 to 2011 and the course outcomes. The interventions mainly consisted of practical reorganization, building up cognitive skills and academic behaviours. Current research should reveal whether or which interventions may have influenced the improved throughput.

Key Words: *architectural design, teaching, transformation, throughput*

Introduction

The term "transformation" as it is used in South Africa can be described as the changes effected in society to facilitate the equity of opportunities (implying not only access, but the opportunity to succeed) for all groupings in society (author's own derivation based on Wits policy documents [University of the Witwatersrand 2005]). Transformation in tertiary education became a primary focus after 1994, and racial equity has come to be considered as an indicator of success, as evidenced by the new SACAP transformation requirements for Architectural learning sites.

In the architectural profession, transformation has been slow, to the extent that the National Research Foundation (NRF) is proposing a specific inquiry. There are many reasons why admissions into Bachelor of Architectural Studies (BAS) degrees have not yet reached equity, clustered around issues such as earning power, perceived prestige and the fact that the few many people will never encounter an architect in their life. As a lecturer in architectural design, my more immediate focus has been the higher attrition rate amongst the "previously disadvantaged" selected students in my class, than amongst their white counterparts.

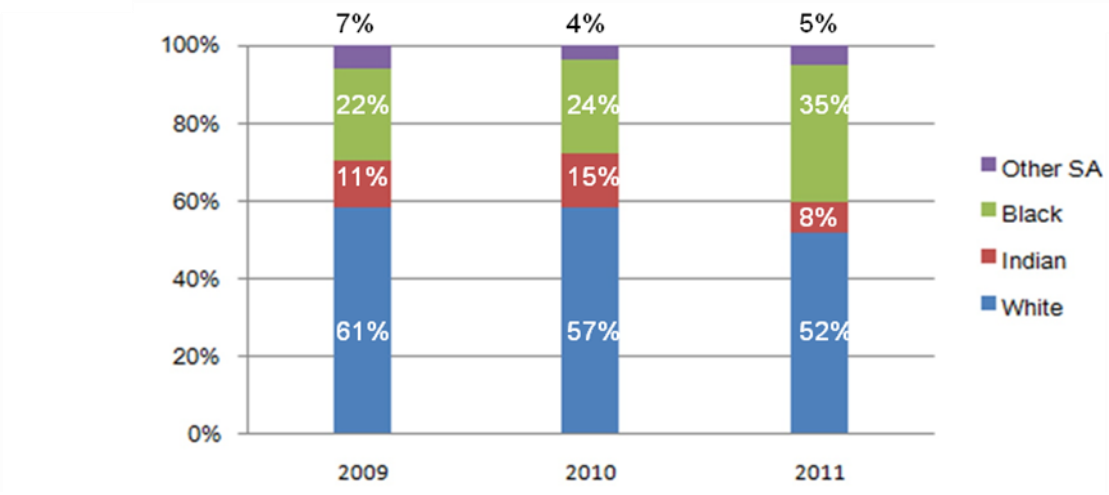

Figure 1: Demography of students registered for first year architectural design at Wits, 2008-2011

At the University of the Witwatersrand (Wits) in 2010, 75 students registered in first year architectural

design class, of whom 18 (24%) were Black. At mid-year, 8 of the 12 students who were failing (75% of the failures) were Black. All these students had come through a stringent selection process and many were students with high potential who were trying hard. Clearly, something was wrong.

It must be noted that in 2011 racial categories cannot be equated with educational advantage, class, or even, increasingly, with culture. However, a shift towards racial equity in throughput can be considered as an indicator of a generally more equitable outcome.

2010						
	Registered Students	**% of Total**	**Pass Semester 1**	**% of those Passing**	**Pass Semester 2**	**% of those Passing**
White	43	57%	40	63%	40	63%
Indian	11	15%	10	16%	9	14%
Black	18	42%	10	16%	12	19%
Other SA	3	4%	3	5%	2	3%
TOTAL	75	100%	63	100%	63	100%

Figure 2: Demography of student throughput in first year architectural design at Wits, 2010

In order to achieve equity within a profession, the critical starting point is equity in student throughput. A successful outcome in "Architectural design" is the best indicator of success in the BAS degree, as it incorporates and integrates all the students' other subjects. It also demands the greatest intellectual integration of abstractions. The question is: How can one teach design in such a way that successful outcomes are facilitated for all students?

Pedagogical model

The BAS degree is a gateway to a profession where standards are determined by the requirements of international practice and accredited by a professional council. This means that the required outcomes are not negotiable. We need to achieve the same outcomes by changing the pedagogy and possibly making the discourse more accessible, without replacing essential content. The present course requires 38 contact hours per week, so if one adds something new, something else has to go.

According to City, Elmore, Fiarman and Teitel's instructional core model (2009:15), student learning only improves if there are improvements in the course content, student engagement and teaching, and you have to change all three to effect any change. Wits's selection processes for BAS are aimed at identifying students with potential rather than evaluating them on their existing skills or background. This results in a richer and more diverse student body with a wider range of understandings, skills and experiences which are not necessarily the ones assumed in pre-1994 architectural teaching models. In architectural design one expresses meaning, values and understandings. Since these no longer come from a single shared culture, the basis from which students engage, has changed.

Prof Jonathan Jansen (2004:301) suggests that the current problem faced by South African urban universities is to "transform institutional cultures in ways that are more inclusive and accommodating of the statistical diversity of their student populations". Architecture's traditionally exclusionary and Eurocentric discourse is currently being challenged and revised in most South African universities. Wider histories of architecture and settlement are being taught, and the technical, cultural and economic knowledge-base and context of projects has become more diverse, changing the course content (Coetzer 2010; Saidi & Nazier 2011). It is still an open question whether this change is deep enough to challenge the profession's engagement with the cultural diversity of the South African community, but even so, course content as well as student engagement have changed, without a significant improvement in equity of throughput. This clearly indicates that our way of teaching also needs to change.

The first year design course until 2009

From 2006 to 2008, the first year Wits design course remained unchanged. When I started teaching this course in 2009, I basically took the given material and started to adapt it as problems became

evident. In 2009 this was a moment-by-moment reflexive process which had to fit into the published course outline. Between the end of 2009 and the start of the academic year in 2010, I could for the first time assess the throughput outcomes and make some adjustments for 2010, based on the experience of the past year, without time to research this formally. I introduced some additional interventions for students failing at midyear in July 2010, which I incorporated into the 2011 standard course.

What I am presenting in this paper is the transformation of the architectural design course from 2009 to 2011 and the outcomes to date. One cannot interpret this as cause and effect, as the formal research into the outcome-value of the pedagogical interventions in 2010 is still being conducted. This will be published in due course.

The design teaching model before 2009 can briefly be described as follows:

Selection process

We use a combination of selection processes to identify students with the potential to become successful architects, consisting of a graphic and written exercise (testing aptitude), a portfolio interview (testing attitude) and academic results, which show whether there is an acceptable academic foundation on which to build.

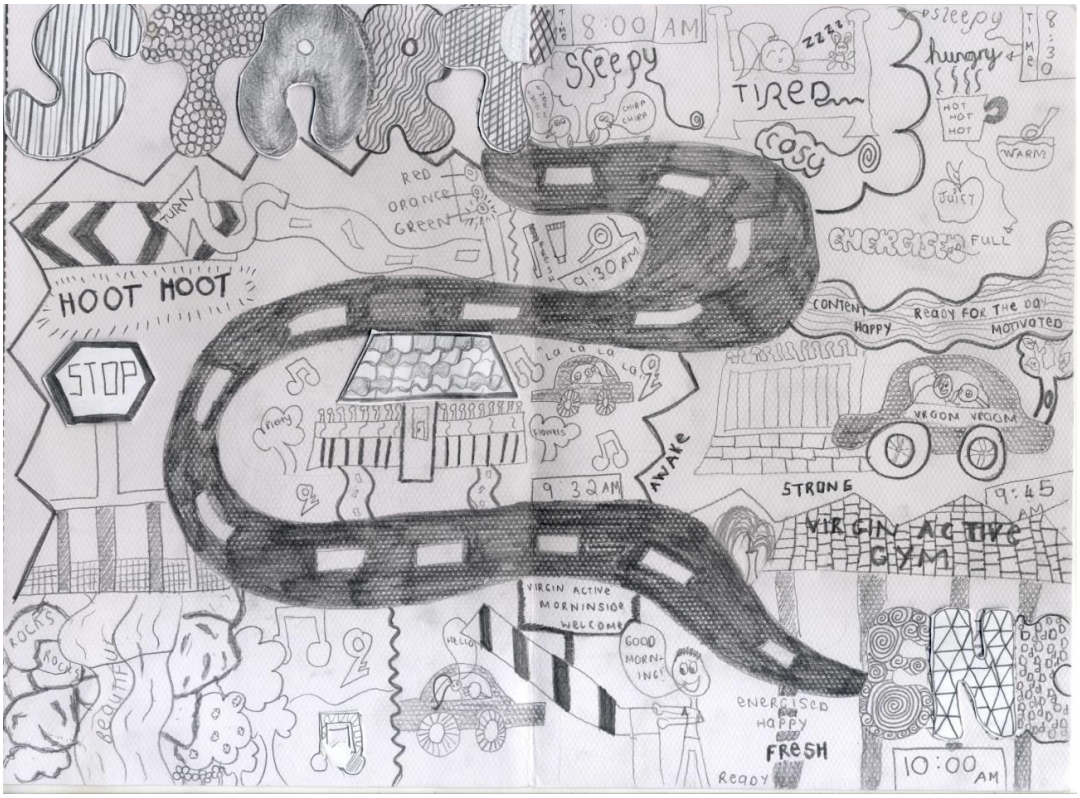

Figure 3: An example of one of the high-scoring graphic admissions exercises, in which applicants had to graphically represent, in pencil, a journey they undertook regularly

Selected students display the following attributes:

- they have temporal and spatial orientation, and the ability to translate this into graphic form
- they are observant, sensitive, aesthetically aware and care about what they do
- they are expressive, artistically creative, and reasonably logical
- they are committed, hard-working, excited about architecture and often set themselves high standards
- they have a reasonable basis in mathematics and can express themselves in English, but not necessarily understand it as well
- they have a rough understanding of what an architect does.

Course aims

The first year course in design aims to introduce the student to the creative process of architectural design

- introducing the student to the primary elements of architectural theory and design
- exposing the student to a broad spectrum of architectural themes, ideas and practices
- awakening the student's creative sensibilities
- sensitising the student to the social, cultural and physical environment and its influence on the built environment and vice versa
- encouraging the student to develop a personal critical viewpoint on architecture.

Required course outcomes

Through the use of standard graphic architectural conventions, free hand sketches, three dimensional drawings, artful presentation drawings, concept models, scale models, descriptive, creative and analytical writing and oral presentation the student must demonstrate the ability to;

- solve elementary design problems
- take design solutions through various stages of refinement
- interpret and understand architectural, social, physical and cultural dynamics
- clearly present appropriate architectural responses.

Course content

Before 2009 lectures and discussions covered the basics of space, the spatial envelope, the design process, concepts, scale, ergonomics, structure, context, materials, identity, formal considerations, memory and spatial meaning, conceptual integration, spatial communication through drawings and models, research and presentation.

Teaching method

Theory of design lectures consisted of a reasonably abstract discussion of theories around slides of buildings. Design assignments were issued using written briefs in which aims and outcomes were defined, the theoretical approach was specified and submission requirements were spelled out. Assignments were often broken up into sub-assignments with specified submission dates. The briefs expanded somewhat on theoretical and philosophical issues. The expectation was that students would integrate the knowledge and skills learned in other subjects into their designs by themselves. Readings (but no lecture notes) were issued, others were prescribed, but there were no set text books.

Students were expected to work in the studio and benefit from peer discussions. They each had a chair and a shared desk and access to the CAD lab. They had access to the library and were expected to make notes of their readings and observations in their sketch books. Once a week there was a "school talk" by an outside professional on architecture or planning practice or research, which they were expected to attend.

Two days a week were allocated for architectural design on the time table. These were generally spent on lecture attendance for the first two hours and critiques (tutor feedback) in the studio for the next 4 hours or more. The class was divided into tutor groups and every student was required to see a tutor to get feedback on his/her progress on the design assignment. This actually happened about once a week as there were 4 tutors for about 75 students. Ideally, all students were to participate in these discussions.

In practice, students generally attended the design lectures and attended the design studio until they had received feedback on their own design assignments, after which they left to work at home. They would listen to the tutors' feedback while waiting for their own turn, but few students actively participated in the discussion or actually worked in the studio. Some preparatory assignments (measuring, researching, etc.) were group assignments, but design assignments were usually individual.

On submission days, students presented their assignments to the class and received verbal feedback. The submissions were retained for marking by the principal design lecturer afterwards. Students' design research, development sketches and rough models were also submitted. Marks reflected whether or not the specified assignment outcome(s) had been achieved. These design assignment marks were added up to obtain a semester design mark. At the end of the semester, each student had a portfolio oral exam in which they pinned up all their design assignments, showed their sketch books and were examined by a panel of tutors and external examiners who questioned them on their design thinking and reading. The assignment mark was moderated by this panel to reflect how well the required outcomes for the semester had been achieved.

In addition, students sat for a written examination in which they answered questions on design theory. During the year they had to write the occasional theory essay and sometimes presented research on architects and their work in the form of seminars. There were relatively few formal lectures on design.
In design assignments, presentation methods and formats were specified. This generally involved hand drawings and model building. Digital techniques were taught towards the end of first year, but not yet allowed in assignment presentations.

In 2009 when I started teaching this course, design theory (comprising discussions on different architects' approaches to design and an examination of precedent) was being gradually phased into the History course. The School had also recently had an accreditation inspection from SACAP in which they had recommended a better integration between design and construction.

Problems encountered in design learning

With this teaching model, these were some of the phenomena that were evident in assignment submissions, as observed and commented upon by teaching staff:
Some class groups had synergy and even weaker students' projects were improving, whereas other groups were static (Elaboration upon grouping strategies to follow).

Some students;

- did not really engage with the design process
- did not seem to have the basic language and drawing skills that are needed to explore, develop and present a design
- did not seem to understand how to produce the outcomes specified in project briefs, despite having attended lectures on all the required components
- did not seem to understand what a concept was and how to use it to integrate the different components of a design problem
- seemed to struggle to produce an end result, despite having had good ideas and enough time in which to develop them. They often changed concepts when they encountered problems in place of resolving them.
- displayed little awareness of the importance of the formal academic framework in which their studies are being conducted e.g. they did not pin up in time for deadlines, notify the university administration if they were absent because of illness, apply for deferred examinations in time, etc.
- were not familiar with urban and/or architectural spaces and their related spatial expectations.

Most students;

- feared experimentation and were more orientated towards achieving high marks than towards learning, as evidenced by students' questions,
- seemed to struggle with time management, as evidenced by incomplete or late submissions.

Possible causes for problems encountered

The following preliminary surmises were made about likely causes for these observed problems, matching the problem to known facts about students' backgrounds from class survey questionnaires, individual discussions with students, and demographic data from admissions records.

Some students

- do not know what is expected of them or what resources are available in a university environment, probably because they are the first in their family or even community to attend a university.
- do not follow abstract discussions or instructions in class, probably because English, the medium of instruction, is not their first language. They are seemingly fluent in English during essay-writing because they use the limited vocabulary that they do know, but do not understand assignment critiques.
- wait to be given instructions and told the answers rather than showing initiative, probably because they attended schools where they were expected to memorize and reproduce rather than to critically analyse problems and find solutions.
- think they have resolved a design when they have only addressed one aspect of the problem, probably because they attended schools where it was acceptable to do a project by reproducing information from one source instead of integrating information from different sources into a new, ordered whole.
- are overly concerned that their design is "correct" and are very hesitant to explore new possibilities, probably because their schools trained them by rote to produce high marks. They fear mistakes and avoid the learning experiences of criticism and unsuccessful quests.
- find it impossible to resolve a design problem, probably because they lack the drawing or writing skills to explore and test ideas too complex to just imagine. It takes a long period of putting in extra time to catch up on skills which require practice, during which time they are also designing more slowly and cannot test as many possibilities.
- struggle with time management, probably because they have little grasp of how long it will take to do a project as they have never done this before.
- have grown up in rural or economic circumstances where they probably have very little experience of urban spaces and complex building typologies.

Two other significant problem areas emerged:
Students who submit late or attend badly are sometimes in difficult financial circumstances which cause them to live far from campus. They cannot afford fast transport or drawing materials and end up working part-time in order to cover costs. This all takes time that they do not have and often leads to despondency.

Academic teaching is traditionally geared towards intuitive rather than sensing learning styles; conceptual rather than active learning styles; verbal rather than visual learning styles and sequential rather than global learning styles. The majority of undergraduate students tend to have sensing, active and visual learning styles. When teaching difficult concepts, it helps to transmit them in the way that can be most readily understood i.e. by addressing individual learning styles (Felder & Brent 2011).

Interventions and changes from 2009-2011

Approach

In teaching, it matters that each student is given the best possible chance of success. There is not time to fully research and ascertain causes before attempting to solve problems. The approach was therefore to use all the strategies that looked likely to be helpful, in the hope that some would produce the desired results, and later identify which had been effective.

Implemented interventions

The selection process, course aims and outcomes were not changed at all. The pre-2009 course remained in place with only the following implemented changes, which were mainly organizational or pedagogic.

General facilitation of learning

In order to maximise peer learning and assistance, I tried to facilitate student cohesion and contact in many ways.

I specifically compiled student project groups so that each group included students from different backgrounds, strong and weak students, mature students and students who had failed the previous year. In 2009 students chose their own groups and that class has remained very segregated. In 2010, I did an alphabetic division but increasingly found that one group was lagging behind. It turned out that this quarter of the class had surnames starting with M, and were predominantly Black. There was less variety of approach in the group to spark new ideas, and there was too high a percentage of students whose schooling had not prepared them well for architecture. I reshuffled these groups in June 2010.
Since 2009 we have acquired 4 post-graduate student tutors to assist the sessional staff in studios, giving a 1:10 staff:student ratio so that students who are struggling can receive more individual attention in the ordinary studio sessions and every student can discuss work twice a week.

Students who were obtaining less than 50% for assignments were specifically invited to additional workshops. The principle is always to offer this to the whole class to avoid identifying and stigmatising a "disadvantaged group". The invited students generally do attend, while the good students who do not want to miss out on anything also come, which provides good synergy.

I start the year with several interactive group projects to facilitate communication amongst students. We have always had a "memory box" design assignment in which students spatially communicate their personal histories. I scheduled enough time for every student to present his/her project to the whole class. The aim is to get to know one another better, to share the richness of one another's stories and to develop a more real view of the South African society in which we design. Both staff and students really enjoy this, and it gives me insights into students' backgrounds and possible solutions to learning problems.

Figure 4: First year design students participating in group activities. Left: A joint performance exercise with students from the University of Pretoria, (2010). Right: A practical workshop on size and scale, (2011).

We have been improving the physical studio environment year by year and have also been setting up fun projects in the studio at the beginning of the year to encourage students to work there. The improvements included new desks suitable for all kinds of work, enough lockers for most of the students so that they can safely leave personal belongings in the studio, magazine shelves, tables for communal cutting mats and a kettle. Students have a key to a store room in which we store projects and supplied butcher paper. In 2009 we suggested that students work in the studio, but hardly anyone did. In 2010 there were more. This year they have owned it to the extent that they want to repaint it themselves in order to be able to put their own graffiti on the walls. About half of the students work there as a group when they need to work late nights.

The first year studio is a thoroughfare for senior students and this has produced a very good synergy for the first years, who receive comments and advice and get to know their peers. Another positive development was that some thesis students volunteered to help mentor first years. The initiators of the

scheme were disadvantaged students who had themselves felt the need of peer support. This provides excellent bridging for students who are not familiar with a university environment. We can also match home languages in cases where students are struggling to understand English.

Bridging from pre-university to university

Research has shown that students who are ready for university learning should display key cognitive capabilities, key content, responsible academic behaviours and contextual skills and awareness (Conley 2008:6).

Architectural key content is a broad awareness of context which is mainly built up through observation; a sound foundation in Mathematics and preferably also Physics, and a good working knowledge of spoken and written English. Admissions procedures generally eliminate students who have a weak foundation in Mathematics. There are students who have passed matric English and even sound fluent, but struggle to understand abstract language or to write well. I try to demystify architectural language by explaining concepts in simple, everyday English.

I partially bypass incomplete comprehension by illustrating lectures very visually; by actually illustrating how things should be done through step by step examples, and making this visual content digitally accessible in the CAD lab afterwards.

There is however still an urgent need to improve students' language skills to a point where they can write dissertations and run projects in English. The Faculty introduced an "academic skills course" in 2010 which covered skills such as taking lecture notes, writing paragraphs and managing time. Architecture students did not find it specific enough to architecture to be very helpful. In 2011 an English lecturer was appointed to integrate a writing course with History and Theory of Architecture. Students received tuition and criticism in creative writing for their written History and Design assignments such as a memory box poem or a critical essay based on readings pertaining to the city. This has been very well received because the subject-matter has sustained their interest, and they see the relevance.

Drawing is another skill which some students lack. We introduce the importance of graphic communication at the beginning of the year and give students drawing exercises to do to start building up competence. I introduce design tutorials in which they do fast sketches, explore line weights and lettering, shading and texturing. By giving a high mark-value to the sketch book, we hope to cultivate habits of reading and sketching. Despite this, some students neglect this. I have also introduced weekly small, step-by-step tutorials to introduce and practice other practical skills such as model-building before they are required in design assignments.

We encourage unsuccessful applicants who want to reapply to spend their waiting year practicing drawing and reading in order to better equip themselves. More and more of our successful applicants are following this route.

We expose students to a wide variety of urban and spatial circumstances and many different buildings to enlarge their spatial vocabulary. The first city bus tour takes place during the introductory week, with two more excursions planned. At the beginning of most lectures I give a quick visual overview of a great building.

In 2011 I followed the example of the Urban Planning programme and used the first academic week to introduce students to University, the School of Architecture, studio culture and practicalities. This orientates them in a way that is applicable to this course, as the University's own school bridging initiatives are ongoing and take much time. This type of bridging builds what Conley describes as contextual skill and awareness.

Integrating subject learning

Since some theory seminars and essays have moved over into History of Architecture, there has been time to give additional lectures in the practical design considerations which are often neglected at traditional academic institutions, e.g. scale, privacy, security, ease of circulation, etc. It is important to show how this is applied in beautiful design examples.

I also give many more lectures that show how the theory learned in other subjects is understood and applied in good architecture, and then co-ordinate my programme with other subjects to specifically use knowledge they have just taught in the next design assignments.

We are increasingly running assignments across different subjects, e.g. in design we talk about structural principles and examples found in nature. In one tutorial students have to find a prototype in nature and sketch possible applications of this principle in architecture. They will then take these principles through into Theory of Structures and build a structure that uses this principle. They will then use this structural type to design a small pavilion as part of a larger design assignment.

Designs are often taken into Construction where working drawings are produced and design detailing is resolved and then re-assessed as part of the design project: did the concept come through?
We now require students to pin up work from Design, Construction and Representation for their portfolio oral so that we can assess whether they have applied the learning from one subject to the others.

Key cognitive strategies

Conley (2008:7) specifies that these include problem formulation and problem solving, research, reasoning, argumentation and proof and interpretation. I illustrate and apply these strategies in my lecturing by always explaining why and where a skill or learning will be applicable in the design process, how to arrive at an answer, how this logic works - but then I leave them to practice it by having to find their own answers. I do practical, real-life exercises such as building spaces out of desks to establish an awareness of size and scale, or to create a certain atmosphere. This bridges language gaps and also addresses the issue of active and visual learning styles.
I break down the first design assignments into small, sequential steps with submissions at each sub-step. This teaches students how to break down a complex problem into manageable chunks and then reintegrate the solution. It also shows us where students are struggling. In 2010 we did this as an additional design workshop; in 2011 we integrated it into the normal programme as a 3-day en loge.
By introducing a new outcome requirement in one design assignment, allowing students to learn from their mistakes, and then requiring the same outcome in the next assignment once they have learned to do it, does build confidence.

Conceptual development

The bridging into construction is done in the second semester. To counterbalance these longer projects, I introduced more shorter, conceptual exercises in the first semester. The 2011 year's design projects explore spatial characteristics, scale, basic measuring and graphic representation of buildings; ergonomic design; a multilevel excavated dwelling without furniture; spatial meaning and metaphor; a contextual design of a small house plus office on a real, steep suburban site with a view; a small community facility in a public space enhancing and embodying the identity of the city; a complex with a shelter, an artist's studio and residence and a public gallery in a large conservation area. They research the artist in question.

Academic behaviours

Finally, there are academic behaviours that need to be learned, which are described as self-awareness, self-monitoring and self-control of processes and actions necessary for academic success (Conley 2008:9).
I present first year design in a structured, disciplined way so that students experience what it entails to complete work on time while maintaining the habit of good attendance. This enables them to cope with the work load and provides a point to which they can return if their own strategies fail.

We are constantly reminding students that they are responsible for their own learning, and that our goal is to cultivate their design ability rather than to produce immediate results or good marks. We try to provide a safe space in which they can take risks, learn and grow faster, and we encourage experimentation.

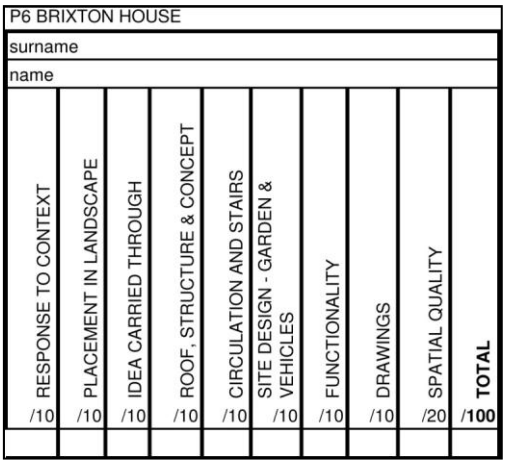

Figure 5: An example of a feedback rubric for a first year architectural design project.

We therefore give criticism that puts the good and the bad into a perspective and opens up possible choices rather than giving advice. Students always have to take and justify their own decisions. They have to stand by their choice and resolve it rather than restarting, which we facilitate through interim goals. I enforce a rotation of tutors for each new project to expose students to different viewpoints, personalities and even marking styles, but with standardised, detailed feedback sheets (figure 5) for each project and combined staff reviews of all marking to ensure fairness, transparency and learning.

Conclusions

Most of the attempted interventions were simple, organisational changes that make a big difference to the environment in which a student has to learn. In the case of students who are in actual fact disadvantaged in terms of their previous experience, this could make it possible for them to use their time and energy for assignments instead of negotiating frustrating detours, and make the difference between passing and failing. This probably makes less difference to a student who understands the university environment and knows how to make things work, while improved teaching approaches and better design projects probably enhance all students' growth as designers. This can only be confirmed through the proposed research.

The challenge has been to improve students' chances of successfully meeting outcomes without additional resources. If this is not sufficient, an extra teaching year will be necessary, as extra time will be needed with individual students, and there is no extra time available in the present first year structure. There has been a steady rise in the throughput rate of first year design students since 2009. This may be due in some measure to an increase in the potential of each year's group, but at least the aim of closing the throughput gap is being achieved. It seems likely that some of the interventions described in this paper have contributed to this outcome. At the beginning of 2012 groups from 2008, 2009, 2010 and 2011 will be questioned and focus groups will be conducted amongst staff to assess the effectiveness of interventions, and a model for facilitating successful design learning outcomes will be developed.

	2009	**2009**	**2009**	**2010**	**2010**	**2010**	**2011**	**2011**	**2011**
	Registered Students	Pass Sem 2	Through-put	Registered Students	Pass Sem2	Through-Put	Registered Students	Pass Sem2	Through-put
White	46	39	85%	43	40	93%	41	39	95%
Indian	8	4	50%	11	9	82%	6	6	100%
Black	17	13	76%	18	12	67%	28	25	89%
Other SA	5	4	80%	3	2	67%	4	3	75%
TOTAL	76	60	79%	75	63	84%	79	73	92%

Figure 5: Changes in the demography of student throughput for first year architectural design from 2009 – Jun2011

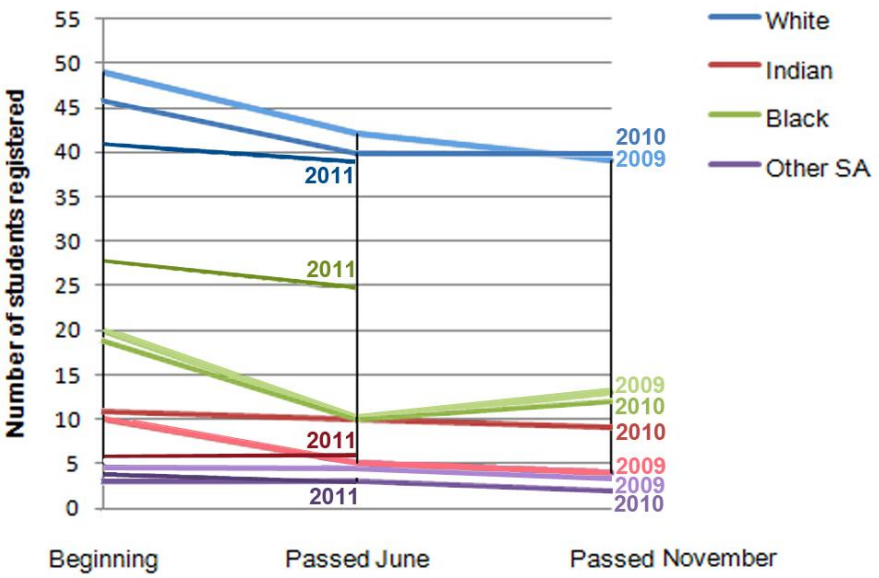

Figure 6: Changes in the demography of student throughput for first year architectural design from 2009 – Jun2011

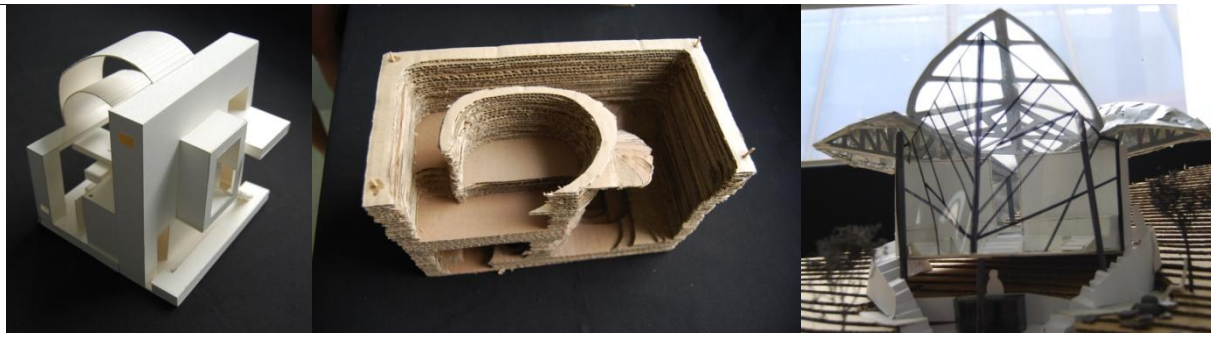

Figure 7 Examples of projects produced by first year architectural design students (2010) (LTR Montjane P2, Thomas P3 and Blumberg P5)

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Short Biography

Ariane Janse van Rensburg grew up in Pretoria and qualified as an architect at the University of Cape Town. After working for architects such as Peter Hattingh and Revel Fox, she opened her own practice doing domestic, educational and smaller institutional work. In 1993 she won a stained glass design competition and attended Pilchuck Glass School in the USA to train in glass painting under Debora Coombs. She has since also done commissioned glass work, exhibited and taught glass painting.

She joined the full-time staff of the School of Architecture and Planning of the University of the Witwatersrand, Johannesburg in 2008, where she attained her MArch (by research) on symbolic meaning in windows and is currently reading for her PhD in architectural education. She is a senior lecturer in architectural design and the undergraduate degree convenor for the architecture programme.