FIFTH FARU CONFERENCE- 2011

Architectural Education Encounters :

Towards Next Century

Faculty of Architecture
University of Moratuwa

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ARCHITECTURAL EDUCATION ENCOUNTERS:
ENCOUNTERS:
TOWARDS NEXT CENTURY

The peer reviewed and accepted research papers of the conference are included in this volume

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MESSAGE FROM THE DEAN, FACULTY OF ARCHITECTURE

It is a great pleasure for me to have the opportunity to write this massage for the Fifth research symposium of the Faculty of Architecture Research Unit, University of Moratuwa. At present the Faculty has a relatively strong research culture. Research activities are carried out at three levels; i.e Faculty level, Department level and Individual level. Major mode of presenting research carried at Faculty level is to hold the annual research conference on a theme related to built environment. This year it has been decided to hold an international conference on Architectural Education in conjunction with the celebration of 50th anniversary of Architectural Education in Sri Lanka.

The theme "Architectural Education Encounters Towards Next Century" was selected for this conference to appraise and discuss the architectural education especially teaching, research and the practice, in locally and globally in the context of planning, designing and managing of the built environment. It will also deliberate on the current issues related to the architectural education and future directions with a view to produce competent and wholesome built environment professionals who will be contributing towards the building of a richer and more complete picture of architectural knowledge, practice and learning.

This conference will give our academics and professionals the opportunity and the venue to discuss and deliberate various issues pertaining to built environment in the local and global context.

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FORWARD

Architectural education started in Sri Lanka in 1961 at the Institute of Practical Technology of Moratuwa. The course led to the Part I of Royal Institute of Architects. Later it was shifted to the University of Colombo and again back to Moratuwa to the Katubedda Campus of the University of Sri Lanka. After 50 years of existence, the program has transformed into a well-established 5 year honors degree, accredited by RIBA and by Sri Lanka Institute of Architects for the Part II of their professional qualifications, and also recognized by Commonwealth Association of Architects. Today, the course is run by the Department of Architecture at the University of Moratuwa, aptly supported by the two sister departments: Department of Building Economics and Town & Country Planning. The student numbers and faculty have increased, along with the research culture at the university. Today, the evolved education program is fully pledged one with a significant knowledge-constructor and disseminator. The diversification of architectural education during the last 50 years is remarkable. Faculty of Architecture Research Unit (FARU) of the University of Moratuwa dedicates its fifth Annual Research Conference to architectural education in order to mark this milestone. The research papers that were referred and accepted for the fifth FARU conference are compiled here.

FARU commenced Annual Research Conference in 2007, with 25 papers that presented the on-going research at the faculty. Taking a step forward, a refereed Research Conference was organized in 2008 with the theme of Built Environment and Its Futures. The conference received a good response from academics, practitioners, and from the industry. Theme of the Second FARU Research Conference emerged from the opinions of the members of FARU, with the aims of establishing the faculty as the centre of excellence in the field of built environment. New concepts, coined by Asian and Western aca-demics that are being tested by the faculty members were presented by the competent academics. As it is the case, the faculty members showed that the Moratuwa is in fact taking a huge leap towards establishing itself as the best university of the island. The emergence and spread of modernity, place-responsive architecture, conservation, ergonomics, and global culture, and for the first time, disaster-related research topics were presented by architects, quantity surveyors and town planners. FARU published the research abstracts, taking another major step. Third conference was again limited to the internal staff, a way to self-assess our strength. Fourth FARU conference had a special focus on Vernacular architecture. The fifth is the culmination having focused on education, and this volume presents the works of numerous academics.

FARU wishes to thank the Chief Guest, Deshmanya Vidyajothi Dr. Roland Silva, Chancellor of University of Moratuwa, Vice Chancellor, Prof. Malik Ranasinghe, Keynote Speakers, and participants for their contributions.

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Improving Quality of Group Work:
Reflections on Module - Colour (AD 1030/DD 1030)

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Abstract

Working in groups has been established as to having multiple benefits in higher education. Yet, its effective execution to achieve the expected outcomes in terms of quality has always been a challenge. The mark received through assessing both the process and the product of a group work is considered to represent its quality in the present study. Lack of cohesiveness, commitment, enthusiasm, uneven contribution of group members and uncertain learning outcomes, were found as to affecting the expected quality of a group activity shared by students of B. Arch and B. Des Level One in year 2009. Only 16% out of 104 students were able to produce good quality work, obtaining above 70 marks, meeting the expected learning outcomes.

To assure high quality group work in the subsequent academic year, several strategies were adopted. The students were free to form own groups in order to uphold interest throughout the process. Assessment criterion and expected outcomes were explicitly and transparently communicated beforehand and reviewed frequently. Prompt feedback for improvement was given at interim submissions where groups which met the outcomes were praised in order to create a sense of challenge and motivation. The group mark (80% of the final mark) was awarded to each member and adjusted for individual contribution via controlled peer assessment (20%). Ground rules were established at the onset to ensure quality, unleash creativity and to facilitate an enjoyable learning experience. Consequently, 99% of 104 students scored above 70 marks, witnessing a remarkable improvement in the quality of group work.

Keywords: "group work", "quality", "learning outcomes", "assessment"

Introduction

This paper draws attention towards authors reflections on a group activity carried out for the final assessment of colour module (AD 1030/DD 1030) shared by Bachelor of Architecture (B. Arch) and Bachelor of Design (B. Des) Level One students in academic years 2009 and 2010, at the Department of Architecture, University of Moratuwa. At the onset, providing supportive evidences from literature, the paper will discuss benefits of working in groups that inspired the choice of integrating group work in to the colour module. Secondly, it focuses on certain factors which affected the quality of the output of group work with reference to the aforementioned group activity conducted in academic year 2009, as revealed by student feedback, with supportive literature. To end with, the main strategies identified and effectively implemented in the subsequent year to improve quality of group work will be brought in to the limelight.

Module Details

Colour (AD 1030/DD 1030) is a 1.0 credit module of which the learning outcomes are to introduce the fundamentals of colour theory, recognize colour as an integral part of design, develop sensitivity to colour, promote meaningful application of colour in architectural and product design and finally and most importantly to encourage innovative experimentation with colour

applications. Assessment is 100% course work based and the criteria comprises of three parts as mentioned below.

Part I   - Group work – Project Report (40%)
Part II   - Group work – Presentation (40%)
Part III - Controlled Peer assessment for individual contribution (20%)

Colour is an extremely unique area of study which demands beyond conventional teaching, learning and assessment methods. Meaningful application of colour in design is distinguished as a skill to be developed by the students. The sensitivity to colour and creative thinking is vital in this regard. There are a handful of students who are born with this innate sensitivity, yet for the others this should be developed as a skill using a variety of techniques. Providing opportunity to experience appropriate precedents as much as possible is one way to trigger their sensitivity. On the other hand, providing explicit knowledge on the theories, concepts and principle of colour can help them improve further. The teaching, learning, assessment methods and module outcomes are set purposely by taking the above aspects into consideration.

Integration of group work in colour module – Intended benefits

Working in a group to accomplish a common goal in terms of learning and assessment is established to bring multifaceted benefits to the learners. The use of group work in colour module is twofold. It is integrated as a form of learning as well as a form of assessment. Students learn in groups based on a particular project assigned to them which shall be examined in groups as the final assessment. The purpose behind the integration of group work for colour module is explicated below with supportive literature.

Group work is catalyst for effective learning. It enables an active, effective and interesting learning experience for both students and the lecturer. As stated by Davis (1993), regardless of the subject matter, students working in small groups tend to learn more of what is taught and retain it longer than when the same content is presented in other instructional formats.

Group work promotes active learning. Students learn best when they are actively involved in the process (Davis, 1993). Group work promotes "active" as opposed to "passive" learning (Kremer and McGuiness 1998; Ruel et al. 2003 as cited in Davies 2009, p.564)

Learning in groups promotes deep learning through discussion. Group work promotes "deep" as opposed to "surface" learning" (Entwistle and Waterston 1988 as cited in Davies 2009, p.564). Each and every student has a particular level of understanding of colour with their exposure, experience, past knowledge gained and the level of sensitivity. Thus, learning in groups enables the students to pool and share their diverse ideas with each other and obtain a deeper and richer comprehensive knowledge on the topic under discussion. As portrayed by Gibbs and Habeshaw, (1989, p.70), learning together brings great benefit to students. Discussion is vital if students are to understand their subject. Meaning cannot be conveyed directly but needs to be constructed within each student. The negotiation of meaning which takes place in discussion is a very effective way of constructing meaning.

Group work develops the skills required to become an effective team player who could understand and respect others, bear responsibilities, manage time and communicate effectively to co-exist with sustained enthusiasm until reaching final output, which is essential in the practice of both architecture and design.

It is also claimed to be an authentic form of assessment in terms of a student's later employability, as working in groups is an essential part of an individual's career, and recruiters often ask students about their experience working in group settings (Ackermann and Plummer 1994; Bourner et al. 2001; Maguire and Edmondson 2001; Mutch 1998; Ravenscroft 1997 as cited in Davies 2009, p.564)

Working in groups to achieve a common goal will immensely save a lot of time, effort and energy of both students and lecturers significantly when it comes to batches with a large number of students in it. Supporting this idea, Davies (2009, p.564) states that, if used effectively, group work is an efficient way of dealing with the increased growth in student numbers in higher education, especially in regard to reducing time taken in assignment marking and allowing reduction in class time. In addition, it can be a way of dealing with larger numbers of students in the same amount of class time.

Group work helps harness creativity demanded by the final product. Discussing points of interest and controversy enables the contributors to develop deep approaches to the processing of information. This is especially important if you aim to develop your student's ability to work creatively with ideas to develop their ability to think things through, and to develop their communication skills e.g. to present a point of view logically or to build on the ideas of others (Gibbs and Habeshaw, 1992, p.70). Small group work can be an important supplement to lectures, helping students' master concepts and apply them to situations calling for complex applications of critical thinking skills. ("Cooperative Learning", 1999) At the bottom line, it is integrated to promote a more satisfied and motivated learning experience. Students who work in collaborative groups also appear more satisfied with their classes (Davis, 1993).

Quality in group work -The line of reasoning

Considering the facts mentioned above, group work was integrated to the colour module as the main learning and assessment method to facilitate an active, effective, enjoyable, peer learning experience for the students while developing their creativity, critical thinking and team skills. Thus, ensuring its effective execution is extremely vital to obtain these benefits to the optimum level in order to achieve the set module outcomes. In view of this, the present study will focus on quality of the output as a point of reference to measure the effectiveness of group work. As defined by the Oxford dictionary, quality is the degree of excellence achieved in any endeavor. In the academic milieu assessment criteria can be set aligned with the expected out comes to measure the degree of excellence. Consequently, if a group achieves all its expected learning outcomes required by the module established by the assessment criteria through its output, it can be considered as having achieved good quality.

Thus assessment, or simply the mark, becomes a tool to test quality of work. Quality in terms of both the process and the product should be assessed in this regard. Accordingly, the mark received via assessing the process and the final product is established to represent the quality of work. In this study the marks or grades A- (70-74), A (75 – 84) and A+ (85 & above) were considered as reflecting good quality work.

Concrete Experience
(Academic Year – 2009)

The group project conducted in academic year 2009 was based on a study on the concept behind the colour scheme of a building design or a product design (such as fashion, advertising, cinema, drama, animations, cartoon, logo design......etc).

Students were requested to divide into 10 groups and study a well established example (A building/ product) for its meaningful colour application, selecting out of a list given to them. At the onset the groups had to comprehend the knowledge in depth on the principles, theories or concepts taught in the module via discussions and exchanging ideas. Then with that established background knowledge, students were made to understand, enquire and critically analyse the selected example for its colour application and come up with creative suggestions and recommendations. They were asked to compose a project report and make a power point presentation based on their findings. Both project report and the presentation carried equal marking weights of 40% of the final mark and was assessed by a panel of examiners .The students assessed their own group members to encounter individual contributions towards the final goal which carried 20% of the final mark. Eventually each student was given a final individual mark. Written feedback was obtained from students on the group activity and the final marks obtained were analysed to test the quality of work. During this process it was identified that only 16% out of 104 students were able to produce quality work by obtaining above 70 marks and thus meeting the expected learning outcomes.

	2009 B. Arch	2009 B. Des	2009 Total	%
No of students	53	51	104	
A+ (85 & above)	-	1	1	1%
A (75 – 84)	4	5	9	9%
A- (70-74)	2	5	7	7%
B+ (65-69)	15	2	17	16%
B (60–64)	27	-	27	26%
B- (55-59)	1	12	13	13%
C+ (50 -54)		16	16	15%
C (45 -49)		1	1	1%
C– (40-44)		9	9	9%
D (35-39)		-	-	-
F (34 & below)	4	0	4	4%

Table 1: Distribution of marks – Academic Year 2009
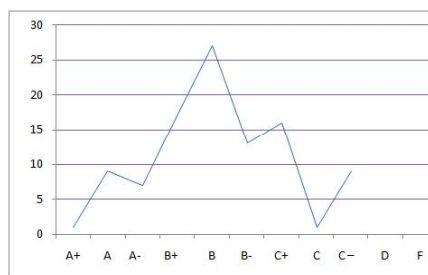
Graph 1:
Distribution of marks - Academic Year 2009

The reason behind the aforementioned performance of students was investigated via critically analysing the student's feedback forms.

Problem Identification – Factors Affecting Quality

Working in groups has its established drawbacks as well. Significantly, its effective execution to achieve the expected outcomes in terms of quality has always been a challenge. As depicted by the student's feedback, lack of cohesiveness, commitment, enthusiasm, uneven contribution of group members and uncertain learning outcomes were found as the major factors to affect the effective execution of group activity, eventually affecting the quality of the final outcome.

The summery of drawbacks of the activity implemented as pinpointed in the feedback by the students are presented below with supportive literature.

Method of grouping: Most of the groups were unhappy about their members as they were grouped following a heterogeneous approach; following the order of the class register. Some faculty prefer randomly assigning students to groups to maximize their heterogeneity: a mix of males and females, verbal and quiet students, the cynical and the optimistic (Fiechtner and Davis, 1992; Smith, 1986 as cited in Davis 1993).

Uncertain Objectives: The assignment was introduced after the lecture series and the assessment criterion was not given to the students beforehand. This had been a direct reason for most of the groups not meeting the expected outcomes and quality standards.

Bad time management: Amidst the busy schedules and submissions of other subject modules, the group members had restrictions to interact and work as a team in terms of time and opportunity. Therefore the group spirit and cohesiveness was less.

Uneven contribution: Uneven contribution of members was highly visible throughout the peer assessment. It may have been caused due to lack of interest and motivation. As established by Kerr and Bruun 1983; Morgan 2002 as cited in Davies (2009, p.566), motivation of participants has been noted to be one of the most serious problems in group work.

When carefully scrutinising the student's feedback it was palpable that this group activity was perceived as a mere academic exercise by the students, thus there was nothing to sustain their interest. Except for two exceptional groups, all the others put bare minimum effort just to meet the submission deadlines.

The activity didn't come out as an enjoyable learning experience.

Identification of Solutions

As clearly stated in "Cooperative Learning", (1999), in a competitive academic environment, where students have most often been rewarded for individual effort, collaboration may not come naturally or easily for everyone. Therefore, in order to remedy the aforementioned issues, a few strategies as listed below, were identified through literature.

1) Design group tasks that require interdependence

The students in a group must perceive that they "sink or swim" together, that each member is responsible to and dependent on all the others and that one cannot succeed unless all in the group succeed. As distinguished by Kohn (1986) as cited in Davis (1993), knowing that peers are relying on you is a powerful motivator for group work. Groups may be assigned by the instructor or decided upon by the students themselves (and there are advantages and disadvantages to each approach) but the key is that the tasks to be accomplished require interdependence, so that no individual student can complete the assignment alone ("Cooperative Learning", 1999).

2) Design group work to facilitate an enjoyable learning experience.

Weissglass (1976) found that a small group approach is quite effective in providing an enjoyable learning experience for students. Both "enjoyable" and "learning" are important here. There is good reason to expect that students can participate in a classroom experience that is enjoyable and results in learning.

3) Setting clear objectives at the onset

Addressing the aims /goals of group work at the onset will make students far more motivated to participate. Being clear at the outset of the class and in the syllabus, about how much of the work in the course will involve group effort and about why such group work will help achieve the goals ("Cooperative Learning", 1999). As established by Gibbs and Habeshaw, (1992, p.71), students will feel happiest with their small group work if the benefits they hope to get from it are clearly visible to them. Most specifically, students respond positively to a clear statement of aims and objectives for the small group work just as for any other learning experience. You can help them by making your own aims explicit and by encouraging student contributors to do the same.

4) Setting the ground rules at the onset

All groups have ground rules. If you want different ground rules to operate, then you will have to state at the start what these rules are to be (Gibbs and Habeshaw, 1992, p.70).

5) Students to form their preferable group

Some faculty let students choose with whom they want to work, although this runs the risk that groups will socialize too much and that students will self-segregate (Cooper, 1990 as cited in Davis 1993). Allowing students to select their own group members can work well in small classes, but this method always runs the risk of further isolating some students or creating cliques within the class as a whole ("Cooperative Learning", 1999).

6) Group Size between 4 and 6 students

Most faculties who have included collaborative work in their courses agree that groups of between 4 and 6 students seem to work best, though depending on the task, larger groups (8-10 students) can function successfully. Determining how the groups will be formed can be more complicated, since ideally the groups should be diverse enough to include students with a range of intellectual abilities, academic interests, and cognitive styles ("Cooperative Learning", 1999).

7) Providing Prompt Feedback

Feedback from the instructors, group members, and other groups helps each group keep on track and therefore helps build cohesiveness. If groups are unclear about their progress, then difficulties between members may hinder their ability to work in an orderly fashion towards an agreed upon goal ("Cooperative Learning", 1999).

8) Evaluating individual work

Grading the group achievement overall should be based both on the success of the final product and the group's assessment of its operation ("Cooperative Learning", 1999).

Planning the Solution and Implementation

Considering the strategies identified from literature the solution was planned and implemented as mentioned below.

Activity - The group activity was changed and structured with the intention of facilitating an effective and enjoyable learning experience. Students were directed to conduct a comprehensive study on a selected colour in groups with special reference to its diverse effects on human beings to be considered for colour specification in architectural and product design using the principles, concepts taught in the module, supported with literature available and peer discussions.

Once the effects of the selected colour were firmly gripped, the next step was to enquire and critically analyse five selected examples where this colour had been integrated logically and meaningfully using the corresponding effects. The assessment criteria and the submission requirements were same as previous project. Following are the strategies adopted for academic year 2010 with the intention of improving quality of group work.

• At the onset of the lecture series the students were briefed on the benefits of group work.

• Grouping was done based on their interests. The students were free to choose the colour to study as per their favorite colour/colors to sustain the interest throughout the process.

• Most importantly, the groups were encouraged to sit and learn together during lectures to gradually improve cohesiveness and interdependence.

• The module structure, assessment criterion, and expected outcomes were explicitly and transparently communicated beforehand and frequently aligned and reviewed.

• Teaching learning and assessment were aligned and at every lecture the students were reminded where they are in the module structure and how the contents of each lecture is related to the assessment.

• On principle, the lecture notes or slides were not given to the students, providing an opportunity for them to be involved and find things out by themselves as a team.

• Two interim submissions were organized to provide prompt feedback.

• The groups which met the criteria at interim submissions were promptly praised as a reward and to create a sense of challenge, competition and motivation.

• Ground rules were established at the onset to ensure quality, unleash creativity and to facilitate an enjoyable learning experience, as mention below.

1) Everyone should contribute equally.

2) Every group should obtain approval on the selected examples before proceeding with the study.

3) Every group should be formed as a combination of both B. Arch and B. Des students to ensure diverse inputs.
(Maximum 5 students from each stream)

4) The number of students per group should not exceed 10.

5) Every student should participate in the presentation.

6) All the group members should be dressed in the group colour at the final presentation.

7) Each student should mark all the members in the group discretely for individual contribution throughout the process, in the assessment sheet provided. (Represents 20% of the final mark)

8) All the sources of references should be cited promptly.

The implementation of this new proposal was done in the academic year 2010 with 104 students (56 B. Arch and 48 B. Des students). In order to measure the outcome, the students were provided with a feedback form after the group presentations.

Data Analysis

The final individual marks obtained by the students were analyzed, tabulated and graphed.

	2010 B. Arch	2010 B. Des	2010 Total	%
No of students	56	48	104	
A+ (85 & above)	16	15	31	30%
A (75 – 84)	39	28	67	64%
A- (70-74)	1	4	5	5%
B+ (65-69)	-	1	1	1%
B (60–64)	-	-	-	-
B - (55-59)	-	-	-	-
C+ (50 -54)	-	-	-	-
C (45 -49)	-	-	-	-
C – (40-44)	-	-	-	-
D (35-39)	-	-	-	-
F (34 & below)	-	-	-	-

Table 2: Distribution of marks – Academic Year 2010
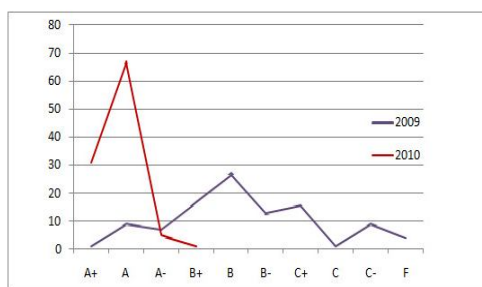
Graph 2:
Distribution of marks – Academic Year 2009 Vs 2010

As clearly shown in table 2, 103 out of 104 students (99%) scored above 70 marks; [(A+) = 31, (A) = 67, (A-) = 5] meeting the criteria for reaching the quality required. Only one student received marks below 70. As evident in graph 2 a remarkable improvement was observed compared to year 2009 where 99% of the students remain in the quality zone.

Analysing the data obtained from students' feedback on group work the following outcomes were revealed. Majority (90%) of students commented very positively on the group activity. In a nutshell, the students perceived the activity as an effective and enjoyable learning experience.

Conclusion

In academic year 2009 only 16% out of 104 students obtained marks above 70. This was increased up to 99% after implementing the new strategies in academic year 2010. Therefore a remarkable improvement in quality of work has been observed. Both final outcome (80%) and the process (20%) was assessed thus it can be stated that both the quality in process as well as the product has been improved.

It was clearly evident that most of simple strategies implemented in this activity, namely, freedom in group selection, gripping the ground rules at the onset, clear understanding on the final outcome and assessment criteria at the onset and throughout the process, opportunity to study a colour that the students prefer, groups sitting and learning together throughout the lectures, opportunity to learn while enjoying, obtaining prompt feedback, and motivation through praise had immensely contributed as a whole for the students to get involved with work cohesively and enthusiastically in team spirit to achieve set goals/outcomes in good quality, as witnessed by the marks obtained.

Therefore it can be concluded that, a group activity can be conducted effectively to achieve a quality output, if it is designed purposely to provide reasons and opportunity for the students to work cohesively while meeting the module outcomes.

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3+2 versus 5:
A comparison of the structure of architectural education with reference to course changes at the University of Moratuwa

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Abstract

University of Moratuwa offered a 3 year Bachelor of Science in Built Environment (B.Sc. B.E.) degree and a two year Master of Science in Architecture (M.Sc. Arch.) degree since 1970's . The system was changed to a five year Bachelor of Architecture (B.Arch.) degree from 2003 new entrants.

In addition to the duration of the course, the delivery system was also subjected a major revision.

The objectives of this study is to compare the effectiveness of the two systems of education from the perspective of the students. A sample of 30 students; 15 from the last M.Sc. batch and 15 students from the first two batches of B.Arch. students were selected on a random basis. The respondents were divided into two categories "Good students" and "Average Students" based on their performances at University of Moratuwa.

The study shows clear preferences of the students who have followed the present B. Arch. Degree. The "Average" students favour the older B.Sc.+ M.Sc. system as it provide a postgraduate qualification to them only on the expense of staying one additional year in the university system. On the contrary the "Good" students are satisfied with "B.Arch." degree as it is accepted as good platform to embark on postgraduate qualifications of their choice.

Introduction

The architectural education system at University of Moratuwa (UOM) was changed to a direct 05 year Bachelor of Architecture degree from the 2003 new entrants. Prior to that the format of the architectural education at UOM was a 03 year B.Sc. (Built Environment) degree and a 02 year M.Sc. (Architecture) postgraduate degree with a minimum of 1 year training in between.

The structural change to the duration of the course was combined with other major revisions such as the introduction of a semester-based educational system and a modularized delivery, replacing the "terms" and "subjects" of the old system respectively. The contents of the courses were also changed with the introduction of new areas of studies and elective modules.

The studio works of architectural design was the forte of both systems. The old system had end-of-year examinations for theory subjects. The new B.Arch. opted for semester and examination. The main advantage in the new system was that there were lesser possibilities of "missing the batch" by students due to poor performances in the theory modules.

There was a compulsory minimum 1 year training period between the B.Sc. (Built Environment) and the M.Sc. (Architecture)

degrees. This practice experience was not monitored by the university nor was it considered as a part of the academic work. Instead it was recognized by the Sri Lanka Institute of Architects (SLIA) as contributing to the 104 week training required prior to the sitting of part three examination. B.Sc. (Built Environment) degree was recognized for the exception of by SLIA part 1.

In the B.(Arch.) degree the students follow a minimum of 44 week practical training after the first semester of Level Three. The training is a part of the course and credits are earned for the work carried out during the period. The students receive exemption for SLIA part 1 qualification only at the completion of the said training. Hence it is not considered as a part of the training for SLIA part 3 examination. The B.Arch. graduates go through two years of training after obtaining the degree. Thus both systems require a minimum of 7 years of study/work to qualify as a chartered architect.

The main aim of the B.Sc. (Built Environment) degree was to produce a student competent in architecture while the M.Sc. (Architecture) focused attention on gaining excellence in architecture.

The B.Arch. degree consists of three phases:

- The first phase: up to the end of semester one of Level Three considers exposure and discovery as the main objectives.

- The training period focuses attention to apprenticeship and integration.

- The final phase of levels four and five aims at 'Majoring' and consolidation.

The last of the first attempt students of the old system completed their M.Sc. degree in June 2008. The first batch of B.Arch. completed their undergraduate degree in December 2008. So far four Batches of B.Arch. students have graduated and two of the B.Arch. cohorts have completed the SLIA Part III examinations. It is therefore appropriate to attempt to learn lessons from student experience under both systems of architectural education at the University of Mortauwa.

The reasons for change

There were several underlying causes that led to the change of the architectural education system at the University of Moratuwa.

- The three year undergraduate B.Sc. (BE) degree lacked recognition compared to other professional undergraduate degrees such as B.Sc. (engineering), B.Sc. (Quantity Surveying) which are of four year duration. This is the case in both the government (as evidenced by the Sri Lanka Engineering/Architecture Service) as well as in the University system where at entry level for a teaching job requires a four-year degree.

- The Government policy of free undergraduate education and self financed postgraduate education introduced in late 1990's demanded higher tuition fees from the students following the M.Sc. (Architecture) course. A majority of the prospective students, after having worked for an year would find it difficult to make such financial commitments. In addition the postgraduate students are not entitled for bursaries where as the students of other four year professional degrees are eligible for financial assistance such as "Mahapola" throughout their academic training period at the university.

- It takes a longer time (06 years) to acquire academic qualifications and enter the profession.

It was also argued that due to the large numbers of students in a batch, the M.Sc. (Architecture) course had not become a research degree.

Besides, the International recognition systems of architecture demand minimum of 05 years academic education (UNESCO -UIA, 2002).

The Department of Architecture, UOM implemented the new system in architectural education which encompasses the following salient features.

- Undergraduate level architectural education to culminate in a professional degree

- Reduction of time taken to academic qualifications to 05 years

- Affording opportunities for the majoring and thereby enabling the student's to find their own niche

Professionals training to be made an integral component of the learning process (A Proposal to Restructure the Architectural Education: B.Arch. (Hons) degree, Department of Architecture, University of Moratuwa - 2002).

The study

The objectives of this study was to compare the effectiveness of the two systems of education from the perspective of the students. A sample of 30 students, 15 from the last M.Sc. batch and 15 students from the first two batches of B.Arch. were selected on a random basis. All of them have completed the Part III examinations of the Sri Lanka Institute of Architects and have become Chartered Architects.

A questionnaire was mailed to the selected participants. The rate of responses was 100%.

For the analysis of data the respondents were categorized into two categories; 'Good" and "Average". It was carried out with the assistance of three staff members who were familiar with their performances at the UOM. A student who would be within the top 20% of the batch was considered as "good." The other students who have passed the degrees were identified as average.

The findings

Selection of a course

The first question asked was, 'given another chance to do architectural studies, what course study would you select'.

As the M.Sc. (Architecture) programme was not fee levying course at the time of it's operation. In order to make the study less complicated the M.Sc. (Architecture) was therefore not considered as a self financed programme.

Preference exhibited by those who followed the BSc + MSc system

	Good Students	Average Students
B.Sc.+M.Sc	05	10
B.Arch.	00	00

All the respondents have opted for the B.Sc.+ M.Sc course structure.

Preference exhibited by those who followed the B.Arch. system

	Good Students	Average Students
B.Sc.+ M.Sc	01	10
B.Arch.	04	00

It was anticipated that the 'good' students (i.e. those with higher aptitude to investigate and explore architecture in depth) would select the 06 year B.Sc.+ M.Sc. system and the average students with the motivation of quickening the path to Part III would prefer the shorter duration B.Arch. system.

The findings were on the contrary. 80% of the 'good' graduates who had followed the B.Arch. programme opted for the same course given the option to select the course again. 100% of the average students selected B.Sc. + M.Sc. as their preferred programme of study. This was completely the opposite of the hypothesis suggested at the study.

Reasons for the selection

The reasons for the selection of a particular course of study was explored by a question offering several probable answers.

Reasons for the selection of B.Sc.+ M.Sc path by former students of B.Arch

	Good Students	Average Students
Post graduate qualification	01	08
Opportunity to mature in architectural studies	00	02

Around 82% of the former B.Arch. students who selected B.Sc + M.Sc path stated that the main reason for the selection was that it would give a postgraduate qualification in addition to the 3 year bachelor degree.

Only 2 out of 11 former B.Arch. students (18%) had selected B.Sc.+ M.Sc. path due to the opportunities offered to mature in architectural studies.

The average students did not prefer to embark on another PG degree after the B.Arch. as it is adequate for them to proceed to Part 3 professional examinations. The value of the PG qualification outweighs the additional time period of one year for the average students

Reasons for the selection of B.Arch. path by former students of B.Arch.

	Good Students	Average Students
Shorter duration	02	00
Recognition of UG degree	02	00

Those who selected old system (all good students) stated that shorter duration and recognition to UG degrees as important factors which influenced their decision. This was probably due to the fact that they were considering to do a postgraduate course to expand their horizons. The present B. Arch. course is recognized as a basic degree to proceed to PG studies. The 3 year B.Sc. (BE) degree was barely acceptable especially to enter PG studies in foreign universities.

Under these circumstances the recognition of the 5 year B.Arch. degree is considered as a positive factor by the good students. The shorter duration of the course also

provide them opportunity to explore their potentials early in practice or in academic fields.

Most productive year

We asked the students to identify the year of study they considered to be their most productive year. A clear pattern of selection could be noticed irrespective of the course of the study that they had followed.

	Good Students	Average Students
The 3rd year or the Final year (Year 5 for B. Arch. students and Year 6 for B.Sc + M.Sc. Students)	08	02
Year of training	01	11
Any other year	01	07

80% of the "good students" identified the final year as the most productive year of their studies at UOM. In contrast only 10% of "average students" selected the same as the most productive year. Instead 55% of the "average students" identified the year of training as the most productive.

The 3rd year and the final year which are examination years with a "Comprehensive Design Project" and a "Dissertation" / "Essay" provide opportunities for self learning and to display the capabilities of architectural design. The "good students" appreciate the works of the year as it allowed them to discover themselves.

The "average" students found more comfort in learning in an less self challenging environment.

Conclusions

It could be argued that the both systems provide opportunities for the study of architecture with their own advantages and disadvantages.

The study shows clear preferences of the students who have followed the present B. Arch. Degree. The "Average" students favor the older B.Sc.+ M.Sc. system as it provide a postgraduate qualification to them only on the expense of staying one additional year in the university system. On the contrary the "Good" students are satisfied with "B.Arch." degree as it is accepted as good platform to embark on postgraduate qualifications of their choice.

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IMAGINING ARCHITECTURE: SCIENCE FICTION AS A SOURCE OF FUTURISTIC DESIGN

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Abstract

The profound changes that are happening based on new discoveries and new interpretations, of the world not only changes Architecture "as we know it", but also demands a reconfiguration of the way one looks at and approaches the discipline.. Thus designing for the future becomes more challenging as it belongs to the realms of "unknown" and "uncertain" that requires Architects to transcend from present realities and perceptions and engage in creative "imagination of futures." Such an approach requires inputs from many disciplines particularly through cross fertilization, understanding to use other disciplines as channels of creativity, and mostly exploring unexplored territories that exist in realms that are unfamiliar to most Architects. Therefore, this paper argues that "science fiction" although quite an unexplored territory among architects, is a possible source that could be used in designing for the future. It attempts to bring to light the possibilities contained in the idea "form follows fiction" or more precisely "form follows science fiction" in futuristic designs and highlights ways of using it.

Indeed the future of Architecture lies in such explorations which will provide the ideas, conceptualizations and tools to venture into the future which the contemporary approaches seem to be unable to provide.

Keywords: Science Fiction, Architecture, Future, Creativity, imagination

INTRODUCTION

As our traditional conception of architecture or 'Architecture as we know it 'constantly changes day by day the traditional disciplinary boundaries too are blurring.(Donna Harraway,1994) in her manifesto Raises the question; *"who can legitimately be described as an architect ? What is the place of architecture within our new virtual, urban and global environments?"* Thus, Harraway's manifesto when mapped on to architecture suggests that the very idea of Architecture will go through dramatic changes in the future, and thus a need has risen to reconfigure the way **"one looks at and approaches Architecture"** in the twenty first century.

One looks at and approaches Architecture through the human mind. Through thought processes, Thus the above Reconfiguration should happen in the thought processes. Particularly the human imagination. Indeed this creative approach requires inputs from many disciplines. Architects the world over have identified this need and are constantly trying to explore other disciplines for ideas and creative stimulation.

However, there is not much evidence to suggest that such a reconfiguration is happening. If one looks at the situation particularly within the Sri Lankan context, one could see an entirely different picture. In fact the following observations were made at the University of Moratuwa;

• **Most futuristic designs attempt to answer problems that will arise in the future, by thinking about the "present" or employing the current state of the**

world, society, and its technologies. There seems to little understand that to find an answer to a question of the future, one needs to imagine the future of the world as it will be. Ironically, this lack of imagining what is "beyond" has made most futuristic solutions being trapped within an already known framework defined entirely by the current level of knowledge. Thus there is a need to identify ways to break free from the above frame work.

• There seems to be strong misconception amongst the students about the concept of "future". Particularly "designing architecture for the future".

For an example when they were showed the following 2 pictures and they were asked to explain which one they think resembles architecture of the future?
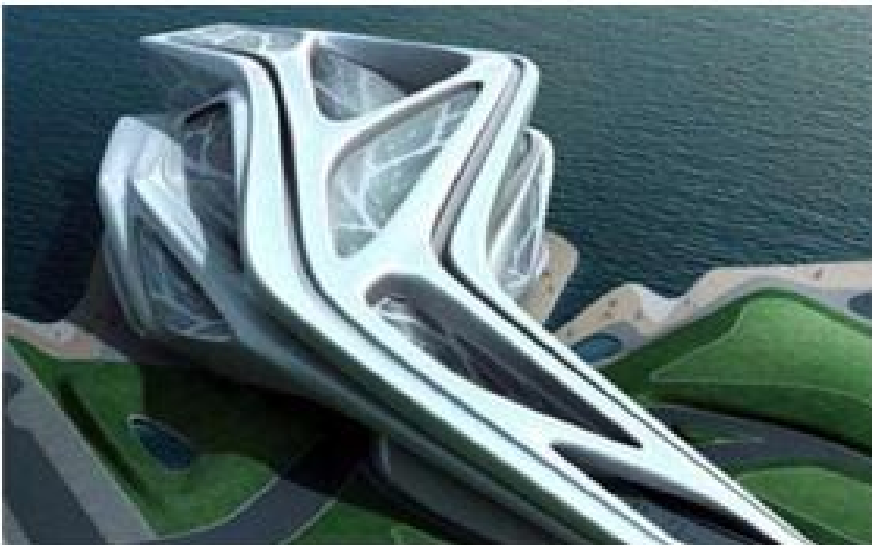

Fig 1: Proposed Performing arts centre by Zaha Hadid

Fig 2: Vegetal city. Source: Web urbanist

About 65% of students directly showed fig. 1 as a piece of architecture of the future whereas the fig. 2 didn't get such attention. They seemed to get this idea by mainly thinking of the technology involved as well as the extraordinary physical appearance it projected. They do not think that on a conceptual basis considering the issues that we have with environmental pollution etc,,, that the architecture might evolve in to highly organic almost natural forms……..

Thus, there is a need to rectify this misconception.

• **The designers are of the understanding that even without formal discussion and theory Architecture has dealt with the "future"**. Thus they have developed a confidence that even without serious attention Architecture will somehow face the future. However, the fast qualitative non-linear evolutionary leaps that are experienced even at present make the above understanding baseless. As (Edward De Bono, 2008) points the more one believes in "Certainty" the less they believe in developing a possibilities system. Therefore speculation and imagination is never developed. Thus, there is a need to develop creative imagination to be able to face the future.

• As (Gandhi D, 2009) points out, in a developing country like ours There is a **gap between architectural education** (which is based on the philosophical historical and psychological theory) a**nd other advances happening parallel in other fields like developments in technology, scientific breakthroughs.** Further as (bermudaz, 1999,Pg 7) explains, *"technology classes dealing with 'green architecture', 'digital media' or other seemingly cutting-edge subjects are too often pre-processed courses that rarely involve any true study of the future and instead concentrate in developing applicable skills for the job market of today."*

This does not mean that the entire profession should move into a topic realm, but shows a need in creating a balance between gaining the skills to be employed and for improving the futuristic imagination, as both are equally required to steer the profession forward.

THE STUDY

Therefore, this paper identifies "science fiction" Which is quite an unexplored territory among Architects, as a possible source that could be used in designing for the future and highlights ways of using it.

Science fiction, which is a sub category of fiction, provides an outlet for realizing visions that have never existed before and entreats experiences that have not occurred in reality. It is an early warning system, a source of weak signals, a literary space with cognition and social interaction as well as a unique tapestry made out of the juxtaposition of different ideas. Further, according to different categorizations there are different sub genres within science fiction that provides a different outlook of the future according to the biases of different authors. Therefore, whilst cyber punk authors like Gibson presents civilizations being built in response to technology, Authors like Herbert presents societies yearning for more primitive needs like water. It is most important to understand that science fiction is predominantly an artistic discipline, strengthened by its underlying base of science. Therefore, **it possesses the generative qualities of Art dealing with how the world might be and the analytic qualities of science dealing with the world as it is.** Both qualities combined together enable it to extrapolate new realities that are possible forecasts of the future.

Hence, it is possible to think that when applied to architecture Science fiction can bring about imaginative forms of design that will give solutions to new problems in new ways.

METHOD OF STUDY

Therefore, this study consisted of a number of case studies, of science fictions and architectural works that the Author interpreted as having had visions similar the fictions. Among these case studies are the sleeper wakes and the Dubai Ziggurat, Dune and Sietch Nevada Proposal, Thousand Dreams of a Stellavista and ADA, and Neuromancer and the virtual trading floor, New York, where each case study consists of a particular work of science fiction and an architectural work that the author sees as having a connection with the aforementioned science fiction work. Each case study was analyzed under the following 3 key research questions;

Question 01: Has the science fiction been able to provide an insight to any future form of Architecture?

Question 02: If so then what type of a futuristic architecture does it suggest? (In terms of space, form, process, technology)

Question 03: Apart from suggesting these trends, what sort of a connection does one see between the science fiction and the architectural work?

The study did not try to prove that any Architectural work is directly related to any fiction but rather that the Author sees a connection that could also be used by others.

RESEARCH FINDINGS AND DISCUSSION

The study did not try to prove that any Architectural work is directly related to any fiction but rather that the Author sees a connection that could also be used by others. Therefore, such a connection was found. According to the case studies, Most of the ideas presented in the futuristic architectural designs have already being presented earlier by science fiction Authors. This clearly shows that vice versa An Architect can use this connection and use science fiction directly for future designs. How?

1. By using the Fiction writers "imagination of the future" and applying it to current design problems in a creative manner. (This can be done in a number of ways)

• First one can use the Architectural typologies (in terms of space form, process and technology) proposed directly in the fiction according to ones biases or the biases of the project. This will particularly be very useful in getting to know technologies that will make the architects imaginary futuristic sketches actually come to life, As it can be understood that many technologies that have been predicted by science fiction has been developed and use years later. Some best examples which anyone might know are the satellite technologies predicted by Arthur C Clarke, cyberspace mentioned by Gibson ,the space travel predicted by Early writers like H G Wells which have all become a reality.

• It can also be done in understanding the "literary space", as a simulation of what will happen if one takes what approach. For an example: How can one build if there is no land available? Would something like an "Arcology" work? Or will people go mad inside

them? Therefore should one build at all? Couldn't one just propose a virtual space? Etc….This can be done easily because the writers have shown trough the literary spaces they create if the solutions will work or not. They have shown the pros and cons, So one could easily make use of them.

• Further, it enables an Architect to understand whom he or she will be designing for the future. Whether inevitably, new types of bodies will be created? whether It will become possible to scan the mind and download it into more durable or flexible containers thereby making the creation of shelters unnecessary ? Therefore in this reality where all conscious beings might not even have a physical presence will Architecture be needed? Then what should Architects be doing can be questioned.

However as good as it might be the above approach has its limits where as "creativity" of Architects is concerned and will be successful in only some instances and aspect, But for an Architect the most important lesson is learnt;

2. By understanding the "Fiction writers" thinking process that facilitates the" imagination of Futures", and as using a similar thinking process in design.

• This becomes possible by understanding how the writers have identified certain issues (socio, political, economical, technical,contextual) Ex: Scarcity of Water, Scacity of Land Etc, issues that might not strike us now but might be vital in the future and extrapolated them in to the future and there by imagined the future. By engaging in such a thought process Architects will be able to take hold of the future in their own way .In this way they might be able to prevent such issues from Arising in the Future.

Therefore, this study highlights the importance in understanding disciplines like **science fiction.** And the benefits one can get from the **cross fertilization** with such disciplines. **It shows how** science fiction can be utilized by Architects to understand the nature of change and their by making clear the Architectural implications of that change. **The study proposes ways of** interdisciplinary enquiry thereby strengthening traditional weak areas of Architectural education. It also helps to propose ways of imagining and designing that transcends the limitation of current methods and technologies. The study itself is experimental and a considerably new venture within our context it is suggested that more studies could and should be done regarding this area so that the theoretical discourse will widen regarding this subject.

Just as much as science fiction can be used to predict a future, it can also be used as a source of strong criticism of how the architectural products of today will affect the future. This too can be an area for further studies. The future of Architecture lies in such ventures that will certainly provide the tools and plans to move ahead in to territories that will ensure at least ones survival in the future if not success.

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Architectural Education and Profession in Bangladesh: Feedback from practice

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Abstract

Institutional architectural education in Bangladesh, started in 1961, has passed through around five decades within which the context has changed. The rapid growth of population, expansion of development works in public and private sectors, changes in public awareness regarding architecture, have created a demand on expansion of architecture as a profession, and hence on education in this country. In comparison to the changes in professional field, the changes in curriculum and pedagogy in architectural education is insignificant.

This paper describes the trend of architectural education and the profession of architecture in Bangladesh. It aims to find out feed back from the professional practice, from the experiences of the graduates and their employers. The paper is based on desk top analysis, literature review from different experiences and actual questionnaire study covering graduates and their employers from selected institutions. The pilot questionnaire designed with the aim to find out the required feedback information that can be further developed for wider use. The research question is how the present method of teaching and curriculum is covering the needs of the architectural practice in order to formulate guidelines for future changes in curricula and teaching method.

Keywords: Architectural education, Profession, Feed back evaluation, Trend, Guidelines.

1.0   Introduction

Institutional Architectural education started in 1961 with one school and only six students in Bangladesh have passed through five decades. Presently around fifteen public and private architectural schools are offering architectural education in this country with yearly number of intakes varied from 200 to 350 (Jasmin, 2010). On the other hand Architectural Profession has also been expanded over the same period of time. The trend clearly shows the increase in demand. The growth of educational facilities, the changes in public awareness about architecture, the changing role of architects in the society and impact of profession on development works demand change in the architectural education in this country. Now there is a time to ask how appropriate is our education to deal with the present state of architectural practice and need for architecture in future.

The universities are producing graduates, majority of them are working in different consulting firms. No such study as ever is conducted to see how the graduates are performing in the practice, what problems they are facing in order to maintain standards and requirements as well as the architectural firm's expectations from the graduates. It is felt imperative to conduct a research in this area with the aim to get feed back information that would substantially help to evaluate and update architectural curriculum and pedagogy. The objective of the research is to find out the gaps in architectural education

and profession and search for measures to overcome those gaps. The hypothesis of this research is that there is a gap between architectural education and profession and it can be reduced if it is possible to identify problems and their inherent causes.

The paper gives an outline of architectural education and profession in Bangladesh and their trends. Examples are searched from the experiences of different countries. The methodology of research and questionnaire design is explained followed by survey findings. The analysis based on questionnaire survey and literature review resulted in recommendation for the future development of architectural curriculum and pedagogy.

The paper is based on desk-top research from published prospectus from different universities, papers, books and articles related to architectural education in home and abroad. A pilot survey is designed to carry out in different professional practices in Bangladesh to get feed back information from practice. For the purpose of survey a questionnaire is designed in a team of six members and rationalized through discussion and review with graduates and practitioners within and outside the team. The author's personal experience in the field of education and profession were also supported the research and evaluation. It is expected in the conclusion that if it possible to identify the gap between architectural education and profession, appropriate measures can taken for the future architects to get better work opportunity and responsive to user's needs, society, economic, disaster preparedness and overall sustainability.

2.0 Trends of Architectural Education and Profession:

During Colonial period and immediately afterwards till 50's, most of the architectural projects were carried out by foreign architects, surveyors and local draftsmen due to non existence of local architects. The gradual increase of development works caused the felt need to establish an Architectural Department within the country. In 1961 an architectural department was opened under East Pakistan University of Engineering and Technology (EPUET) run by one foreign teacher from the Texas A & M with only six local students. Six civil engineering graduates were sent to the USA to acquire architectural degree and take over the charge of the department afterwards which is now under Bangladesh University of Engineering and Technology (BUET). (Jasmin, 2010)

Within fifty years gradual increase of architectural schools, mostly started after 1990, reached to four public and eleven private schools by 2009 (Jasmin, 2010). The passing of private university act in1992 initiated the establishment of large number of private schools in Bangladesh. At present there are more than 18 universities offering architectural programs. All the schools have continuous five years of Bachelor of Architecture (B.Arch) degree program with 2 to 3 semesters/ terms per year. Only BUET has post graduate program offering M.Arch and PhD. The total number of intake per year is gradually increasing in each school due to increase in student population, job prospect and increased demand among prospective students. The experience at AUST (Ahsanullah University of Science and Technology) shows that number of intake has increased from 20 to 100 per year over 15 years time. At the same time the grade point average of admitted students are much higher now, 10 (secondary and higher secondary examination total grade points) on an average instead of 7 to 8 in 2000. The total number of students in older schools varies from 200 to 400. Along with the student, the number of qualified teachers has not increased substantially. Still there is no set standard regarding teacher student

ratio. The recent trend is now to establish architectural schools in different Divisions of the country.

The British dominated architecture during colonial period, from 1757 to 1947. Important buildings designed by British architects and surveyors were mostly exact replica of those in Europe with minor modification to suit the local climate. These architectural styles were accepted and used by the then local elite groups; examples of that architecture are still visible in different parts of Bangladesh e.g. Ahsan Manzil, Ruplal house, colonial bungalow houses and so on. After 1947, during Pakistan period, most of the designs are done by small number of foreign architects, civil engineers and non architects. The first Bangladeshi architect started practicing in 1953 (Islam M. et al, 1985) and the first batch of six Bangladeshi trained architects started their practice in 1966. The major projects were under government and semi government sectors. The two most remarkable buildings designed by foreign architects were the Capital Complex (now Sangsad Bhaban) by Louis I. Khan and the Agricultural University at Mymensing by Paul Rudolph.

"Almost all contemporary works are basically rooted in western culture, though the architects, local and foreign, have tried to solve problem with local conditions in mind." (Islam M. et al, 1985)

After the independence of Bangladesh in 1971, the scope of design by Bangladeshi architects started increasing and more and more architects involved in independent practice. The changes started visible, especially in the capital city Dhaka, in all areas of building industry. The emergence of Developing firms started in late 1970's to early 1980's, now took up a large portion of building industry, employing a substantial number of graduating architects.

Gradually architects have been establishing their profession by designing several important public buildings. Now a days, architecture and professional works are evident in different sphere of development projects. At present consulting firms are dealings with different field of works, such as residences and apartments, interior design, shopping complexes, office buildings, mixed-use complexes, industries and work-shops and many others. The role of architects has changed over the years. Architects are now needed to satisfy different kinds of clients like individual owners, different government and semi-government organizations, local and public authorities, and corporate clients and so on. (Jasmin, 2010)

Regulatory body

The University Grants Commission (UGC) was established in 1973 under the UGC of Bangladesh Order 1973. Being the statutory apex in the field of higher education in Bangladesh, and attached to the Ministry of Education, the main objectives of the UGC are to supervise, maintain, promote, and co-ordinate university education and thereby maintain standard and quality education in all the public and private university in the country. For the field of Architecture the Institute of Architects Bangladesh (IAB) plays the role of the statutory body in Bangladesh where architecture graduates, from an IAB recognized University, can apply for membership i.e. registered architect; provided that they have two years working experience under a member architect. Recently IAB in cooperation with UGC is trying to form an Accreditation Board to maintain the standard of architectural education in all the public and private universities in Bangladesh.

3.0 International Scenarios

In course of time different countries, of the developed and developing world, have adopted different systems in their architectural teaching method and curriculum. There are debates and discussions on how far the existing method is accommodating the present need of the architecture profession. Researchers who are concerned about the curricula and pedagogy have suggested ways to improve the gap. To elaborate on the international scenario this section of the paper has been divided in to two parts. The first part gives an overview of education system and its relationship to profession in different developing and developed countries. The second part gives an overview of opinion of the researchers/ educators, in the area of link between architecture and profession and their suggested way to improve the gap.

3.1. Trend of education system and its relationship to profession: An overview

The total credit hour of most of the schools of architecture throughout the world range between 160 to 190 credit hours offered in 5 to 6 years with only a few four year non professional courses (Rahman, 2003). In the UK the architectural education typically consisted of the following structure: an initial period of three years full-time study (RIBA Part 1) leading to a BA or B.Sc degree in architectural studies; a period of one year of practical training in architectural practice – the 'year out'; two further years of full-time study (RIBA Part 2) leading to a B.Arch degree or Diploma ; and, finally, a minimum period of one further year of practical training (RIBA Part 3) leading to registration and conferment of the title 'Architect'. The academic part of the programme of study is known by the shorthand description of '3 + 2' (Russell T. 2004).) Keeping a watchful professional eye on all of this was the Royal Institute of

British Architects (RIBA) which had been founded as early as 1834. By the 1920s the study of architecture was evolving into a five-year period of full-time study. Australia, Canada, Hong Kong, Malaysia, New Zealand, Africa and Nigeria adopted the two-tier system in the 1970s (Adeyemi, 2006). In Australia courses are typically five years long, with a further year of practical experience required by some schools between the third and fourth years of their courses. There are sixteen schools of architecture in Australia, each offering courses with a different emphasis. Some are largely design-focused, some lean more to a sociological position, whilst others are more technical. All schools are reviewed by the profession to determine that they satisfy the accreditation criteria of the professional bodies. Recognition by the Royal Australian Institute of Architects also ensures recognition by the Commonwealth Association of Architects, which provides the international status of Australian degrees in architecture. In order to achieve recognition, the schools must satisfy the education policy of the profession.

According to Chayaa (1998), a three tiered national policy in architecture education was proposed and implemented in the USA after a thorough review of architectural education and profession in 1954. Schools with research and development temperament (e.g. Harvard, MIT, Pratt, Columbia, Berkley etc.) followed a different approach to those with excellence in architectural design. The academic institutions were liberated and provided complete freedom to experiment with education ideology and pedagogy. The professional licensing examinations in all the basic seven subjects there are conducted by the AIA (American Institute of Architects) ever since. The quality of professional service is governed by strict and clear legal and legislative controls.

The Council of Architecture (COA)

in India under the provisions of the Architects Act in 1972 provides for registration of Architects, standards of education, recognized qualifications and standards of practice to be complied with by the practicing architects (COA web site). Besides maintaining the registration of architects, the COA remains responsible to regulate education and practice of profession. There are altogether 135 institutions offering architectural education leading to recognized qualification in India. The COA sends Committees of Experts for inspection to maintain the standard of architectural education.

The European Committee Bologna (Joint Declaration of 45 countries in 1999, the latest being in Berlin 2003), advocates a standardized two-tier structure of five years duration overall for all university education, culminating at Masters Level (Holden G, 2006). With respect to architectural education in Europe the Bologna Declaration predicts that Masters will become the principal professionally recognized qualification. Professional Masters programs now predominant in the USA (over 60% of the courses). According to 18th CAA (Commonwealth Association of Architects) proceedings, all ten professional architecture programs in Canada are Masters. It seems almost obvious that Masters professional education is emerging as a common international standard. (Holden G, 2006)

3.2. Knowledge from scientific bodies

Emerging construction industry has created varieties of job opportunities to meet the demands of this century for which architectural education is undergoing remarkable stress and attention. Various researchers and authors also share their concern and suggestions upon available Medias. For instance, in the book "Changing Architectural Education: Towards a New Professionalism" (Nicol D,edi. 2000) a wide range of authors, from different countries (including UK and USA), who have been working in the

fields as education research, have contributed their knowledge and inquiries on innovation in design studio projects, ways of developing communication and team working skills in students, on ways of strengthening design thinking, how to develop self responsibilities in learning, how to embed change at school level and how to prepare practitioners to teach in the design studio. The need for better communication between the professions and their clients, building users and society is also stressed in this book. John Mclean, Hatim Hassan, Dr. Terry Russell, Simon Pilling, Ruth Reeds, E. Elnachar, Holden Gordon are some of those researchers who, have been working in the area of link between architecture and profession, and have suggested ways to improve the gap. This part is an overview of their analytical proclamations and suggestions.

John Mclean opined in his dissertation that professional architectural education could hardly meet the tasks, skill, knowledge and abilities required in the contemporary architectural practice. In the conclusion he stated that the focus of architectural education should be "narrowed to the goal of providing students with the type of preparation demanded in practice today (Mclean 1982). Hatim Hassan also found out in his PhD thesis a similar problem in Saudi Arabia, where new graduates remains unprepared to meet the work requirements of practice. Their training in design studio is far removed from the practical project requirements, management procedures and financial constraints, (Hassan H, 1999). In his study he stressed the need for effective provision of practical training within the architectural program and also the need of teachers to have practical experience. Ruth Reeds, a tutor of British system Part III, experienced that his students find difficulties to relate "what they learned in the design studio when faced with the realities of practice" (Reeds, R. 2010). According to his opinion the use of unrealistic brief in the design studios paralyses students from the capability to design within practical constraints such as legislation, cost and materials.

At the same time he recognized the fact that architecture is a life-long learning process. There seems to be an impractical expectation of enriched and experienced knowledge from fresh graduates. They should join the team of professionals by demonstrating a mature perception that continuance of gaining knowledge in multifarious aspects of architecture is expected of them. This can be carried out by organizing personal development plans, training them to acclimatize their knowledge to their careers.

Dr. Terry Russell conducted a case study to consider the integration of "work-based learning into the full-time curriculum of architectural education" based on his experience at the University of Edinburgh. The integration of practical training within the degree program is expected to provide students sufficient work experience and prepare them for professional practice (Russell, T. 2004).

Seidel, Holden and Ozdil (Holden, G. 2006) pointed out a gap in knowledge and capabilities between education obtained and its practical application, in a paper published lately about the basics, that over 1600 heads of architectural firms across the USA, UK and Australia/New Zealand iterate that an architect ought to know.

Apprehensions about the split between architectural education and professional practice have occupied a fair share of the literature over the last couple of decades. Keeping in mind the built environment as a product of practical application of the knowledge acquired, on the one hand, the mode of education preparing for this practice has been questioned, and on the other hand the built environment stands as a witness to the lack of integrity of this profession, raising more questions on the credibility of architectural education. (Elnachar E, 2010)

Enhancement of skills defines professional architectural education. As a consequence, the humanities receive little attention.

Overwhelmed with loads of practical tasks, students cannot manage to do further beyond their course requirements of studio project works. Such a rift spawns unproductive results: graduates end up failing to construct persuasive arguments in favor of their work. Absence of humanities from the curriculum results in poor knowledge of the architects about this vital subject which is exhibited in the substandard environment we dwell in. (Nicol D, edi. 2000)

Consistently it is claimed that sustainability as a concept should become focus and goal of architectural education worldwide (Elnachar E, 2010).For the time being, the primary and leading objectives of design education plays a crucial role in this regards. Contextually, the groundwork of this paper is realizing the goals of defining practice as actual deeds and education as stimulating conceptualizations.

Examination for registration preceded by completion of an educational program acknowledged by the authority and a phase of practical experience- is the most common trail to registration, claims Holden (2006). According to his analysis, preparing students with appropriate knowledge and skills is a central requirement in order to make sure that their experience further enhances their competency in meeting the expectations of architectural education and training, which would pave the path for them to become architects within the jurisdiction under consideration.

3.3 Synopsis of the Overview:

• A two-tier structure of five years duration culminating at Post-graduation / Masters Level has been appreciated. Apparently it seems that Masters professional education is emerging as a common international standard.

• Sometimes the expectations of fresh graduates appear impractical as they stay

aloof from the professional life. Therefore they should join the professional team to develop a matured perception as early as possible. This can be carried out by various ways such as organizing personal development plans, train them to become accustomed with the practical knowledge.

• Absence of humanities from the curriculum resulted in poor knowledge of the architects which is demonstrated in the imperfect built environment.

• Practice is perceived as actual deeds and education as stimulating conceptualizations.

• Students should be prepared with appropriate knowledge and training to be competent for the examination leading towards a registered architect.

4.0   Research   Methodology   and questionnaire design:

In order to achieve the research objectives, an exploratory investigation has been conducted among the two focused groups to find out their demand from architectural education. The first group was the architect- 'employee' who recently graduated from any university and working in any architectural firm and the second was 'employer'- owner or the team leader of any architectural firm supervising or coordinating the newly graduated employee in their professional works.

The first set of questionnaire towards the fresh graduate has designed to find out the following major issues:

• Responsibilities given - to identify whether these types of works had been carried out during their educational period.

• Adaptation – time required to cope up with the new environment as well as changing situation.

• Satisfaction on the working environment

• Familiar with the design procedure and working methods

• Application of academic knowledge in the professional field

• Modification that are suggested for filling up the existing gap.

The second set of questionnaire towards the employer of any architectural firm to evaluate the performance of newly graduated architect and what modification and adjustment they are suggesting to train the students during academic career for the professional field. The main queries can be outlined like these:

• Performance on the given responsibility

• Responsiveness towards the works given

• Creative quality and skill

• Communication skill

• Eagerness towards new things

• Capacity to contain knowledge and its application in professional field

• Guidelines to improve the academic curricula for perfect architect to manage professional field

5.0   Survey Findings:

The questionnaire survey was conducted in April 2011 among five architect employers and ten fresh graduates (architects), two under each employer who supervised them directly. The survey revealed that the study of architectural education and its professional application includes such diversity that present education system is struggling to meet professional demand in this ever changing field of architecture.

Collected questionnaires have been evaluated carefully, synthesized and pointed out the issues they suggested. The findings are organized sequentially in accordance to their importance and described with their suggested thoughts. Following the research objectives the answers of the target groups have been summarized in an order.

Findings from employees in relation to major issues in the survey questions are discussed below:

• This is clearly identified from the first inquiry that the graduates have to perform a wide range of works which varied from architectural design, working drawings, interior design, preparing legal design, presentation works, field visits and other office works. As they get scope to design a limited number of projects (usually from 10 to 12) within five years of their academic education, they face difficulties when they have to carry-out different projects in real life situation in their practice. There are some subjects in education those have less application in profession and there are also some subjects which need in depth study to be professionally applicable. So this is clear that the curricula in architectural education should take care of the changing demand of profession and importance be given according that.
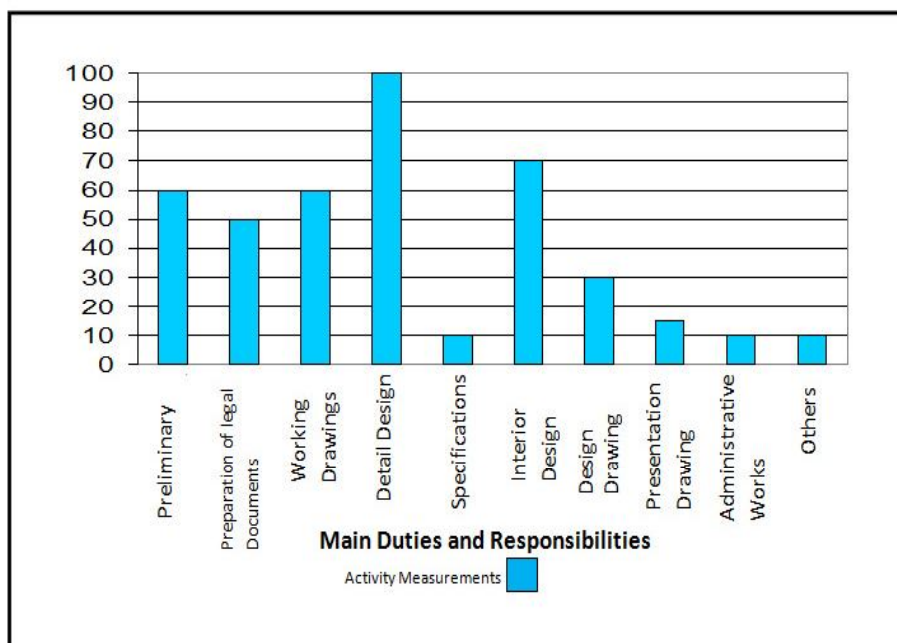
Fig. 1: Responsibilities undertaken by the fresh graduates in Architectural firms

• In response to satisfaction on the given responsibility most of them just accept present situation. 80% of the total respondents are moderately satisfied with their responsibility and the rest are fully satisfied. Though the working environment is in favor of them but because of some types of works for which they are less trained during academic period, they faced some difficulties performing those duties. Moreover the working procedure and work load were mentioned as at a moderately satisfaction level.

• About application of architectural knowledge in professional practice, half of the respondents stated that they can apply 70%-80% of their gained knowledge but there are also a number who are facing problems. This is clearly identified by further investigation when asked about specific subjects to apply in profession. 50% to 70% of the participants responded that they hardly can apply their knowledge in working drawing, project management and field related work at their firms. They also face difficulties about the recent knowledge on building materials and technique whereas well familiar with design development and building typologies.
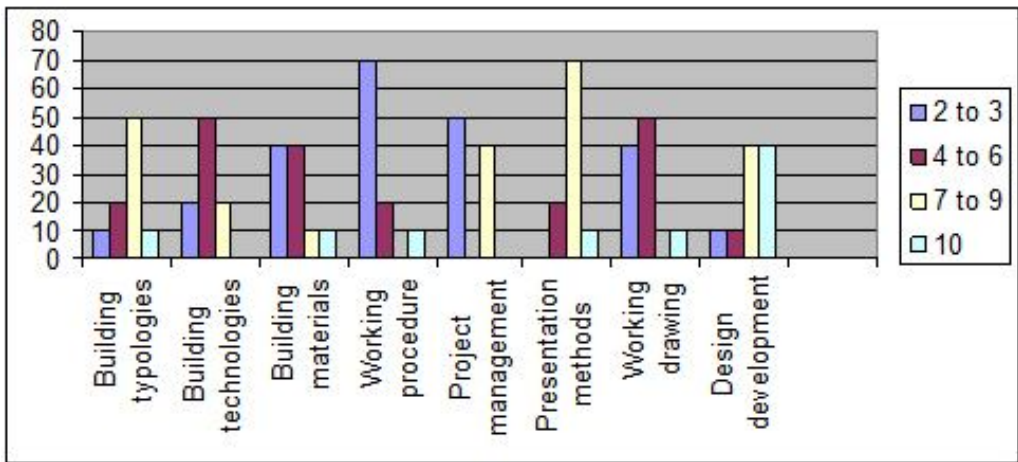
Fig. 2: Application of gained knowledge in profession field

• About the method of work and technique for drawing production and preparation, an urgent point has disclosed that more than half of the participant required to train themselves on new technique (both hand drawing and computerized) to prepare professional drawings. Though 40% did not require special training and they felt the need to know about the use of modern technique in professional architectural design.

• On suggestion about the up-gradation of architectural educational curricula for the competitive professional market, varied comments noted which can be pointed out and ordered as follows:

o Provision for professional training for a period of 3-6 months before entering into full profession and the training should be more reality oriented emphasizing practical examples.

o Provision of field related training such as site visits, construction technique, material acknowledgement, climate and site surrounding analysis.

o Require to give more importance on working drawing, detail design, legal drawing (Rajuk sheet preparation), computer aided drawing, graphics related tools and 3D modeling.

o Attending design competitions, workshops, seminars should be encouraged.

o Theory courses also need equal importance for their relation to practice.

Findings from employers about their fresh graduate employee:

• The duties assigned by the architectural firm for fresh graduates can be ordered as such preliminary design, working drawing and detailing, design development, 3D visualization, and field related works.

• About their response towards given duties and new works, almost all of them are moderately responsive. Around 80% of the employers are just satisfied on their work performance following organization standard whereas the rest suggested up gradation.

• The major difficulties faced by the architectural firms on performance of fresh architects can be listed as: lack of design knowledge and construction documents, less professional attitude, detailing and managing field related works.

• 80% employer believe that the fresh graduates have manageable knowledge from academic education on building technique, typologies, materials, design development, working drawing, presentation but this require urgent up gradation to make place at present competitive environment. But about project management and field related works, 60% employers stated the poor status of the graduates which need special attention.

• Almost all employers stated that the fresh graduates do not have in-depth theoretical knowledge that can be applied in professional field.

• The employers stated that the fresh graduates have knowledge and familiar about the common drawing production method before but they have huge ignorance about detail and recent techniques of drawing preparation. Almost 80% employers have to train their employees on drawing related techniques. They also required the graduates make familiar with working drawing, site work, construction management, client dealing in professional practice.

• Response on following chart clearly identified the performance of fresh graduates evaluated by their employers.

Table 1: Employer's responses on evaluation of their fresh graduate employees.

	1-3 = poor	4-6 = satisfactory	7-9 = good	10 = excellent
Able to accomplish the specific job responsibility		X X X X	X	
How prompt he is to understand the new problems	X X	X X X	X	
Design skill, Creativity		X X X	X X	
Capable to work according to supervision		X X X X	X X	
Work co ordination, Team performance		X X X	X X	
Graphical communication skill		X X	X X X	
Verbal communication skill	X	X X	X X	
Time management		X X X X	X	
Self management		X X X	X X	
Oral expression,	X	X X	X X	
Establish own ideas		X X X	X	
Productivity		X X X	X	
Adjust quickly with the changing situation	X X	X X	X	
Dealing with client and other professionals	X	X X X X		
Administrative responsibilities	X X X	X X		
Attitude to learn new subjects or problems		X X	X X	X

• All the renowned firm owners believe that the present architectural education system require urgent modification and up gradation and other respecting professional demand. Their suggestion are listed below:

    o Need professional attachment during student life. Total educational system must be related to practical work.

    o Knowledge on practical field work and knowledge on construction technique.

    o Practical knowledge on site supervision, dealing with client and other professionals and project management.

    o Drawing related software, presentation related digital programme.

    o Build professional attitude.

6.0 Recommendations:

There is an attempt to make some recommendations for modification and alteration essential for architectural education here in Bangladesh. The survey suggestions from both employees and employers, observation from the international education system and their changing environment and authors' direct experiences in this field, all together listed the following suggestive issues which are required to ploughed in the present architectural education system to compete in this ever changing professional field.

6.1 Internship and professional experience in Architectural Education

All the architectural schools in Bangladesh offer a continuous five years Bachelor of Architecture (B.Arch) degree where the

scope of students to divert to different branches of architectural education is not possible. The internship is offered as a non credit requirement. Majority of the cases it is difficult to maintain the quality of training, placement opportunities and difficult to assess their authenticity. The Institute of Architects requires a full two years practical experience to qualify for full membership. The first two years in majority of the cases are the first experience to work in a professional environment for fresh graduates. As they are employed as junior architects, instead of intern, the consulting firms expect productive output from the very beginning. Consequently instead of trained they are expected to work as full professionals. As such there is a need to have inbuilt organized internship program within architectural curriculum.

6.2 Scope of Practice

The scope of practice has expanded over the last fifty years. Before independence the majority of large scale projects were mainly in the government or semi government sectors. Now various range of projects and client group emerged involving large to small scale practices. The projects include residential, institutional, recreational, hospitality, health care, industrial and so on. It extends from land use development, master plan, and mega scale projects to small scale residential developments. Along with the scale and type of projects, different practices are trying to specialize in different types of projects. Consequently different types of design and skill are searched from graduating architects.

6.3 Learning Technology, Practical Skill and Construction Knowledge

This is clear from expertise comments and also from the survey that the new graduates starting professional practice have deficiency in practical skill and knowledge. They need to spend some

part of working career to train them in learning these technical skills. But the changing, competitive market and economy may not give them scope to learn these technical skills. To ensure their place at this information age, this is mandatory to incorporate technical skill, knowledge of innovations in materials, construction technologies, and environmental systems in current education curricula. For that the model of education must incorporate mechanisms responsive to current practice formats of providing professional services and changing market demands (Adil S.E, 2000).

6.4 Creation of mind-set to foresee future

This is essential to root an understanding that architectural education does not begin by the entering architectural degree program ant not end just after graduation. The aim of major educational subjects should be to create a mindset that is ready to solve problems not based on present but also can foresee future perspective (Aktar S M, 2006). Especially, architectural education is life-long and always makes them ready to maintain the relationship, manage the diversity, implement the knowledge of theory and design, able to except and handle the new and changing objects and environment. Ultimately, as Douglas mentioned, architectural education should be such that makes someone to understand and willing to couple experience with structured education in order to grow, develop, and finally broaden the perspective to understand the power of architecture (Douglas L Steidl, 2008).

6.5 Development of Communication Skill

The architectural schools give sufficient courses on graphics, computer aided design and drafting, working drawings and

other graphic tools to equip students for professional work. Those who are eager to learn can get scope to be skillful in those areas of knowledge. The feedback from profession shows that the graduates lack knowledge in working drawing and detail design.

Though the students often face jury to explain their ideas in front of a number of in house and visiting architects, they show poor performance when dealing with clients and in meetings with other members of working team. Verbal communication is essential for architects to convey their ideas to client and take leadership role.

6.6 Understanding Context

Understanding context means understanding users or client's requirements, site, surrounding, history, socio-cultural aspects and economy. Architecture sustains its life on living civilizations and living culture. Without roots deeply embedded in the culture and people, architecture is meaningless shell. Visual truisms and idioms without any reference to the local culture do not produce architecture, or even good buildings.

6.7 Create Professional's responsibility:

An architect has to deal with his clients, building users and society so his/her behavior and decision will have significant power within the society. This is essential to penetrate the professional's responsibility toward the user group from the education life. As Douglas suggested, environmental stability, the wise use of land, the design of public spaces, energy conservation, sustainability, community improvement, resource allocation, adaptive reuse, building function, aesthetic delight, air quality, safety and security, and so many more of the issues that we address in the course of our professional lives must be approached with an inherent understanding that being an architect carries immense responsibility. Our education must be founded on such an understanding (Douglas L Steidl, 2008).

6.8 Learning Ability / attitude to learn new problems

It is an accepted idea that it is not possible to train a student and impart complete knowledge required for practice from an educational institution. Sound education gives theoretical knowledge and internship gives practical knowledge, together makes a graduate equipped to work in the professional field. Within the five years program students do not get scope to work on wide range of projects which the practice require them to work on. Important fact is that students must develop an inbuilt attitude to face new problems, search for required information, learn new things and try new solutions in every step of their professional life. The education and training prepares him/ her with sound methodology how to deal with new problems, search for new information and how to adapt to new situations and find ways in a creative way.

6.9 Specialization in varied field

Our education system has one model to fit everyone, mostly design oriented. All the schools have similar curriculum and design studios conducted with similar objectives and project choices. Throughout the experience it is evident that not all the students who graduate from different schools are design architects. A large number switch to different disciplines of architecture or related field. Thus it can be assumed that there is scope to modify our curriculum to give scope for different field of specialization e.g. interior design, graphic design, and building and construction management, developing and so on.

6.10 Role as a Team Leader and Co-coordinator

The architect in a team of multi-professionals usually plays the role of team leader and co-coordinator who look after the inter-disciplinary co-ordination and also need to lead the project from inception to completion. The practice to take the overall responsibility can not be developed starting from the beginning. So even in the education system this role need to be taught and practiced through group projects, workshops and in theoretical courses.

6.11 Interdisciplinary Project work:

In architecture, interaction with other disciplines is unavoidable moreover gained importance. Most of our studios deal with individual problem solving approach, whereas professional architectural environment deals collaborative team work especially in the contemporary days it is very evident. An architect has to manage any project as team leader working with different sectors (structural-electrical- mechanical engineers, plumber, surveyor, supervisor and so on). So he/she requires training in this interdisciplinary work from the academic life by arranging interdisciplinary project work in the design studio as a part of curricula.

6.12 Avoid Master- oriented studio:

Most of our educational institutes are conducted by master- apprentice method where the teachers usually impose their own thoughts, language and ideas to the students (Harsha M.2006). The process hinders the real development and learning of creative side of architecture. The architectural education should be taught and discussed in different ways just to help the students discover themselves. Dutton suggested that competition should be replaced with collaboration in the design studio, so that the students and the teachers

work together to solve the problem (Dutton, T., 1991). There should be easy and comfortable dialogue between teacher and student not a monologue which will inspire them to find the questions for the given problem, gather information to solve that collectively in an architectural way. This collaboration is essential to help the students explore themselves smoothly, disclose their creativity. Creativity is very important in the design process and this creativity can only appear in mediums where creativity is encouraged (www.eaae.be/eaae/awarded, 2009).

6.13 Participatory education/ Active learning (workshop, discussion…):

Our architectural education broadly dedicated to conducting theory courses and emphasizing design studios for architectural problem solving. Hardly we encourage and support for seminars, workshops, site studies (for construction technique and materials) which could insist students towards more active learning. Giving importance for workshops and participatory programs in architectural education as place of interaction, Vessely stated that these are the ideal places for the conduct of experimental dialogue where new rules of knowledge can be developed and cultivated (Vesely, D., 1995). By attending these interactive occasions the students of architectural discipline as well as tutors along with different disciplines can make them fit for ever changing future through group work, inter-disciplinary gathering, dialogue, ideas sharing and development, increase self-confidence, motivation, intellectual and cultural exchange.

6.14 Hand drawing as 'tool of thinking':

Students now a day are more inclined to use computer aided design, presentation and drafting tools. They also get adequate training at schools how to use computer

for drafting and presentation. The positive side is they can save time for presentation and give time in design development. On the other hand less use of pencil and thought process along with hand sketches has a negative impact on design development. Though computer drawing is faster, easier and easy to make amendment but hand drawing should be encouraged as tool of design thinking with a sense of designer ownership. Senyapili and Basa (Senyapili and Basa 2006) argue that as architecture is a field that is defined by both art and science and for that the reason hand drawing is preferable due to the nature of architecture. In the architectural education hand drawing, sketching should be encouraged in their design process to develop their creativity. In the early design process sketching was used an important tool for design process which allowed them to express, test and develop their ideas. So, Rice argues that sketching in all its various forms (by students, teachers and practitioners) should be observed and documented from a phenomenographic viewpoint. He believes that a phenomenographic perspective will be valuable for both students and teachers and professionals (Philip W. A., 2007).

7.0 Conclusion

This is very urgent for architectural education to make amendment in its curricula for tackling the challenges of present and ever changing professional demand. By direct survey on employers and their employees, going through the present trend of architectural educational system and their changes around the world, direct experiences of the researchers related to this paper established this essential demand. Directed by the research covering different issues from education system and its deficiencies, trend of profession and the struggles to meet the demand, suggestions from the target groups, and the recommendation from researchers, an attempt is made to recommend important

areas that can be considered for updating architectural curricula and pedagogy in Bangladesh. Further investigation and wider scale research might help detail and better outcomes for this topic, which of course will make our architectural education healthier.

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'Eavesdropping'

Can it add to a student's learning by allowing them to witness his or her own summative assessment and feedback event?

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Abstract

The Design Studio learning system within most Tertiary Design Schools has a unique critique method, often called 'The Crit;' this event itself has been analyzed and written about extensively. However, we have also had a lot of negative feedback from students that this form of critiquing process is not necessarily a good type of feedback process for them individually, particularly in relation to their specific piece of work. Therefore, is there a method that protects the student's privacy related to his or her own design work and at the same time maintains the Design School's integrity of supplying reasoned and fair assessment within the wider Profession? A field trial scenario was designed and arranged with a group of volunteer design students, so each in turn, could sit-in and witness their own assessment / feedback session. The students were allowed to 'eavesdrop,' i.e. allowed to watch and overhear only, their individual feedback and assessment. This paper reports on this field trial, (which was timed to occur just after the 'The Crit'); the resulting student comments were surprisingly positive towards this experiment and affirming that indeed it was an aid to their overall learning. This paper then analyses this experiment, exploring the field trial responses, and looks for links within a wider Educational literature base to the ground this 'Eavesdropping' scenario within known pedagogies. Note: This scenario is not proposing to supplant 'The Crit' rather, the intention being an addition to it.

Keywords: Learning transparency, Student assessment, Student feedback

INTRODUCTION

In response to the nineteenth century Industrial Revolution, the Ecole Des Beaux Arts, (School of Fine Arts founded in 1819), in Paris, set up an architectural educational system where the "learning by doing," (Anthony, 1991, p.9), replaced the existing learning via lecture system. Under this new system students were put into 'ateliers' or studios, which were led by patrons or Masters. And the evaluation of the student work was done via a 'behind-closed-doors jury' system. The students got their marked work back with little or no comment from this assessment jury.

Today, Studios within Design Schools around the world have evolved into being places which incorporate rigorous iterations of drawing and model making, in a process which Schön (1983), likens the design student to a "reflective practitioner." Studio tutors, rather than 'Masters' per-se generally run these types of Studios. The review or critique, (commonly called 'The Crit'), of the student work is a 'pin-up' of all the work, then each student in turn stands up, and presents their work to both peers and the 'jury,' (which often contains outside practicing Designers as well as the Studio tutors). This 'Crit' session can form the basis of the assessment. The assessment is done after the 'Crit,' in private, usually by the Studio tutors only. The marks are then released publicly so the students can see how they have performed relative to their cohort.

At Unitec, Auckland, New Zealand the Studio tutors also write up a comment sheet for each student, this forms the formative feedback aspect of the process.

There has been a lot of discussion about the merits surrounding the 'The Crit,' the possible strengths of the conventional 'Crit' range from: it allows practice in time management, (meeting the deadline hand-.in); the cohort pin-up allows each student to see their work in relation with everyone else's, (so that they can start to self-evaluate against their peers); to practice his / her presentation skills in front of an audience, (which later in professional life translates to presenting to the Client); seeing other responses to the same design problem, (allows the student to become critically aware of other / wider design approaches and in turn allows deeper thinking about their own work); debate within the cohort of a wide range of design / social issues so that the students can learn from everyone present; first-hand feedback for the student work from outside professionals that may be on the Jury and all of this within a safe environment with every student in the 'same boat' and without the real-world worries of money.

In contrast the possible weakness's of the conventional 'Crit' range from: aggressive tutors that take advantage of the power imbalance between themselves and the students, (causing students to feel inferior), this causes the students to become very defensive about their work; no meaningful engagement by fellow students to create a debate which then leads to a one-sided and boring 'Crit;' the student can be often 'freaked out' just standing up and discussing their work in front of the Jury / tutors and thus any feedback is not taken in and cannot be digested for later reflection.

As tutors, we often hear that 'The Crit' process is unique and remains essential to design tutoring as it can cover a wide range of issues; but we also hear that the same

process is often not a great technique for feedback related to 'that particular piece of work' for 'that particular student.

'The intention with this paper is to describe a field trial, analyse the feedback, and then search for links within a wide range of educational literature to evaluate this experiment.

THE RESEARCH PROJECT

The findings of this paper are based on a field trial set within Unitec, Auckland, New Zealand, which took place in November 2007. The proposed field trial method was put to the Ethics Committee. Upon receiving approval, a call for volunteers was made to a group of second year Bachelor of Landscape Architecture students. This field trial took place shortly after (3 days after) a Final Studio Crit, which was the culmination of five weeks work designing and drawing up construction details for a proposed intervention on an urban site.

Each volunteer was asked to read and sign off an 'Agreement of Participation,' before the commencement of the experiment. Then, one at a time, each student entered the assessment room and sat behind the tutors. Each was allowed to watch and listen to the tutors, (the two Studio tutors who had run the Studio programme), as they discussed that particular student's drawings. One staff member had a comments sheet, (with standard written feedback comments), which was altered as the discussion went along, so that not too much time was spent 'writing up' at the end. (This was later typed up and became the written feedback for each student).

The volunteer was not allowed to speak during the assessment process. This was to ensure that this experimental event was not deemed 'just another type of Crit,' the student present was there to just listen and watch.

Following the event, and related only to this author's field trial, each student was asked to verbally comment on something which was 'good' about the process they had just witnessed, and something which was 'hard' to hear about their work / performance, and any other learnings. This verbal data was triangulated via a written questionnaire, which was filled out anonymously, and in private, in a separate room. The questionnaire focussed on: how useful was this eavesdropping event now as a learner? And how useful was it in developmental terms as a budding designer? In addition, each student was also asked to rate this event on a scale of 1 to 7, (with 1 being the least useful and 7 being the most useful).

The received comments seem to evoke four educational themes:

- **Direct Learning**
- **Life-skill Learning**
- **Positivity Accentuated**
- **Deep Learning**

RESEARCH ANALYSIS

Much educational literature has been written on traditional exams and assignment type assessment, and the associated pitfalls of these methods as a way of testing learning. However not much has been said about proposing new ways of making the assessment process more transparent for the tertiary level student. This field trial is one such attempt to experiment in a real world learning situation and eliciting student feedback comments both good and bad. The student comments received from the field trial then became the data, which was analyzed and reflected upon whilst researching within a wide research literature base to try and ground the threads, themes and linkages found within this data.

Direct Learning

The time taken to look at, consider and grade each students work, (comprising 4No. A1 sized sheets of detailed drawings) generally took about 10-15 minutes for each student. The volunteer could see and hear 'first hand' the tutors as they worked out the individual feedback comments and the associated grade. The assessment criteria, used to critique the learning outcomes were released at the start of the Studio programme and were therefore known to each student prior to pinning their work up for the Final Crit. Likewise, the grade descriptors were released within the School's Handbook at the beginning of the year, and were widely known throughout the cohort. By the student being in the same room, in effect: 'Eavesdropping,' made the whole assessment process transparent to the listening and watching student author.

The tutors discussed the work presented and its author candidly. The tutors spoke with care and respect, more so than normal due to the fact that the author was in indeed present, (but it took surprisingly little time to forget that the student was indeed overhearing the discussion). Compare this with Higgins, Hartley & Skelton, who cite students asking that their feedback comments be "more personal and direct, then it would be more helpful," (Higgins et al., 2002, p.56).

During the process it was apparent the tutors own behaviour was modified, compared to current 'behind closed doors' versions of this assessment process, for example: no swear words were used, and gossip type opinions where not aired (e.g. "Have you seen that car 'Student A' drives?"). The tutors discussion seemed to remain at all times animated yet professional, focussed on those aspects that pointed towards one grade, (and the associated feedback comments). And, if the tutors disagreed with what grade /

feedback comments to append to the work, the eavesdropper could see and hear firsthand how the tutors argued the various aspects back and forth till a decision was reached. These characteristics fall into line with some of Boud's thoughts about offering good feedback, namely: [the tutor's did not use] "fancy words or abstract language, [and they were] consciously non-judgemental," (1986, p.31).

Care and consideration were shown in relation to both the feedback wording and the decided upon grade. "It is up to the…[student]…to accept or reject them," (Boud, 1986, p.31). There were no 'double word meaning,' or 'lost in translation' or other 'out of context' type issues by using this type of process, (as can occur via written language feedback techniques), this direct method shows the tutor's 'warts and all,' and the whole assessment procedure was laid bare for the student to witness in real-time. A couple of trial participants noted within the returned questionaires:

"It's more informative, you seeing the marking, you can't get better feedback."

"Far more thorough and [in] depth…[than]… when you just receive a paper slip and can find it hard to understand where the marker is coming from."

The intention of this technique is to be more a meaningful 'production' in terms of the feedback delivery, an analogy would be to compare: watching a play on stage vs. reading the corresponding script. This 'Eavesdropping' session was a "here-and-now concrete experience," as cited by Kolb, (1984, p.21). This technique is a type of "Experiential Learning" (Kolb, 1984), which could be described as: a learning process that revolves around a concrete experience, followed by observation and reflection, leading to the formation of abstract concepts by the learner and finally testing these concepts in new situations. In addition, it is apparent that this

technique could expose the so-called 'hidden criteria,' aspects that tutors may have. For example: sometimes a tutor did not 'visually like' the actual work, this personal opinion was aired openly in the discussion with the other tutor, who in turn, made sure that this did not cloud a fair and reasoned assessment.

By the time students get to tertiary level education they have been subjected to various assessment methods, this direct 'Eavesdropping' technique seems to allow a transparency that could pave the way for dispelling any / many student myths about how their grades and feedback are achieved.

Life-Skill Learning

A comment received from one participant was:

More information about what its like in the professional realm.

This comment seems to acknowledge that the student knows that learning the goes beyond the mere Studio setting. To get a glimpse, as it were, into the landscape architect's office: hearing the tutors discuss wider issues provoked by their work, perhaps seeing them disagree over issues and hear their resolution, all these experiences would seem to be valuable insights for a budding designer. This Design School, (and I am sure many others), has summer internships: awarded as prizes, at the end of each year within local professional offices, these are much sought after by the students and this gives further evidence of students striving for wider professional life experiences.

During this field trial, one participant noted, how pleased that her involvement in the studio were noted and taken into account during the assessment - this was a surprise to her, as she herself says:

Unique opportunity to learn more about things discussed in marking an assignment other than the technical requirements of the brief – i.e.

> *Attitude*
> *Scale*
> *Commitment*
> *Interest in Landscape Arch., etc.*

For the tutors it seemed natural to think about this student not only as a potential professional designer but also as an individual, and to pass comment on her other special attributes as a human being seemed normal and valid. "Assessment is not just about measuring knowledge or skills, (summative) or about correcting and directing learning (formative)," (Havnes & McDowell, 2008, p.210). That the 'all-roundedness' of a person could come into play within the assessment process was a surprise to this student, in fact this does currently happen, albeit unknown, (in the behind closed door version), but this 'Eavesdropping' technique allows the student to witness the event in its entirety, which in turn may benefit their self-esteem.

In addition, Kerka, describes how the job market has changed markedly, that the days of a 'job for life' are long gone, rather what is required is "individuals should consider themselves a collection of attitudes and skills," (1997, p.1). Given this fast paced and ever-changing world, Barnett also promotes a learning style within such an unknown future might be deemed "to encapsulate [the] right relationships between persons and the changing world in which they [end up being] placed," (2004, p.259). Being able to hear firsthand those skill qualities from this 'Eavesdropping' technique may well be a step in that direction for that listening student to collect such outlooks and attitudes and reflect upon how they might be used in modifying their own behaviour.

Positivity Accentuated

As tutors, we always try to work from a 'positive' angle, we are always trying to find something worthwhile about each and every student's design work, and there always is something to praise, (even if it is the quality if line-work within the drawings). When there are problems or things haven't been quite resolved, the tutors tended to wonder aloud: "had the author thought about such and such?" Rather than saying taking the negative approach: "that looks weak" or that: "wouldn't work."

Industry based 'Strength Based Learning' or 'Strengths-Based Development' involves a similar technique to this 'Eavesdropping' model. These strength based techniques can be best described as: "rather than spending time helping their associates become 'well rounded,' many… managers have instead invested time in learning about individual talents of each of their associates, and managing with those unique talents in mind. This concept not only applies to managers, but to educators, [and] students," (Hodges & Clifton, 2004, p.256). Similarly, sports teams are made up of specialist players for each particular position.

A 2003 Gallup worldwide poll question asked, "Which do you think will help you improve the most? Knowing your strengths or knowing your weaknesses? The poll result being: "people think focusing on weaknesses will help them improve more than focussing on strengths" Following this poll, Hodges and Clifton reiterate: "there is clearly a need to educate the world about positive psychology in practice and the importance of understanding and focusing on strengths," (2004, p.257).

Broadfoot, (2008), transcribes similar thoughts about power of positivity, which she coins as "learning power." Learning power means, "having positive views about

one's own capacity to learn and a degree of confidence and resilience which enables one to work through the challenges and setbacks that genuine learning inevitably presents," (Havnes & McDowell, 2008, p.210).

Deep Learning

Deep learning "means taking an active approach to learning; trying to 'make sense'; using a variety of ideas and approaches; and being able to reflect on learning and act on one's reflections," (Havnes & McDowell, 2008, p. 210). As tutors we always hope for our students are getting deep learning, but are the students really getting it? There seems still a large suspicion that for many students it remains more superficial: that they are grade driven in their motivations. So perhaps all we can do is to continue to encourage, support where we can those learning's that have depth, and this is perhaps elicited from within the field trial by the following comments:

It was helpful to watch someone try to navigate between drawings.

It proves the readability of your work.

I think it will help to make one's work evolve or develop more.

The marking tutors in this scenario were not only faculty staff members, but also practitioners; this must add some weight to their comments in regard to 'build-ability' and 'application' (of the proposed construction details), in the eyes of the student learners.

Although within tertiary education, replicating the professional realm remains fraught with difficulties, as Teymur quips: "the Design studio is about 'learning' and the Office about 'earning,' " (1992, p. 36). "The raison d'être of a higher education is that it provides a foundation on which a lifetime of learning in work and other

settings can be built," (Boud & Falchikov, 2006, p.399). By allowing the student more exposure to such 'professional type' of activities, (albeit watching and listening), then perhaps students can be exposed to a greater depth of experiences and learning. Allowing the depositing of such experiences within the learner's memory bank, can perhaps give that learner something to fall back on later during their careers?

Another feedback comment was:

I find it more useful as it is more private.

From this, it would seem to reinforce of the Design School's ongoing and abiding intention to protect each and every student's private realm in terms of their assessment. Within this 'Eavesdropping' scenario, the tutors ensured that each student's work was not compared or 'benchmarked' with other work from within the cohort. Also, it would appear that the listener was not too concerned about hearing the feedback comments alone, (knowing that no other peers where present). Compare this with 'The Crit' situation, which is more public, and often tutors 'dumb down' the feedback, so as not to put down that student in front of his / her peers. This 'Eavesdropping' situation however, was an intimate event, with close scrutiny of individual work, a full and frank discussion took place between the tutors focused on the various strengths, (and if any, the areas that need strengthening), related to the work and its author. Also, what was said in the room remained in the room. As Knight and Yorke, state: "Understanding, (as a term, [is], preferred to 'knowledge' because of its implication of depth), is the key outcome of higher education," (2003, p.9). The design process has to be engaged with, it has to be encountered, felt out by trial and error, it is simply not just knowledge in the sense of: 'who was the first man to land on the moon?' And, as Sullivan, adds: "Research has indicated that deep learning is linked to providing

a stimulus in a way that leads students to focus more clearly on their particular topic, and then giving them the opportunity to reflect on and respond creatively to their chosen topic so that they can claim ownership of it," (2002, p.127). This idea of 'ownership' or preference of a way of working around and through a design problem is important at this time for a student, because what the tutors are really trying to do is help students to find their own individual 'voice.' Schools of Design and the wider Profession are always trying to encourage individual responses to new and evolving social issues of the day.

WHAT WAS NOT HELPFUL ABOUT THIS 'EAVESDROPPING' EXPERIMENT?

The received comments from the participating student volunteers centred on logistical matters: time waiting, timetabling, and time taken, these were totally valid and are also vitally important when considering the expansion such an assessment / feedback event to encompass an entire studio class.

DISCUSSIONS AND SUGGESTIONS FOR PRACTICE

Rather surprisingly the field trail feedback responses and grades were overwhelmingly positive; refer to the following comments:

An in depth analysis on paper and verbally of how the work was marked.

Do this, because it keeps you in touch with the reality of your work, instead of kind of forgetting about it once it's handed in.

I think it is better than handing it in, waiting 2 weeks, then receive a grade, because this time gap separates you from your work and your grade.

The direct marking of your work is of greater benefit.

Associated with all the comments received from the students, the overall support rating from the survey was of 5.91, (out of a possible high of 7). My fellow staff member also backed up the student claims, he too, thought it was a worthwhile experiment and said it was easy to adapt into the role. In fact at times he totally forgot the student was present although he was later rather 'miffed' when I told him one student thought his jokes were negative, (Francis, 2007).

In an effort to make it a 'win-win' type scenario: a way of further refining this technique could be to use the marking schedule or 'common feedback comments sheet' during the assessment but in a slightly different manner. Namely: during the tutor discussions, those comments that don't apply are struck out, (with a large felt-tip), and any additional comments are written on the sheet by hand. The tutors then sign it, a scan is then made of the final comment sheet version, (this scanned version then becomes a copy for the School's records), and the original sheet is given to the student as he / she leaves the room. Assessment, mark allocation, (un-moderated mark only), and feedback all done in one neat package.

LIMITATIONS OF THIS STUDY

The findings of this field trial should be treated tentatively. This was a small sample of people, (6 out of a possible 22). The end-of-year timeslot used to trial this experiment may also contribute to such a low turn out, (students probably just wanted to get away to their summer recess). In addition, the types of students who volunteered to partake in the field trial were the 'keen' students of the class.

It could also be argued that we should have had a control group to compare this experimental trial, however this was marking in real time and we still had to assess the other 16 students. (Which we

did, behind closed doors, and it should also be noted we, as tutors, slipped into our old roles of gossiping, 'slating' student work and other bad habits whilst we graded and worked out feedback for each student, so perhaps this could be deemed to be the control?)

Another limiting aspect would be: Does this scenario work with the assessment / feedback of a student who is about to fail the course? (Or, does not get as good a grade as they thought they would get?). How would the comments / grade be received in such an intimate environment? Would that student be able to remain silent, (or possibly burst into tears)? What pressures would be put on the tutors in handling such delicate situations in front of the student? These scenarios remain untested and leave the way open for more and larger trials.

Having said the above, I feel the warm support shown by the volunteer participants and associated staff, (together with the high student ratings supporting the concept), makes me confident that this 'Eavesdropping' technique has some potential.

CONCLUSIONS

"Students can, with difficulty, escape from the effects of poor teaching, they cannot, (by definition, if they want to graduate), escape the effects of poor assessment," (Boud, 1995, p.35).

Until Tertiary Education facilities switch to formative assessment only, this 'Eavesdropping' field trial shows at the very least the positive affects that transparency brings to the learning process. It not only affects tutor behaviour for the better, it allows the student private, yet direct access to positive feedback comments about their work and themselves. These gleanings could activate within the student deep

learning and foster critical thinking, (what could they improve for the next project?). By witnessing this event it could also prepare the way for further professional learning in their lifetime should they go on to be professional designers.

As interviewed and quoted by Anthony, "Architect: Charles Moore says: 'One of the legacies of the Beaux-Arts that we still have with us is that secrecy, the business of retiring into a room where nobody could see what you were doing… To keep people from copying each other is presumably why this secrecy was set up. Yet so much of practice is indeed copying each other, building on each other's ideas, and keeping other people interested in what's going on,' (1991, p.204). This paper attempts to show how a student learner can be a 'Eavesdropper' for a time, inside that room, and potentially glean something meaningful about themselves, their work, their potential and something more about the Design process by witnessing their own assessment and feedback event.

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Studio 19: Assessing the future of a New Zealand Design Document Build Studio

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This paper will assess Studio 19, the design-build-document studio offered at the Unitec New Zealand School of Architecture in Auckland, New Zealand, for the past four years.[1] It will begin with a brief history of 'building' in architecture. It will then shift to a discussion of design/build studios in general, focusing on their pedagogical outcomes. These include: enabling a design process that engages the entire body, promoting a sense of social responsibility in future architects, the acquisition of specialized skills, and learning to work in groups. The paper will then discuss the difficulties, from an institutional perspective, of running a design-document-build studio. These include the difficulty of finding passionate educators with a highly specialized skill set, fitting the studio into an existing curriculum, and funding the studio. Finally, the paper will suggest some possible ways in which pedagogical outcomes might be more consistently achieved and the difficulties of offering the studio might be minimized.

Brief History of the role of 'building' in architecture

Since Alberti stated in his 1485 treatise *On the Art of Building in Ten Books* that "the carpenter is but an instrument in the hands of the architect," architects have been separated from, and generally considered 'above,' the act of building. Yet this was not always the case: "in the Middle Ages, the three visual arts - painting, sculpting and architecture - were mechanical arts confined to the artisan's guilds, in which ...the architects were associated with the masons and carpenters" (Kristeller 1990). When formal education for architects was established at the Ecole des Beaux Arts in Paris, the two-dimensional analogue – the drawing – replaced building, and tectonics were evident only in watercolour plans, elevations and sections. Although the Bauhaus briefly reinstated a craft-based approach to art and architecture in the 20th century, this model constituted the exception rather than the rule. Most Western architectural education to this day has followed a Beaux-Arts-inspired "representation-based pedagogy" in which "representations in elevation, plan, or three-dimensional models [are] rarely at full scale…and…students graduate with a view of architecture removed from the actual act of making (Carpenter 1997).

Brief History of Building in New Zealand Architectural Education

The University of Auckland Architecture School offered several design-document-build studios during the 1960s and 1970s, although the studios tended to be one-offs, rather than regular occurrences. In 1966 students designed and built a house for an anthropologist and his family to inhabit while doing fieldwork on the Pacific atoll of Tokelau. In 1968, students built a small multi-story studio out of demolition materials under the guidance of Maurice Smith, who was visiting from the Massachusetts Institute of Technology. In the early 1960s, students built a large timber building to serve as the studio space for two year-groups of students. In 1971 a group of students built their own accommodation at the Warkworth Student

Congress, a one-week occupation of rural land inspired by the social movements of the time.

Design Document Build (DDB): Studio 19

In 2008, Dave Strachan, a registered architect in New Zealand and an adjunct professor in the School of Architecture at Unitec, approached Tony van Raat, the Head of Architecture, about his desire to teach a design document build (DDB) studio at the school.[2] Inspired by Studio 804 at the University of Kansas School of Architecture and Urban Planning, and by the Rural Studio at Auburn University in Alabama, Strachan wanted to begin a similar studio in New Zealand. "I was tired of hearing other architects complain about how students coming out of the architecture schools here were lacking in practical skills. I thought that, rather than complain, I should do something about it (Strachan 2011)." Since 2008, Unitec has offered a design-document-build studio, called Studio 19, to sixteen architecture students each year.[3] The studio involves students in all aspects of the design and construction process, from communicating with contractors, engineers and builders, to working with building code and seeking council approval for construction, to managing a budget and wielding a hammer.

Pedagogical outcomes of Design, Document, Build

"In the 1990s, "the construction of buildings was much less interesting to the students than architectural theory, especially theory more inclined towards philosophical preoccupations. Buildings, it seemed, somehow managed to be built from loose sketches. Other people would effect this essential translation – 'they' would find a way with a minimum of prompting. This attitude is apparently still with us, as engineers, among others, regard part of their role as 'problem solvers', where the architect is seen as part of the problem (Burry 2005)."

Dave Strachan says that he began Studio 19 because, "when you are at the School of Architecture you come up with these beautiful ideas and drawings but, without having to document them and without having to complete the final stage of building, you don't really understand what it is that you have done...The programme enables students to do what I call "closing the loop," through completing the design, documentation and the build of a house (Nichols 2010)." One of the most important lessons of the Design, Document, Build studio is, therefore, for students to realize that the lines they draw in plan, section or elevation have implications when it comes time to build.

"Mastering one craft personally helps the designer and architect to grasp the nuances of other crafts and, before all, to respect the special skill and experience of the craftsman executing his design. Besides, learning any skill intimately teaches one welcome humility (Pallasmaa 2009). As an example, Strachan explains how students in the 2010 Studio decided that they wanted floorboards of varying widths in the bach's outdoor deck.[4] "They thought that the variation would make the deck look more interesting. When they found out that pre-cut boards were unavailable in the widths they had specified, they decided to make them themselves. They spent the next three days planing, cutting, routing and sanding the boards to non-standard widths in the workshop. I'm always pleased when students push their designs, but it's also good for them to learn that their decisions have practical implications (Strachan 2011)."

This does not imply that students simplify their designs in order to make them easier to build, but rather that they have to think carefully about which details are most important. Callum Dowie, who participated in the first DDB studio in 2008, says,

"You really learn to pick your battles in terms of design. You learn that there are not unlimited possibilities and that you have to decide which bits you will fight for, and which you are willing to let go of. With our bach, we were quite determined to custom design the bracing for the Southern wall, which is angled at the top, and plumb at the bottom. We devised a way of constructing the bracing that involved CNC routing and laminating plywood to form an angled post. It was not the easiest way to do things, but it accentuated the angle of the roof, which we thought was important. Because of this, we were quite happy to have the rest of the walls made of simple, bandsawn plywood (Dowie 2010)."

While traditional studios rely on a primarily visual engagement with imagery in the form of drawings and scaled models, the DDB studio engages students through the very physical, multi-sensory process of construction. This physical engagement is an increasingly rare experience, especially given the increasing shift, in architectural education and practice, towards digitally-constructed imagery and digitally-printed models. The hand-eye-brain connection that underlies sketching, hand-drafting and model making has been replaced with a process where "the hand selects the lines from a given set of symbols that have no analogical – or consequently, haptic or emotional- relation to the object of the drawing (Pallasmaa 2009). Rachel McCann argues, "Architecture students "need to develop an intimate relationship not with the world of the page or screen, nor even with the forms and surfaces portrayed on them, but with the potential corporeal and multi-sensory experience of…emerging spaces (McCann 2005)."

"I think the most amazing thing about the programme is when you hear students talking about the project and you realise that they actually fully understand it. There's not the sense that they've learnt it yesterday and will forget it tomorrow. You get the sense that it is embedded in their understanding and they will remember it for the rest of their lives (Nichols 2010)." George Elvin discusses how involvement in the construction process can facilitate the identification, and resolution of difficult design decisions. "When we talk about an object abstractly, we each have a slightly different view of the thing. But when we stand in front of it, and experience it as built reality, we are dealing with the thing itself, and this eliminates some of the confusion that inevitably results from discussions based on drawings and explanations once-removed from the real thing" (Elvin 1993).

The documentation and construction process also offers students a new lens through which to analyse, critique, and continue to develop their designs.

"The period of realising ideas into built form is a transition during which some qualities are gained and others lost. As immaterial and intangible ideas develop, the question of how things are made generates a period of opportunity. If equipped with a critical understanding of the rich potential of this phase, the designer will approach the transition with confidence… and adapt to change accordingly. Architectural design does not end as the tools of fabrication are put into action. On the contrary, making is a discipline that can instigate, rather than merely solve ideas – in other words a design process" (Sheil 2005).

William Carpenter explains the role that the resolution of architectural details may play in the resolution of a design: "The detail holds the genetic information for any design project, allowing the entire design to be revealed in the smallest piece. In this way of making, the parts inform the whole" (Carpenter 1997). In Studio 19, students construct 1:1 mock-ups of details during the documentation phase to test the ways in which a detail might affect the overall design. Strachan emphasizes the importance of repeatedly

returning to what he calls 'the big idea' -- the architectural idea that informed the original design -- throughout the documentation and construction phase.

Collaboration

Another important pedagogical aspect of the Design, Document, Build studio is that it requires students to work collaboratively with other students, clients, and professionals. Although student group work is also common in traditional studios, the size and complexity of the DDB studio project generally make collaboration essential to the successful completion of the task. Andrew Freear, current head of the Rural Studio, says, "We are taught in architectural education to be tortured artists. The fact is, architecture is teamwork, and this is the first time most students have worked with someone else" (Oppenheimer and Hursley, Rural Studio: Samuel Mockbee and an Architecture of Decency 2002)."[5]

Group work generates a broad array of solutions to a particular problem, allowing students with different backgrounds to bring their special knowledge to a project, and gives students a structured experience so they can practice skills applicable to professional situations. Also, students who work in groups may prepare better and work harder, so as not to let the group down, and may be more willing to participate in discussions and activities than they would be in a larger, more anonymous setting (Sarkisian 2011). Group work can improve communication, cooperation, time-management, and self- and group evaluation skills (Unitec Centre for Teaching and Learning 2011). Finally, group work and group assessment promotes student autonomy by shifting some of the responsibility for teaching and learning to other students.

Dowie says of his group experience in Studio 19: "We had to hash things out a lot. I remember an entire day of heated discussions with other 'wall team' members regarding interior cladding. Once we had decided on plywood, a discussion ensued regarding the placement of the battens, then the size of the sheets, then the orientation of the plywood. Every option had to be thoroughly examined by the group, and every decision agreed upon." This way of working, he explains, is similar to the way he currently works in one of New Zealand's largest architectural practices. "Here, teams of five or six sit together and work on the same project. We have to get along, and we have to understand the abilities and responsibilities of each person in our group. The project architects spend a large amount of their time in meetings, so we have to rely on each other for help" (Dowie 2010).

Studio 19 students also collaborate with a client throughout the length of the project.[6] In traditional architecture studios, the importance of visual and verbal communication is discussed between staff and students, both of whom are familiar with architectural discourse and the language of architectural drawings. In a DDB studio, "communication… becomes the essential key to progress. No matter how elegant a proposal, if the client cannot understand it, its value remains unclear (Carpenter 1997).

When working with a client, a power shift occurs: the client makes decisions, and not the students. "To cross the line between working for oneself and working for someone else is difficult and accounts for much of the disillusionment students report feeling during the first year of employment" (Harris 1997). Students learn to cooperate, compromise, and conduct respectful negotiation when working with a client (Carpenter 1997). These skills may ease the transition to practice.

Another aspect of Studio 19 that prepares students for working professionally is collaborating with contractors. In his own work, Strachan tries to convince clients of the need to involve building contractors early on in the design process. He says, "Collaboration is a word that has been bandied around for the last couple of years in our profession but I think I have always done it because of my building background. I always try to work on the basis that we are all on the same team and that we aren't working against each other. By doing it that way we develop a mutual respect for each other's knowledge and work (Nichols 2010)." He carries this way of working over into Studio 19, where students work with builder Dave Cocks to resolve design details in the documentation stage.

Another form of collaboration required by many DDB studios is collaboration with the wider community. In his essay "The Suppression of the Social in Design," Anthony Ward discusses how "mainstream or dominant theories of architecture…place it in the category of high art- isolated from the social milieu of its time and supposedly transcending moral imperatives." These theories, he argues, are reinforced by the hidden curriculum of the design studio, which tends to be product-oriented, overly influenced with image making, and often involving a pedagogy that is highly competitive, hierarchical, and disempowering. Pedagogies that resist this model, he argues, are those that involve direct contact with disempowered community groups, involve students in attempts to resolve real-world problems, and place emphasis on process as well as product (Ward 1996).

Ward uses the term 'social architecture' to describe architecture that highlights the moral imperative to increase human dignity and reduce human suffering (Ward 1996). The DDB studio is an extremely powerful vehicle for conveying to students

the ability of architecture to improve the lives of both individuals and communities. The Rural Studio at Auburn University is one of the most renowned examples of a DDB studio that promotes social architecture. Students in the program design and build houses and community buildings for residents of Hale County, one of the poorest counties in Alabama. Samuel Mockbee started the studio in the early 1990s, at a time when "American architecture had retreated from social and civic engagement to a preoccupation with matters of style…[and] architectural stars, swept up in the new global economy… were designing increasingly audacious buildings for affluent clients worldwide" (Oppenheimer and Hursley, Rural Studio: Samuel Mockbee and an Architecture of Decency 2002). Mockbee's belief that the architectural profession has an ethical responsibility to improve living conditions for the poor, and his desire to pass this conviction on to students, continues to be the driving force of the studio. [7]

In 2008, Studio 19 supported KidsCan, a New Zealand charity that attempts to meet the physical and nutritional needs of disadvantaged New Zealand children. The culmination of the studio's construction phase fortuitously coincided with a KidsCan fundraising telethon: Studio 19's bach was auctioned for NZ$160,000, with all proceeds going to the charity. Since 2010, Strachan has selected a project of an appropriate size, program and complexity from those offered to his practice.[8] The client pays for construction materials and transportation of the building, but no design fees or teacher fees. Both Dave Strachan and Tony van Raat feel that this situation benefits the clients - who are able to afford the services of an architect - too greatly.

A proposed collaboration between Studio 19 and Housing New Zealand (HNZ), the Crown agent that provides social housing services, would allow the studio to shift its

focus to building for those in need. Strachan sees the collaboration as an opportunity to critically examine HNZ's current housing models, which haven't changed since the 1960s despite drastic changes in terms of residential design, construction techniques, and population demographics. Students would test new designs, building materials and construction techniques for HNZ, and would offer the organization four new designs per year. Students might also test their designs for temperature and humidity performance by constructing a control building and an experimental building, and using data loggers to track the performance of each over time.

Difficulties of Running a Design/Document/Build studio

The successful running of a DDB studio relies heavily on finding staff with a unique combination of architectural skills and personal qualities, some of which include: a broad architectural knowledge base that includes design and construction techniques, a strong belief in the benefits of a hands-on approach to design, a willingness to put in long hours with the students, and an ability to communicate clearly and patiently. Samuel Mockbee said, when discussing his departure from home to work with Rural Studio students each week, "I kiss my wife and go to war." With respect to Studio 19, Tony van Raat clearly states that the studio's existence is largely dependent on Dave Strachan's ability and enthusiasm.

Strachan stresses that he likes teaching Studio 19 because it makes use of his individual skills and allows him to do what makes him happy: design, build and teach.[9] When asked what his practice gains from its involvement in the studio, he says that the students also 'teach the teachers' through the work that they do. Specifically, student research into SIPs (Structurally Insulated Panels), LVL (Laminated Veneer Lumber) and CNC (Computer Numerical Control)

routing and laser cutting has made its way into his practice's work.

Strachan's teaching philosophy is based on an aboriginal elder's saying: "You have to give it away to keep it," which he explains as follows: "If you have something that you think you know is useful, you must pass it on… you [also] have to clarify things in your own mind before you pass on knowledge." He also says, "If everything is too easy, it doesn't mean anything. When you put a massive amount of effort into something is really when you reap the rewards (Nichols 2010)." Callum Dowie states that one of the things that Strachan most effectively transmits to students is an overwhelming enthusiasm for his work. "Teaching is not just about explaining…. it's also about conveying passion. Our project never would have been finished if Dave hadn't turned up every weekend (Dowie 2010)."

From an administrative point of view, funding is one of the most challenging aspects of offering a DDB studio. Staffing costs for Studio 19 are NZ$ 50,000 per year, as follows: Dave Strachan-$30,000, Marshall Cook - $10,000 and Dave Cocks - $10,000. These costs are nominal considering the amount of time and effort that staff put into the studio each year.[10] However, when considering that the staff-to-student ration of Studio 19 (1:8) is generally half that of a traditional studio (1:15), it becomes apparent that the staffing cost, per student, of the DDB studio is quite high.

Building materials are also a large percentage of Studio 19 funding costs. In some DDB studios, the high cost of materials has been turned into a creative challenge for students. Limited funding in the Rural Studio led to a focus on the use of donated, salvaged, and recycled materials, which subsequently required students to develop innovative building techniques. Examples include: hay bales covered with

wire and stucco in the Bryant House, the use of 1000 surplus tires filled and coated with concrete in the Yancey Chapel, a wall of overlapping automobile windscreens in the Mason's Bend Community Centre, and a house made out of reinforced blocks of carpet. Scott Stafford, a fifth-year Rural Studio student, built a small round smokehouse for client Shepherd Bryant as a thesis project. The smokehouse, made of concrete rubble walls with embedded coloured bottles to let light in, cost a mere US$ 140 to build.

Studio 19's 2008 KidsCan bach was built entirely with donated materials obtained by students. However, in 2009 the international economic crisis hit New Zealand, causing a number of suppliers to withdraw sponsorship. As a result, the students greatly reduced the size and scope of their construction project that year, building the smaller, second half of the 2008 project. The decision to use private clients was made primarily to ensure that future construction would not be limited or cancelled due to unavailability of materials.

Regarding the placement of DDB studios within the architecture curriculum of a school, William Carpenter states, "The [construction] studio track should continue the student's development in increasing complexity as a unified sequence. We have found it best placed in the fourth year of a five-year program, or in Yale University's case, placed that the beginning of graduate studies. This allows the students to have a working knowledge of design and the maturity to work as an integrated team (Carpenter 1997)." Strachan concurs with this opinion when discussing the impact of shifting the Studio 19 from the fourth year of study to the third year, following a 2009 restructuring of the Unitec architecture program.[11] "The extra year that the fourth year students had under their belt made a big difference. They were better prepared to deal with the complexity of the documentation and construction

process, and they were more confident and therefore better able to solve problems on their own. The extra design experience is very helpful in a process which is already extremely tight with respect to the amount of time available (Strachan 2011)."

While other DDB programs, such as Studio 804, design and build in a slightly shorter time than Studio 19, there is usually a strong emphasis on prefabrication and modular construction in these studios. Studio 19, which encourages custom construction, is limited to three academic quarters: work is interrupted in the third quarter when students return to a traditional studio for six weeks.[12] Strachan says that extending the program to a full year would allow more thorough research and development, and relieve some of the pressure from him and his practice.[13]

Conclusion

Recent events seem to indicate that DDB studios are, after a 40-year hiatus, re-establishing their place within New Zealand architectural education. As this paper is being written, Studio 19 students are beginning documentation drawings for this year's project, a team of students at Victoria University of Wellington is completing the construction of the First Light house, which will compete later this year in the US Department of Energy's Solar Decathalon, and another small group of Unitec students have recently started a second, separate DDB project.[14] Given these events, it seems an opportune time to assess what lessons might be learned from Studio 19's first four years.

With respect to the pedagogical outcomes discussed in this paper, Studio 19 does several things well. It offers students practical experience that prepares them for work as architects, reveals to them the value of construction in the design process, reminds them that the lines they draw on paper have practical

implications, and teaches them that collaboration with clients, contractors and each other, is a necessary and fulfilling aspect of their work. It also affords students the opportunity to work with a committed, talented and energetic team of professionals in all phases of the project.

Yet the studio, as run at present, fails to take advantage of certain opportunities that would both enhance its pedagogical value and make it more sustainable. The first of these is to teach students that architects have a responsibility to provide for the poor and to address critical social issues. The proposed collaboration with Housing NZ seems promising in terms of shifting the focus of the studio to a socially driven program. Student contact with HNZ's clients, as opposed to its employees, should be specified as an essential part of collaboration between Unitec and HNZ. Should the HNZ relationship fall through, the studio might instead focus its attention on the design and construction of post-disaster housing. The February 2011 earthquake in Christchurch, NZ which destroyed an estimated 10,000 homes, and damaged another 100,000, emphasized the lack of available, affordable, post-disaster housing in NZ (Small 2011).

In order to ensure that Studio 19 continues, it should be more thoroughly integrated into the rest of the architecture program. This could be achieved by moving the studio to first year of the master's program, extending it to one full year, and associating it with a Materials and Construction research strand.[15] Expanding the studio to one full year would create more time for research and development, and would relieve pressure on staff caused by strict time limitations. Supplementary courses, such as materials and methods, construction documentation, and construction site safety, could be offered in the second and third years of the BAS degree. These courses would better prepare students for the DDB studio, and

would relieve some of the pressure placed on Studio 19 teaching staff to cover all aspects of documentation and building in the studio. These classes could be prerequisites classes for students interested in participating in Studio 19, and electives for other students.

Reducing the financial cost of Studio 19, both to Unitec, and to its teaching staff, would make the studio more sustainable. Any future partnerships will need to resolve the somewhat contradictory tasks of promoting a charitable model for the studio and reducing the cost of running the studio. The Housing New Zealand partnership offers one possible solution, as HNZ would pay for Studio 19 staff fees and for construction materials. This arrangement would benefit both HNZ and Unitec. [16] Another option would be to seek outside funding for the program. If the studio were moved to the first year of the MArch (Prof) degree, research grants to investigate specific technologies might provide a source of short-term funding. Additionally, former students of Studio 19 could be paid to tutor in the studio. One or two graduates could assist during documentation and construction, thereby lightening Dave Strachan's teaching load, and making his involvement in the studio less financially and physically taxing.

Footnotes

[1] Students named the studio for the 19 people who are involved each year: Dave Strachan, Marshall Cook, Dave Cocks and 16 students. For more about the role each person plays in the studio, please see the Appendix.
The Unitec School of Architecture is distinguished from the two other tertiary institutions offering architecture degrees in New Zealand (University of Auckland, Victoria University) in that it is designated as an Institute of Technology, and not a university. The institute's motto, "Real

World Learning," reflects its origins as a technological and vocational school. Students in the MArch (Prof) degree at Unitec are required to complete 480 hours of work experience before graduating. This is not required at the other two schools of architecture.

2   The term 'design document build (DDB),' as opposed to the more common term 'design build,' will be used in this paper. Dave Strachan prefers calling Studio 19 a 'design-document-build' studio because it emphasizes the importance of the documentation phase in the studio process.

3   Please see the Appendix for a detailed description of the structure and staffing of the studio.

4   Bach (pronounced *batch*) is the New Zealand word for a small, modest holiday home, usually constructed of timber.

5   Students in the Rural Studio first participate in the program in their second year of an undergraduate architecture degree. They return to the Studio in their fifth year to undertake a thesis project.

6   In 2008, the client was KidsCan, a New Zealand charity that supports underprivileged children. In 2010, theclient was a young couple who wanted a weekend home for themselves and their two children. This year, the client is a single mother who wants a weekend home for herself and her two teenage daughters.

7   Mockbee died in 2001. Andrew Freear has since led the Rural Studio, maintaining its original emphasis on improving living conditions of Alabama's rural poor.

8   Studio 19's collaboration with KidsCan was not intended to be ongoing as the charity does not have an annual fund raising event at which it can auction the bach.

9   Strachan began working as a builder in Auckland in 1974. In 1975, he decided to study architecture at the University of Auckland, continuing to work as a carpenter throughout school. In 1979, he completed a Teaching degree at the Auckland College of Education, and in 1980, set up his own design/build practice, starting with small house alterations and additions and working his way up to larger projects. In 2000, Dave went back to the University of Auckland to do a Master's degree in sustainable design, an interest that, he says, grew out of the sustainable design principles that he was taught in architecture school in the 1970s.

10   The actual cost of Cocks' work on the 2008 bach, were he billing at his standard rate, would be $30,000. Dave Strachan estimates that cost of Studio 19 work done by him and his office staff over the last three years, if billed at normal design fee rates, would be approximately $250,000.

11   In 2009, Unitec restructured its architecture program, changing it from a five-year BArch degree to a three-year Bachelor of Architectural Studies (BAS) degree plus a two-year Master of Architecture Professional (MArch Prof) degree. At this time, the decision was made to move Studio 19 to the third year of the BAS degree, because it was felt that Studio 19 projects were not programmatically complex enough for a master's degree and did not provide sufficient opportunities for research. Furthermore, the first year masters curriculum specifies that design studio should be focused on long-span or high-rise buildings. These assumptions and specifications are challenged in the conclusion of this paper.

12   The decision to require Studio 19 students to complete one semester of studio with the majority of their classmates was made to ensure that they get at least some experience designing the larger-scale, more programmatically complex

projects that their classmates are working are in Studio 19.

13   Carpenter states, with respect to the DDB studio, that "fifteen weeks of to study architecture at the University of Auckland, continuing to work as a carpenter throughout school. In 1979, building is the minimum required to achieve a successful project (Carpenter 1997)."

14   This project, taught by Mark Mismash, another Unitec faculty member with extensive construction experience, was undertaken in response to a request from a resident of Christchurch, who lost her home in the February 2011 earthquake. The studio is focusing on energy efficient mass housing constructed with pre-fabricated materials and modular construction techniques.

15   Currently the Unitec MArch (Prof) degree curriculum does not allow for research specialization, even though specialization is common in other masters programs. Furthermore, the first-year masters curriculum favours large-scale, programmatically complex urban projects. In a country where most architects design small, residential buildings, and in an institution that values 'real world learning,' research that focuses on the relationship between design, detail, materials and construction seems highly appropriate.

16   HNZ would still save money by paying no design fees for the four designs presented to them each year, and paying no construction labour. Testing Studio 19 house designs against a control house would cost the additional amount of the control house materials.

17   William Carpenter, Samuel Mockbee and Stephen Freear, all educators involved in DDB studios, clearly state the necessity to keep studio groups small. Carpenter explicitly states that no more than seven students should have to work together in a single group.

APPENDIX

Structure of the studio

The Projects
Studio 19 generally calls for the students to design a bach -- a small, modest holiday/beach house that is traditionally constructed of wood. One of the main requirements of the program is that the building be transportable, as they are built on Unitec's campus and transported to the site.

Selection of students
Students must bid to participate in the studio by submitting a portfolio of their previous work and a written statement that expresses why they would like to participate. Based on these submissions, Strachan decides who will be involved in the studio, attempting to maintain a balance of skill, age, gender and ethnicity.

Staff
Dave Strachan and Marshall Cook, both professional architects and adjunct professors at Unitec, teach the studio. Strachan is the primary studio tutor and the main supervisor of the documentation and construction processes. Marshall Cook works primarily in the design phase of the studio. Dave Cocks, a well-known local builder, assists with in the documentation and design phase. Unitec technicians Tom Whelan and Graeme Leitch assist with supervising construction.

Studio schedule
Studio 19 currently occupies the first, second and fourth quarters of the Year Three design studio. In the third quarter, while building consents are being sought for the documented design, the students rejoin a regular third year design studio with the majority of their classmates.

Design

The first six-week quarter focuses on design, and is run as a competition: four groups of four students present designs to the client in response to the brief. The client chooses either a single, winning design, or requests a new design based on two or more of the designs presented. The students then work together to finalise a single design.

Documentation

In the second quarter, students document their design. Four teams are created: the floor team, the wall team, the interior team, and the roof team. The interior team leads spatial planning, and creates furniture, cabinetry and detailing. The floor team is responsible for the foundations and floor. The wall team is responsible for all walls, windows, doors and waterproofing, and the 'roof' team is responsible for the roof. The teams work together to determine how their respective portions of the building will meet. Students contact suppliers and build 1:1 mock-ups in order to resolve construction details.

Build

In the fourth quarter, after receiving council consent to build, students begin construction. Each team drives the construction of its particular portion of the building. The structures are built on Unitec's campus, adjacent to the architecture school's wood/metal workshop. This arrangement allows the students access to the workshop, helps maintain safety standards on site, and allows the rest of the school to watch the construction process as it unfolds. Upon completion of construction, the bach is transported to the site, where any necessary on-site construction (usually decking) is completed.

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EFFECTIVE TEACHING STRATEGIES IN ARCHITECTURAL EDUCATION:
'ADVENTURE LEARNING'- LEARNING THROUGH EXPERIENCE & FUN
(Reflections on the Subject Modules-World History of Architecture & Design)

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Abstract

Individuals perceive and process information in very different ways. Therefore learning/teaching methods always differ from one person to another. There are large variety of different learning/teaching methods and selected few are; 'Observational learning', 'Collaborative learning' and 'Multiple intelligences'. 'Adventure learning', which is most popularly used in Architectural education, demonstrates all the learning methods mentioned above.

Adventure Learning is to create activities that provide students with opportunities to explore real-world issues through authentic learning experiences within collaborative learning environments. It is not just a game. The facilitator need to guide students in the activity in order to gain experiences to achieve the academic objectives. It is believed that actions are easiest to remember and the learning can be best done through experience and fun. Further this method can convert passive learners in to active learners.

Further it is said that, 'most people learn 80% of what they use and do in real life'. Therefore the objective of this paper is to show the importance of using innovative teaching methods with few examples from author's experiences in teaching the subject module, world history of architecture & design for B.Arch./ B.Des. degree level one, University of Moratuwa, Sri Lanka.

Keywords: Active learning, Passive learning, Unconventional teaching methods, Adventure learning, Effective teaching methods, Peer learning, University of Moratuwa

1.0 Introduction

It is believed that actions are easiest to remember and the learning can be best done through experience and fun. This paper draws attention towards author's reflections on using unconventional teaching methods in the module, world history of Architecture & Design, shared by B. Arch and B. Des Level One students(100 students) during the time period of 2005 to 2011 at the Department of Architecture, University of Moratuwa, Sri Lanka. Providing supportive evidences from literature, the author highlights the importance of using innovative and effective teaching methods to improve quality learning in Architectural education.

1.1 Definition of learning

The nuance of the word, "learning" is always in par with knowledge and skill. According to Soanes (2007), "learn" means "gain knowledge of or skill in / Become aware of". Further the same dictionary defines knowledge as "information or awareness gained through experience or education"

and skill as, "ability to do something well". These standard definitions provide a surface understanding of 'learning'. Yet, it is believed that 'learning' has a meaning beyond the dictionary definition. The word 'learning' signifies different meaning depending upon the philosophy in which it interprets. According to the great Greek philosophers Plato and Aristotle, learning is "an intellect over practice". This means **learning is achieved by doing** (Brockbank & McGill 1998).

According to Dwey (Brock bank and McGill, 1998), leaning process should start with real life problems and should continue as a reflective practice.

Further, Dr L. Dee Fink,(2003) the pioneer, of the 'Taxonomy of significant learning', expresses his perspective on learning as follows;

"I define learning in term of **change**. For learning to occur, there has to be some kind of change in the learner. **No change, no learning.** And significant learning requires that there be some kind of **lasting change** that is important in terms of the learner's life".

Therefore, it could be said that learning is a process that bring together cognitive, emotional and environmental influences and experiences for acquiring, enhancing or making changes in ones knowledge, skills, values and the world view.

1.2 Learning methods

Individual perceive and process information in many different ways. Therefore learning methods always differ from one person to another. There are large variety of different learning methods and selected few are as follows.

a) Observational learning

Observational learning occurs when an observer's behaviour changes after viewing the behaviour of a model. Learning by observation involves four separate processes :attention, retention, production and motivation.

-**Attention:** Observers cannot learn unless they pay attention to what's happening around them

-**Retention:** Observers must not only recognize the observed behaviour but also remember it at some later time.

-**Production:** Observers must be physically and/intellectually capable of producing the act..

-**Motivation:** In general, observers will perform the act only if they have some motivation or reason to do so. **The presence of reinforcement or punishment,** either to the model or directly to the observer, becomes most important in this process.

Human development reflects the complex interaction of the person, the person's behaviour, and the environment . **What a person observes can powerfully influence what he does.** Person's behaviour also contributes to his environment.

It is believed that educators must **provide students the opportunity to observe** and model the behaviour that leads to positive reinforcement though organizing.
Examples:
- inspiring guest lecturer,
- site visits (to meet inspiring people in the industry and to see their work),
- encouraging collaborative learning environment (group work),
- Adventurer learning exercises,
- work with senior students, etc

Educators can provide the incentive and supportive environment that would facilitate observational learning that world promote positive/learned behaviour in students.

b) Collaborative learning
(learning together/from peers)

Collaborative learning means to provide activities that engage student with their peers while learning and applying the course material. Usually it involves small group activities. This could conduct during both theory classes and practical classes. According to William Glasser (cited in Biggs, 1999,P-78) most people learn;

10% of what they read, 20% of what they hear, 30% of what they see,
50% of what they see & hear, 70% of what they talk over with other,
80% of what they use & do in real life,
95% of what they teach someone else.

Therefore it is believed that the learning is more effective when students discuss among themselves and teach one another (peer learning).

In working together to solve challenges, groups find themselves testing methods of communication, responsibility, Co-operation, trust and creative problem-solving.

Further, peer-controlled activities are useful for elaborating, broadening, understanding, providing view points/ perspectives & obtaining self insight.

The Architecture Degree course encourage collaborative learning mainly because it is identified that this learning method develops students ability to work innovatively with ideas, solve problems creatively and communicate effectively. Therefore the department promotes activities such as **Adventure learning**

to facilitate effective learning and creative thinking.

c) Multiple Intelligences

Physiologist Howard Gardner(1998), suggests that there are at least seven ways that people have of **perceiving and understanding the world.** Gardner labels each of these ways as a distinct "intelligence"; in other words a **set of skills/abilities a**llowing individuals to find and resolve genuine problems they face.

The identified seven intelligences are as follows;

1. Verbal-linguistic- The ability to use words and language.

2. Logical- Mathematical-The capacity for inductive and deductive thinking and reasoning, as well as the use of numbers and the recognition of abstract patterns.

3. Visual- Spatial-The ability to visualize objects and spatial dimensions, and create internal images and pictures

4. Body-Kinaesthetic- The wisdom of the body and the ability to control physical motion.

5. Musical-Rhythmic-The ability to recognize tonal patterns and sounds, as well as sensitivity to rhythms and beats.

6. Interpersonal-The capacity for person-to-person communication and relation-ships.

7. Intrapersonal- The spiritual, inner status of being, self reflection and awareness.

Verbal- linguistic and logical mathematical intelligences are heavily favoured by the traditional teaching system. But this concept of multiple intelligences show us,

the need of a **balanced curriculum** that incorporates arts, self awareness, communication, physical education etc. Therefore it would be beneficial for students, if lecturers could introduce assignments that respond to various intelligences/skills such as Role play, musical performances, film reviews, group activities, etc.

2.0 Approaches of learning

Literature based on education explains two approaches in education. They are as follows:

a. Passive/ Surface learning
b. Active/ Deep learning

As academics, who facilitate student learning, it is useful to reflect on the characteristics of the above two approaches and improve where, when necessary.

(a) Passive/ Surface learning

Passive learning happens when the teacher dominates the class and students are expected to listen and memorize. This is the traditional style of lecturing.

(b) Active/Deep learning

L.D. Fink (1999) has expressed lot of views on the subject of 'Active learning', He has proposed a model which offer a way of conceptualizing the learning process in a way that may assist educators in identifying meaningful forms of Active learning. This model which is named as "Fink's model" (figure 1) suggests that all learning activities involve some kind of experience or some kind of dialogue. The two main kinds of dialogue are "Dialogue with self " and 'Dialogue with others'. The two main kinds of experiences are 'observing' and 'Doing'.
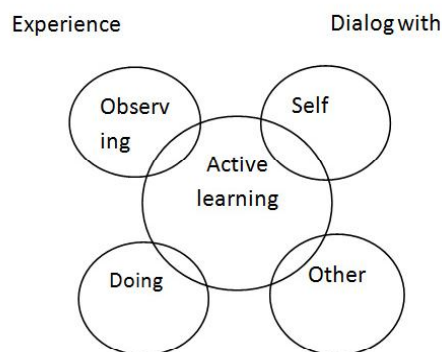
*Figure 1: A model of Active learning
(Sources: Fink L. D, 1999. Active learning, reprinted with permission of the university of Oklahoma International Development programme, Accessed: 02nd June 2009, (http://honoluluhawari.edi/intrant/adve.htm)*

I Dialogue with Self

This is what happens when learner thinks reflectively about a topic. This can be implemented in higher education by reflective learning logs where students can keep a note on topics they learn and synthesis those with previous knowledge for better understanding. The basis of self dialog is questioning and answering paralley on a topic within one's self. It means, one becoming the arguer and the counter arguer at the same time. This ultimately leads to consciousness of the things being learnt. This is kind of an active engagement in the learning process than being a memorizer.

II Dialogue with others:

Discussion of a topic with an interest group, enhance both memory and sharpens comprehension (Biggs 1999), because within a discussion a student can clear, unclear areas and gather diverse viewpoints from others questions and inquiries.

III Observing:

Observation can be direct or indirect/ vicarious.

a) Direct observation – the learner is observing the real action; directly. Example: site visit to a building under construction (see live performance)

b) Vicarious/Indirect observation - observing a simulation of the real action Example: Watching a documentary on building construction or photography

IV Doing

Mere observation does not make student active learners. Observation needs to be followed by action/doing. 'Doing' may be direct or vicarious.

a) Direct – Build actual structures using real material

b) Vicarious – simulation Activities such as role playing

Further 'Doing' is important as it directly links with the 'functional knowledge' and long-term memory.
The following quotations would strengthen the significance of 'Doing';

a) *"Tell me and I'll forget; show me and I may remember ; involve me and I'll understand".*
-Chinese proverb -

b) *"Knowing is not enough; we must apply. Willing is not enough: we must do".*
-Johann Wolfgang von Goethe-

Distinctive features of Active learning are as follows;

1. A search for meaning and Understanding

2. Greater student responsibility for learning.

3. A concern with skills as well as knowledge (problem – solving skills, Initiative & efficiency skills, Interactional skills, communication skills)

4. An approach to the curriculum which looks beyond graduation to wider career and social settings.

It would be correct if said that active learning is a prerequisite for deep learning; that is if students do not engage actively in there learning activities, there is less possibility for deep learning.

3.0 Facilitate effective learning
(Find better ways of engaging students in the learning process)

3.1 Effective teaching strategies:

a) Encourage functional knowledge:

Today students come to our universities in the hope of graduating and fitting into a diversity of careers. The employing organizations, which offer those diversity of careers demand significant skill and functional knowledge. Therefore the university education must focus on providing functional knowledge.
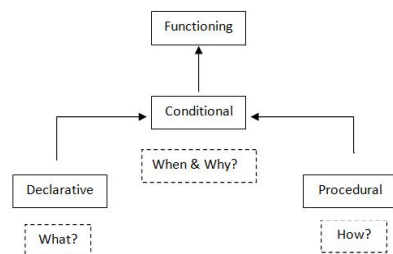

Figure 2: Functioning knowledge (source, Biggs, 1999, cited in Ekaratne's and Weerakoon's 2008, CTHE course Hand book, 9th ed , staff development centre, university of Colombo,P.4)

A knowledge becomes functioning when students know theories to explain certain situation (what), how they can use these theories to make decisions (How), under that circumstances (underlying Assumptions of the theory – 'when' and the reasons to believe that the theory will work- 'why'). Therefore learning outcomes should cover four questions of 'what, how, when, & why'.

b) Use of "Tell-show-do" approach:

Tell Dialog→ with self and others   Show → Observing   Do → 'Doing'
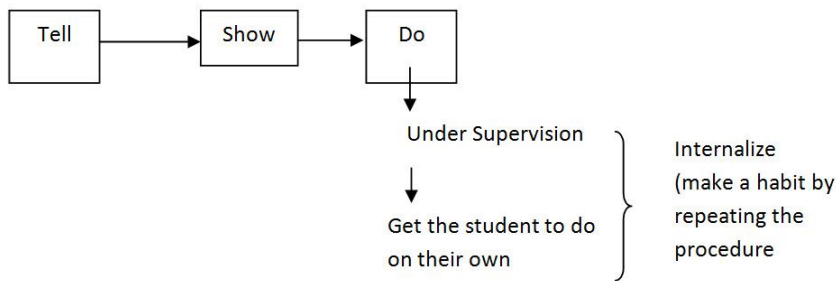
Figure 3: Active process – 'Tell-show –Do'

c) Encourage students to enjoy learning- Adventure Learning:
Definition of Adventure Learning:

According to John Biggs(1999,p.76-78), Adventure learning is to create activities that provide students with opportunities to explore real-world issues through authentic learning experiences, within collaborative learning environments. These activities contain an element of risk, which could be physical, social or emotional, so that the experience is more real. The facilitator needs to guide students in the activity in order to achieve academic objectives.

Significance of Adventure learning:

1. Adventure learning facilitates the use of multiple sensory modes. Students learn through different sense modalities & the more one modality reinforces another, the learning becomes more effective.

2. Adventure learning provides experience & knowledge that last a life-time.

• Peak experiences are exhilarated through Adventure Learning. (combination of fun & the committed hard work)

• When fully engaged it makes unforgettable discoveries & lasting results.

3. Adventure learning draws out undiscovered potentials of each individual.

• It promotes adaption to challenges in ways never thought possible.

• It draws out surprising talents/ creative thinking.

• It provides opportunity to see things with fresh eyes.

4. Adventure learning facilitates team spirit and peer learning.

> • In working together to solve challenges, groups find themselves testing methods of communication, responsibility, cooperation, trust, risk-taking & creative problem-solving.

> • Peer-controlled activities are useful for elaborating, broadening understanding, providing viewpoints/ perspectives & obtaining self-insight.

The educator can introduce innovative activities that encourage excitement and enthusiasm in students. These activities could happen within the lecture room as well as out side the lecture room. Few examples are as follows;

(i) Indoor activities: Role play, poster presentations, film review, debates, quizzes, treasure hunts, etc

(ii) Out door activities :Site expeditions, out door workshops, etc

All these activities could be broadly named as '**Adventure Learning'.**

4.0 Case study:

Use of Adventure learning method in developing the subject module - World history of Architecture and Design for B.Arch/B.Des. degree courses

History is well known to be a more descriptive, theoretical and a boring subject among students. Therefore it was a challenge to change the preconceived attitude towards it and make it interesting and useful for students. Several 'changes' were made into the conventional teaching method along with the adventure learning theory and developed its application in response to students feedbacks and personal reflections(reflective practice cycle) over a time period of six years.

Majority of student answers at the examinations and written assignments were very descriptive and lacked analytical component **(Only declarative knowledge was exhibited).**

Further they lacked the ability to integrate knowledge. For example they never tend to incorporate knowledge gained through other subjects such as social studies, Nature studies, Design theory, etc. Even with the subject- world history of Architecture, majority could not see a holistic view.

Therefore many activities that reflect Adventure learning theory, were applied in conducting the above module and few are as follows;

Activity 1: Film Reviews

It is firmly believe that learning has to be done while enjoying. Fun creates excitement and increases the adrenaline level in the human body. Scientist say that high adrenaline level in blood increased brain functioning and therefore the learning becomes more effective. Hence, an attempt was made to promote activities that students, enjoy. 'Film review' is one such activity that students enjoy. Further, it improved the analytical skill in students and captured their enthusiasm.

Recommended films relevant for each historical period are as follows;

Historical period/ Architectural style	Relevant Film/ documentaries
▪ Pre- History	▪ 10,000 B.C
▪ Ancient Egyptian architecture	▪ Discovery documentary on Ramses the great, Lost Cities
▪ Ancient Greek architecture	▪ Discovery documentary on Alexander the great, Troy, 300
▪ Ancient Roman architecture	▪ Gladiator, Agora
▪ Middle Ages-Gothic architecture	▪ Hunch back of Nottradam, ▪ Kingdom of heaven (crusade)
▪ Renaissance architecture	▪ Christopher Columbus, Immortal beloved - Beethoven, Anonymous
▪ French revolution	▪ Tale of two cities, Queen Marie Antoinette
▪ Industrial revolution	▪ Oliver Twist
▪ Victorian middle class style	▪ Pride and prejudice, Sense & Sensibility
▪ World War I, II	▪ Schindler's List, Hitler-rise of evil
▪ Modern movement architecture	▪ The Architect, My Architect (Louis Khan)
▪ Cyber Architecture	▪ The Island
▪ New trends in architecture	▪ Documentary on Jewish Museum in Berlin
▪ Colonial Influences on Sri Lanka	▪ Gampereliya

A good film is produced with lot of background research. Although the selected films (except discovery documentaries) are fictional, they give insight to the Socio - Cultural, Political, economical background of a particular era. These are valuable for students to compare, contrast and distinguish (Bloom's taxonomy-analyze) what is shown with what was learnt in class. Further they can debate and evaluate observations and conclusions.

Appropriate films were shown throughout the semester in relation to the conducted lecture topic. Film reviews were conducted in two ways.

i) Individual film reviews – as written document (Year 2005-2008)

ii) Group film reviews – as a Poster with a verbal presentations(Year 2009-2011)

Figure 4: Student presenting a film review with a poster.

The individual film review method used during 2005-08 had several disadvantages, such as;

• Students were not able to share their thoughts and knowledge since it was an individual report

• Some students could not understand the aims and the objectives of the exercise. The reviews were very general and shallow.

• Some students reproduced information on the internet without any analysis

• The lecturer was overburdened with report marking and could not provide feedback comments on appropriate times. Reflecting on the shortcomings noticed through student feedback comments and self observation this exercise was developed over another time period of two years(2009-2011). It was changed in to a group activity and groups were assigned to study a specific subject in response to the film. They were encouraged to be creative when presenting and use innovative presenting methods such as 'role play, quizzes'.
Example :

Watch the film 'Pride and Prejudice' and study the following areas in groups;

Group1-Socio-cultural and political background of the particular era reflected by the film
Group2-Architectural styles reflected by the film
Group3-Interior and furniture of the particular era
Group4-Fashion and Jewelry of the particular era
Group5-Graphical presentation of the film
Use the film as a case study and discuss the given subject, using a PowerPoint presentation and a poster. Role-play is encouraged.

(Restrict the Verbal presentation to 20 mints)

Further, 'Peer-marking' method was used in class. After the end of each presentation, students were given a marking criteria

and asked to mark their colleagues presentations in their own working group. Student comments were read aloud along with the lecturers comments.

Students organized and participated in the activities with lot of enthusiasm. They enjoyed these activities a lot. Some groups dressed-up appropriately to the subject they discussed while another presented their work as a drama and another group organize a quiz at the end of their presentation with a prize for the winner.

Their film reviews showed improvement in their analytical skill. (This was observed both in written assessment as well as in their final examination)

Therefore, It was realized that objectives could be achieved more successfully by promoting activities that students enjoy.

Further, film reviews enabled them to see a bigger picture (holistic approach) and enhanced imagination and creativity.

Activity 2 : Reading exercise with the poster presentation.

Majority of students reproduce the lecture note at the examination or in their written assessments. They lack knowledge on the subject matter beyond what is taught. In the class, and do not seem to refer the recommended reading. Further, students lack enthusiasm in reading because of language difficulty and also because they are not used to reading (no habit).

In response to the above observations, it was important to **initiate the reading habit among students.**

Therefore a reading exercise to be conducted in class was planned. Since the reading habit has to start from the very beginning, this exercise was planned for B.Arch/ B. Des level one students for the module; world history of architecture.

The steps implemented were as follows;

1) Divided students in to small groups and made them sit in circles

2) Distributed copies of the reading material among students.

3) Allocated a reading section for each group.

4) Instructed students to read and highlight on important points within 10 minutes. (spoke to them about SQ3R method and other easy tips to consider in reading)

5) Asked them to discuss and prepare a presentation with the aid of a poster to explain on what they read within 15 minutes.

6) Asked them to select a reporter who can come foreword and present to the class.

7) Summarized the whole activity and helped students to understand the idea of the whole article.

Before introducing the assessment it is important to motivate students by showing short term and long term benefits of the exercise.
Example:

• Ask them to consider this exercise as a **'start' towards developing reading habit.**

• Show them the importance of peer learning and how this sort of an exercise could be carried out when studying for the examination (each person to be responsible for a section and teach others; so that it saves time and be more effective.)

The facilitator can provide dictionaries to the class, for students to clarify difficult words. Further, one can encourage more able students to help less able students in language difficulty (motivated them to change their attitudes and not to be ashamed of their disabilities in language). The facilitator also should go around the class helping, guiding clarifying when necessary.

Figure 5: Students reading in class and working on the posters.

All students were very active throughout the exercise. They showed excitement and participated enthusiastically in the activities. Many used the dictionary, which showed their activeness and eager to learn. Further, peer- teaching (student teaching / explaining another student) and team-spirit in preparing the poster were observed.

Majority of feed foreword forms had positive comments except very few. They had complained about; dominant students who does not respect others opinions, conflicting ideas, communication difficulties / misunderstanding among group members, noise made by students, etc.

Activity 3: Rearrangement of Furniture

When initiating a new lecture topic, it is effective to approach 'unknown' through what is 'known' to students. Therefore it is important to initiate a dialog with students in order to build on what students know or familiar with. (Example: "What comes to your mind, when I say ancient Egypt?"). It was observed that undergraduate students are reluctant to answer and express their views on such simple questions. Further, it was noticed that students behavior at the studios (place for design activities such as drawing, model making, tutoring, etc.) differ from their behavior at the lecture hall. At the studios they look more relaxed, comfortable and active; but at the lecture halls they look tensed, uncomfortable and passive.

Therefore It was assumed that the furniture arrangements has an impact on the behavior of students. To check whether my realization is correct, I changed the furniture arrangements according to different activities. (Inspired from Gibbs & Habeshaw, 1989, P. 76)
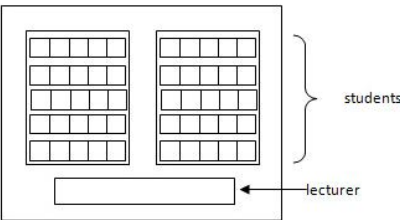
Figure 6: Conventional seating arrangement in the lecture hall (Formal)

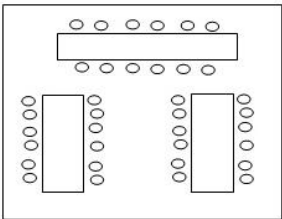Lot of space lecture to move around

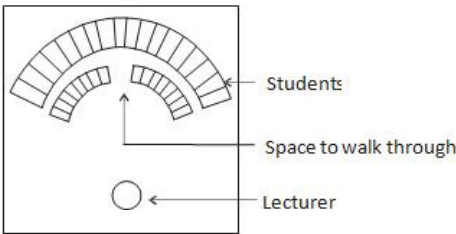*Figure 7: Furniture arrangement in studios (Informal)*

Figure 8: Classroom furniture rearranged by students
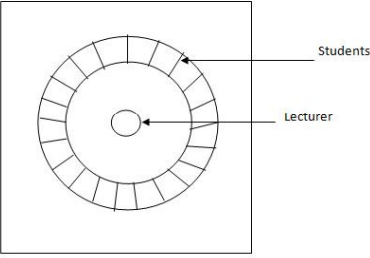
Figure 9: Seating arrangement for the activity, 'rounds'.
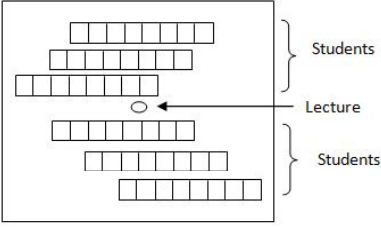
Figure 10: Seating arrangement for activity 'debate'
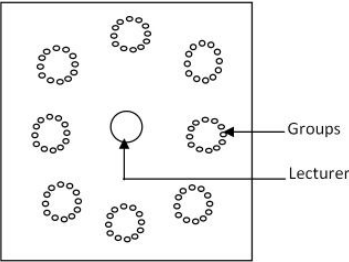
Figure 11: Seating arrangement for small group activities
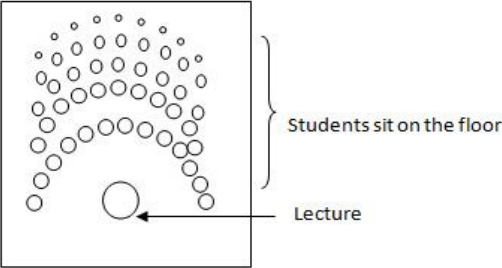
Figure 12: Students seated on the floor

In rearranging furniture, following aspects were considered;

-maximize eye contact: Arrange in a way that the lecturer can see all students

-Accessibility: The lecturer should be able to walk around the class and be able to have direct access to students as much as possible.

-Nature of the activity: The seating arrangement should be in such away that it facilitates the activity

Change of seating arrangement encouraged students to be expressive and improved verbal communication skill.

This could be due to the following reasons;

i) The new seating arrangements provided informal setting, where students could see each other. They became more relaxed and comfortable.

ii) In the new seating arrangements the lecturer was able to have more eye contacts and direct contact with more students (more attention results better performance in students: Hawthorn effect- stoner 2000,P.32)

Therefore it could be said that appropriate arrangement of furniture encourage positive behavior in students and improved their communicational skills. Further, it enabled students to enjoy the lecture and made learning effective.
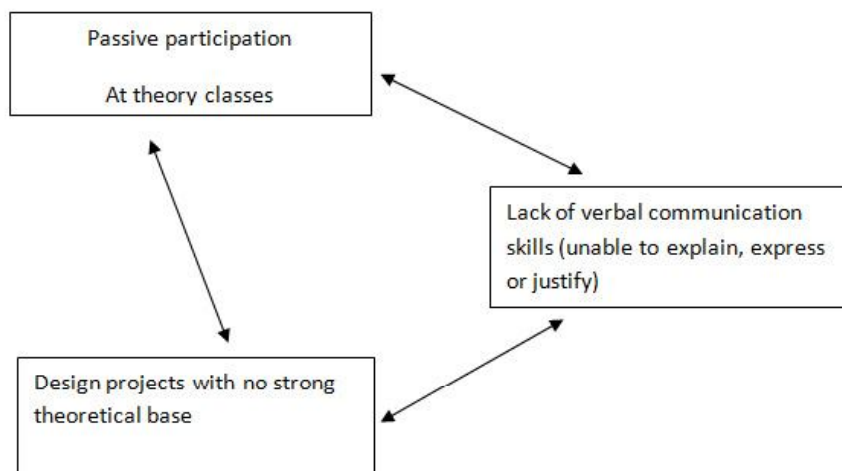
Figure 13: Interconnected issues in architectural education. (mainly based on lack of communication skills)

Activity 04: Debate

Majority of students lack verbal communication skills and are poor in explaining & justifying their design proposals. All these three issues are interconnected.

Figure 13: Interconnected issues in architectural education. (mainly based on lack of communication skills)

As a response to the above identified interconnected issues 'debate' activity was introduced to enhance not only communication skills but also analytical and implicational skills in students. Following steps were undertaken;.

1. Derived a controversial statement from the relevant lecture.
Example: "should the design product depict the designers /architects identity or not?"
(under the section identity of Mackintosh)

2. Asked students to decide whether they agree or disagree with the statement.

3. Instructed them to divide themselves in to two groups with two main leaders; and exchange their views for five to ten minutes.

4. Asked them to rearranged the furniture as indicated in figure 10 above.

5. When the students started on the debate, the lecturer acted as a mediator and guided students towards the right direction without letting them to go off track.

6. At the end, the lecturer summarized ideas and derived a conclusion.

Surprising ideas/comments were given by students. Above all, students enjoyed the whole activity very much.

Activity 5: Field expedition

A site expedition was organized by the year coordinators (Archt.Prasanna Liyanage, Archt.Roma Wickramanayake and Archt.Marini Samaratunga) in the year 2007 for a level one design project (Yatra) of B.Arch/B.Des degree program. The selected location was Godawaya (ancient sea port) in Hambantota, Sri Lanka and spent five days on the site.

Project aims:

• An ice-breaker to change preconceived ideas & evoke imagination.

• Orientate towards our own identity, respect to our own inheritance & ourselves.

• Consider history & context as a tool in the aspect of deign.

• Design as a problem-solving exercise.

Project task:

• Understanding & interpreting the term Yathra and design a method to carry people/ goods uphill as per the interpreted context, interpreted function

Group work (Godawaya-Site Forces):

1. Rock Profile
2. Site Levels (contours)
3. Wind patterns
4. Wave & sound patterns-Sea
5. Water flow-River
6. Views

Figure 14:Understanding the Rock profile & Site levels (contours)

Figure 15:Understanding the Wind patterns

Figure 16:Understanding the Views, Wind patterns, Wave & Sound patterns of the Sea

Figure 17:Understanding the Water flow of the River

Key points to consider in implementing Adventure learning in the field:

1. Activities should be keyed to academic objectives.
Eg: Objective - To Understand Design as a problem solving exercise.
Activity - Designing and building something that floats (which could be lit as well) and moves down river considering both the surface & deep water currents.

Therefore Declarative & Functioning knowledge are linked, reinforcing each other.

2. Respond to the Risk factor/ safety of students
-Arrange Pilot trips(to be familiar with the location)before taking students
-Accompanying several lecturers or responsible senior students
-Set Ground rules   -Instructing students to look after each other
-Allocate groups in charge of basic needs (First aid/medicine, food, sanitation, accommodation, equipment, etc)

3. Strengthen the control over students
-Form team leaders   -Introduce ground rules
-Clear instructions/ preparation before the site visit
4. Prepare for unexpected situations- Weather changes, Accidents, Vehicle breakdowns, etc.

5.0 Reflections : Student Feedbacks and data analysis:

At the end of each academic year, student comments on the teaching performance were collected anonymously using a standard feedback form. Student feedback form had 05 criteria and 3 grading. Five criteria are as follows;

1. Ability to understand the lecture's teaching
2. Effective nature of lecturer's communication skills
3. Effective nature of lecturer's teaching strategies.
(Quiz, debates, film reviews, studio assignment, slide presentations, etc.)
4. Lecture's knowledge on the subject taught
5. Lecture's overall performance in the class
(Control over the class, punctuality, enthusiasm, connectivity)
The three grading are;
A – Good   B- satisfactory
C-unsatisfactory

Used 50 feed back forms to develop the following graphs.

Graph (1) Teaching performance during 2005-2006:
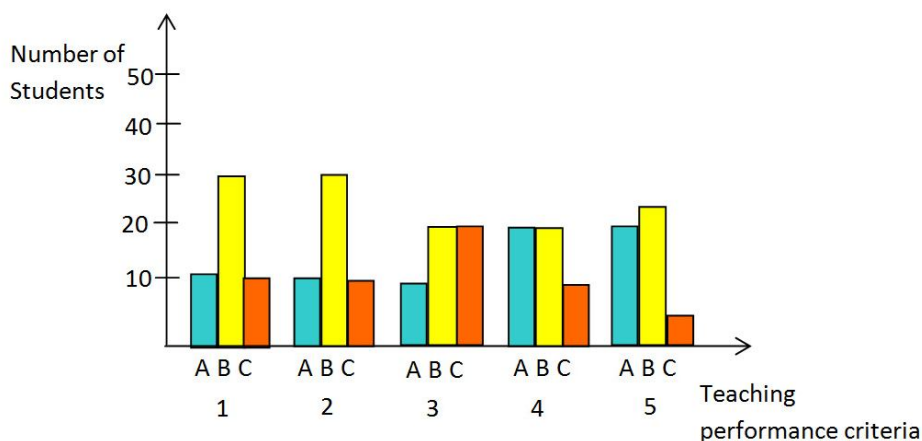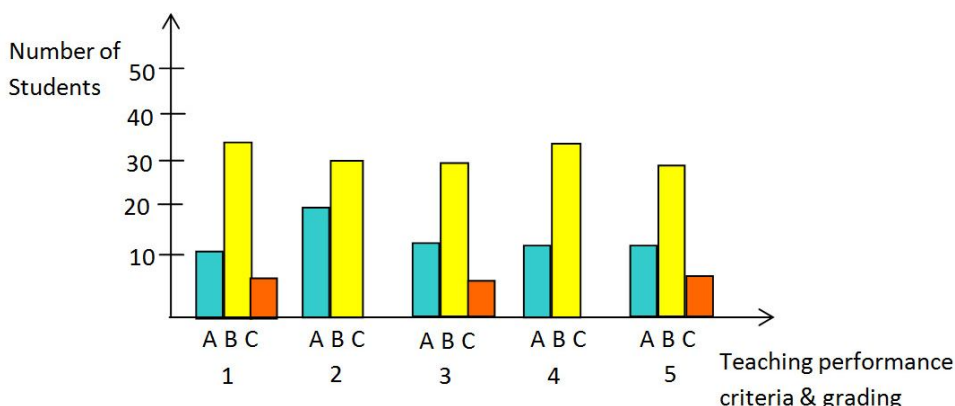
Graph (2) Teaching performance early during 2006-2007
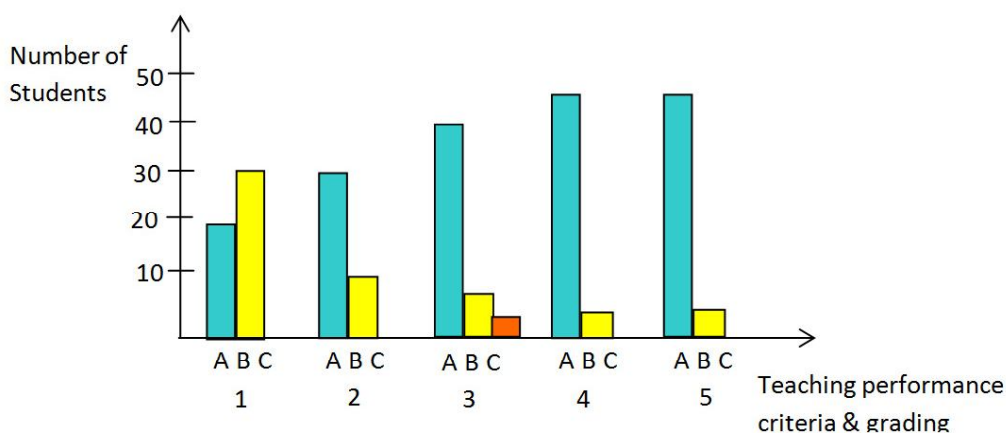
Graph (3) Teaching performance during 2009-2010

Figure 18: Graphs showing personal development in teaching performance between 2005-2011 time period

Analysis of the graphs

Graph #01 shows that, I have had problems in my teaching performances at the beginning of the academic carrier. Considerable number of students had been unsatisfied (Grade C) with my performance. The most unsatisfactory performance had been in effective nature of using teaching strategies. At early stages, I had very little knowledge about effective teaching strategies. My teaching was mainly based on conventional lecturing (teacher centered).

Graph #02 shows my teaching performance during 2006-2007 had started to improve with the use of innovative teaching methods. Weaknesses in the previous teaching wer-e identified and had taken necessary action to eliminate them.

Graph #03 shows a dramatic improvement in my teaching performance during 2009-2010 period (increment of 'A' grades and decrease of 'C' grades in feedbacks). It shows that the remedies taken to eliminate weaknesses had succeeded. Since Adventure learning was mainly

implemented in conducting lectures, it could be said that it is a very effective teaching/learning method in Architectural education.

6.0 Conclusion/ Recommendations:

"A little knowledge that acts is worth infinitely, more than much knowledge that is idle"
-Kahil Gibran-

Teaching is not just lecturing but **facilitating learning.** In tertiary education teaching should act as a **learning – triggering activity** and therefore should maximize the chance of learning through the efficient use of learning outcomes, handouts, reading lists, class room activities, innovative assignments, projects, quizzes, role plays, feed back to students & final examination.

These activities should be **aligned for students to construct knowledge,** efficiently.

It is believed that students **learn best when they learn through experience and fun**; and the learning of that sort lasts for a life time. It is important to integrate and reinforce declarative & functioning knowledge.

Further, it could be said that **peer interaction promotes active and deep learning that leads to creative thinking.** Adventure learning facilitates all the above mentioned effective teaching strategies and could be proposed as an appropriate teaching method in Architectural education.

"we must become the change we want to see"
-Mahatma Gandhi-

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Interdependency and the Individual: Socialisation as a Formal Learning Construct

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Neil Lamb

Abstract

One of the enduring and memorable properties and qualities of the 'unique situational laboratory' of design studio as a learning environment (Travar and Radford, 2003) is its ability to support and foster social interaction. As such, together with the opportunity for collaboration and sharing, socialisation serves as a significant contributory component and stimulant of learning (Parnell, 2001), at least informally. Indeed it is argued that the most significant attribute of design studio is the culture that it develops, as it is this, propagated by the learning environment, that acquires lasting significance (Koch et al, 2002). From a pedagogic perspective, therefore, the social dynamic of studio is deemed crucial. Additionally, interaction in studio facilitates the development of mutual emotional and morale support, and in the face of duress or adversity the social mechanisms appear to act as support structures founded on interdependence and camaraderie between students. The developing culture, which Thomas Fisher describes as a 'fraternity' culture (1999) cultivates bonds between individuals that can be very powerful and frequently endure over the course of a lifetime.

However, a considerable body of literature has developed over the last 20 years that challenges some of the habituated behaviours and rituals that are commonly associated with studio, and which can inadvertently run counter to educational theory. For example, despite its inherent social properties and reliance on discourse, the learning process typically introduces 'power asymmetries' that suppress the individual (Dutton, 1999), and offers limited recognition of the individual in terms of experience and perspective (Webster, 2003). Instead, the collective educational model has traditionally been more of a tool of normalisation and professional acculturation in relation to values, beliefs, and behaviours, as well as skills.

With a few exceptions such as the 'review' or 'crit' process, interdependent or peer learning has tended to occur through informal interaction, enabled by studio but remaining relatively unstructured. However, a number of educators have begun to explore methods for the structured incorporation of socialised learning into formal pedagogical constructs. Taking Piaget's constructivism and Vygotsky's socio-cultural notion of 'proximal development' as the theoretical underpinnings of studio enables the development of pedagogical frameworks for formalised interdependent learning. The aim is primarily to release latent potential within studio, thereby further enhancing its potency as a learning environment. This paper presents pedagogic development being undertaken at the School of Architecture in Aberdeen, Scotland, that seeks to enhance discourse through use of peer learning as the principal pedagogic structure, as well as introducing methods of learning that embrace the diversity represented by the student body as a rich and hitherto under-exploited resource for learning.

Keywords: Peer learning; group learning, independence; interdependence; design studio

In discussing teaching, Louis Kahn wrote of the need to 'sense the spirit' of teachers rather than to emulate them [1]. Of course, this may be seen in the qualities of antiquity that are reinterpreted in a modern idiom in his own work. But he also spoke of the importance of students 'sensing the nature of things' rather than being 'directed to

the solution of problems'. This sense, he said, comes from the gut. It is personally derived and interpreted, it is a function of individual perspective and experience.

But let us consider the student embarking on their architecture education. Most quickly become immersed in the environment of design studio, providing as it does both the setting for creative endeavour and social interplay, whilst fulfilling the expectation of what design learning entails. In the words of Travar and Radford [2], it is the 'unique situational laboratory' that supports and fosters social interaction. Indeed, informal socialisation forms an important part of learning within design studio (Parnell [3]), and it is argued by some that it is the culture that develops around studio's social properties that acquires lasting significance for the individual (Koch [4]). The developing culture, which Thomas Fisher describes as a 'fraternity' culture [5] cultivates bonds between individuals that can be very powerful and frequently endure over the course of a lifetime. Thus the social dimension of design studio, through its interaction and camaraderie, makes a fundamental contribution to the learning environment, and to the act of learning and its support. Yet despite the collective nature of design studio, it is argued that the formal pedagogies employed are principally oriented to the individual than to capitalising on the resource and embodied experience of the peer group through structured processes and methods.

The Individual

The failure of architecture education to accommodate the individual needs of the learner (Webster [6]) is at odds not only with the generic emphasis on developing learner autonomy, but also with a primary intent of design studio and constructivist theory to develop creative and professional skills built on the knowledge and experiences of the individual. The diversification of the student population culturally, ethnically, economically, and so on, not only demands that this be acknowledged within the learning process, but also offers the opportunity to enrich the learning experience for all through capitalising on the experiential breadth and multiplicity of perspectives which is likely to exceed that of traditionally homogenous groups (Stevens [7]) relative to a number of standard classifications.[1]

According to constructivist learning theory, the pedagogic root of design studio, the tutor assumes the role of facilitator, directing the student in ways that ensure that she / he will learn from their experiences, as it is in this way that skills, language, method and process are best inculcated (Ledewitz [8]). Ultimately the objective is for the student to become an independent and effective thinker, and the accommodation of the individual's perspectives, opinions and experiences crucially conveys the sense of the individual being valued in the learning process. Indeed, learning is derived from dialogue between student and tutor, in which the experiences, perceptions and values of both parties contribute and are seen to have equivalent validity. Moreover, discussion that demonstrates richness through the breadth and divergence of opinion, is critical to the development of independent thinkers and learners (Brown and Moreau [9]).

Over the last two decades, a significant body of literature has developed that challenges some of the habitualised behaviours and methods of design studio,

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[1] In his book 'The Favored Circle: The Social Foundations of Architectural Distinction' (1998), Stevens notes the historic homogeneity of those undertaking study in architecture, in terms of ethnicity, socio-economic background, education and cultural disposition, etc

some of which run in contradiction to contemporary educational theory. Of particular note is the work of Thomas Dutton [10] who observed the inherent contradiction between studio's innate reliance on dialogue and discourse, and the fact that the typical dynamic of the tutor-student relationship militates against open dialogue especially in the early years where the student lacks the confidence acquired through knowledge and skill. Consequently, the 'power asymmetries' identified by Dutton frequently suppress the individual in terms of their expression of ideas, perspectives and experiences (Webster [11]). Additionally it can lead to the phenomenon of the 'counter learner' identified by Schön [12]. Ironically, therefore, it is argued that widespread practices inadvertently suppress the gut feeling deemed so essential by Kahn and others.

Socialisation and Interdependency

In the context of architectural education, the process of socialisation is relatively rapid for the majority of students, this being facilitated significantly by design studio. However, it is contended that many academics mistakenly view the inherent social dynamic as effective social learning, but this is by no means guaranteed. Indeed observations of how some students use studio as a meeting place, with learning taking place elsewhere, begs questions about what today's students really value in the setting. Furthermore, experience shows that this socialisation process can ultimately become constrained by the adopted learning behaviours themselves in that the intensity of curriculum demands negate strong affiliations being established outside the discipline (Koch et al [13]).

Taking Piaget's constructivism and Vygotsky's socio-cultural notion of 'proximal development' as the theoretical underpinnings of studio enables the development of pedagogical frameworks

for formalised interdependent learning. Through consideration of the writings of socio-cultural theorists such as Vygotsky, Shaffer [14] has observed how learning takes place through the internalisation of social processes of evaluation, and contends that therefore 'the norms of the community become a framework for individual thinking and individual identity'. The process by which the student participates in practices adopted by a community, was also identified by Wenger [15] as being central to learning. Indeed, Wenger noted that communities of practice typically form in groups united by discipline interest as a means of disseminating and exchanging knowledge, and of sharing resources for learning. Thus the learning process involves both individual and social dimensions. Of course, studio-based teaching has historically utilised the peer group within learning (Nicol and Pilling [16]), but has rarely done so in a manner that taps into the full potential represented by a cohort. The adoption of peer, or interdependent, learning has further potential to alleviate the detrimental effects of power asymmetries, and to liberate discourse. Indeed, more generically, Piaget regarded peer co-operation to be central to the development of reflection, discourse and critical abilities (Falchikov [17]). Additionally, one of the strongest mechanisms for supporting the diversity of learners within a cohort is the cultivation of a community that builds a strong inter-relationship between the learning process and social activity. Indeed Tinto's Student Integration Model [18] has highlighted the importance of the social and academic integration of students if they are to become and remain actively engaged in the education process. Research into the educational theory underpinning studio, from which the above presents some key points, prompted a review of learning strategies within the school, and the recent implementation of a new first year programme that aims to

address many of the shortcomings of the traditional studio model.

The Developing Strategy

As Falchikov observed [19], the term 'peer learning', which encompasses a considerable breadth of practices, is often inappropriately adopted to suggest a single type of relationship or exchange. Of the ten different models of peer learning identified by Griffiths, Housten, and Lazenbatt [20], the proctor and learning cell models were adopted as core components of the pedagogic strategy.[2] Of particular interest was the notion of the learning cell, incorporating the formal use of structured interaction and peer dynamics. Thus, alongside the agenda of stimulating independent, critically conscious students, was the development of a pedagogy referred to by Boud as being of interdependence [21]. Additionally, whilst learning in design studio corresponds with Bruffee's notion of 'constructive conversation' [22], the designed learning process sought to formalise this using it as a means of enhancing socialisation and interaction, and managing engagement, as well as diagnosis of skill and aptitude.

At the core of the strategy lies reciprocal peer learning within the first year cohort, which encouraged exchange between students of equivalent level, although with varied experiences and perspectives, which the learning process sought to capture. Critically, the learning experience is also mutual between students, echoing Habermas' concept of the 'ideal speech act' [23] relating to the liberation of interaction when any differential in authority between parties is negated.

At the school in Aberdeen, we have been beginning to explore a new pedagogic framework in first year that seek to address the issues introduced, and which adds greater clarity for staff and students regarding the intention, purpose and objective of projects through which learning is achieved. Indeed, the team purposefully set itself the challenge of being able to fully describe the learning strategy and structure for design studio for the entire first year, without referring to the specific content of any project. In other words, it sought to comprehensively articulate the learning framework to which projects could then be attached that satisfied particular objectives at specific points in time. However, capacity for the programme to be flexible and responsive to diagnostic outcomes was recognised as being important from the outset.

The process began with the identification of four guiding principles drawn from the literature, as follows:

1. Recognition of each student as an experienced user and observer of the built environment, accepting that their architectural sensibilities that had yet to be developed and shaped. Students were encouraged to reflect on their experiences and observations through an architectural lens.

2. Commitment to developing ways in which the multiple perspectives and experiences of students could be shared and built on.

3. Rendering the learning process explicit, and the development of greater understanding of the process in the mind of the student.

4. Identification of ways in which the power relationship between tutor and student could be minimised.

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[2] The notion of the 'learning cell' involves the formal incorporation of student interaction and peer dynamics, such as discourse, dialogue and other forms of communication. The 'Proctor model' involve the use of peer mentorship as a component of the formal learning strategy.

Further consideration of the learning process in relation to the underpinning theory led to the identification of three key 'strands' that structure the learning strategy, as shown below.

Architectural skills — Communication, visualisation, etc, that are fundamental to discipline

The Critical Self — Development of reflective capability, critical thinking, enquiry, and judgement

Professional persona — Development of identity as an architect

Although these strands possess areas of clear overlap, and thus represent something of a simplification of the learning process, the structure was considered valuable in defining an integrated student-centred strategy.

The Learning Strategy

It is perhaps inevitable that the three strands referred to above became quickly interwoven as the three parallel agenda were carried forward. The analogy of the strands weaving to produce a rope is apposite in the sense that it was intended that the strands, when combined, would create a learning experience stronger and more robust than the simple sum of its constituent parts.

The learning plan sought to weave together tasks and exercises that made the learning process explicit and intelligible, as well as developing knowledge and ability readily understood to relate to architecture. Aspects critical to motivation, such as the building of personal confidence, were also central to thinking.

Each strand was managed over 2 formal tutorial days per week, both of which were highly structured although differently. Together with group working, the first day contained formal input, such as lectures / presentations, project presentations, and skills instruction. Typically, progress against the learning progression or 'map' was discussed at this point, embedding understanding of the learning process, and allowing students to begin to make connections between exercises themselves. The second day involved a wider tutorial team and typically consisted of group presentations and discussion.

The Geography of the Learning Space

Pragmatically, any form of pedagogic experimentation is necessarily governed by the available resources, both in terms of space, equipment, and academic staff. Consequently, these, together with the notion of a democratic working space, defined parameters or constraints within which the strategy was developed.

The studio was laid out in a structured way, the overall cohort being divided into working groups of 3 or 6, depending on the purpose and stage of the exercise (see Figure 01). Each group of 3 became the fundamental learning unit around which the learning process was organised (see Figure 02), with 1 student in each encouraged to assume the role of 'group leader'. The basic premise of the learning strategy was that the spatial organisation facilitated discussion and fostered debate and the exchange of ideas and opinion from the outset, with the academic role being more one of observation and stewardship than of dictat. Equally, the benefits of sharing amongst peers with variable and diverse skills sets was enabled through the vehicle of structured peer interaction, which also allowed students

with different aptitudes to contribute. It also served an initial social function in that it eased the process of adjustment and acclimatisation, and enabled social bonds to be constructed within the first few days of the academic year.

Importantly, one side of the studio space served as a permanent gallery where each student and group of students had an equal amount of space (see Figure 01). Here it was intended that ideas were democratically presented, development becomes explicit, and that aspirations could develop through comparison and implicit competition.

Initial Learning

The importance of the initial step in any learning process holds significance in terms of stimulus and engagement, as well as meeting the student's expectations and preconceptions [24]. A number of objectives were defined aimed at introducing the student to the world of architecture, and informing the teaching team about the nature of the cohort and its composite groups. The project, a study / recording of urban spaces, was designed to at once introduce the student to the city that would be their adopted home for the duration of their studies, and enabled initial discovery of the language of the city. Moreover, through qualitative peer and tutorial discussion of places and spaces, it served as an introduction to the language by which architects communicate about the city.

However, the initial exercise also played an important diagnostic role, both in terms of revealing the relative dynamic of individuals, and in terms of the skills at recording that students arrive with, whether these by verbal, written or graphic. Finally, the exercise also served to introduce the notion of critique and feedback as essential, constructive components of learning within the subject.

Purposefully, learning commenced in group format, to encourage sharing and co-operation, contextualised by discussion of the collaborative nature of contemporary practice. As some students appeared to have an aversion to group working, the establishment of this background and rationale was crucial and required regular reiteration. Any resistance encountered tended to relate to issues of confidence as group work placed students in positions where they were required to confront realities, such as, say, acknowledging that certain skills are not as developed as those of others in the group (despite the fact that this was invariably balanced by some other capability). However, as has already been acknowledged, confidence is central to deep learning and engagement, leading to the objective of the second learning exercise being to make conscious (to the individual and others) existing skills sets and abilities. This was achieved through inviting each student to communicate the architectural qualities of an urban space they had initially studied, using a skill that they individually regarded as a strength. This celebration of ability – from drawing, to poetry to dance - served not only to reveal and publicly share a varied panoplae of skills, but enabled the individual to understand that they already had abilities that had a relevance to the subject of architecture. Consequently, it resulted in raised levels of confidence, and an acknowledgement of the collective abilities embodied by the peer group that represented a resource for future learning. Finally, the identification of a specific space or place, and the communication of its perceived qualities also served to introduce the role of opinion, and the importance of declaring and justifying a position within a subject of indeterminate nature. In other words the subjectivity of architecture is exposed from the outset. For many students, weaned on schooling systems that promote notions of right and wrong, this presents a significant challenge, as countering this phenomenon

equally does for tutors. As a result, the first weeks contained discussion sessions and exercises designed to systematically disabuse the notion that personal preference and choice (i.e. 'I like…') represents sufficient justification for ideas, and that the position of the tutor does not necessarily represent a position that the student is expected to adopt.

Architectural Skills

Aimed at developing core architectural skills, a series of tasks were run in parallel with other studio-based work throughout the session. In doing so, skills were individually acquired within the group setting that could be immediately and progressively applied to other ongoing work. Moreover, the parallel nature of their workload introduces the student to issues of time management and prioritisation, this being considered essential to enabling the student to perform optimally. Early diagnostic exercises enable the level of input and scope of the tasks to be reviewed to ensure that the entire cohort has the opportunity to achieve a threshold level over the duration of the session. These also allow peer learning groups to be effectively structured to benefit from the range of personalities and aptitudes. The range of skills developed included sketching and mark-making, architectural drawing and modelling conventions, and academic writing and critique. With respect to the latter, students were given contemporary theoretical texts to discuss and analyse, with the purpose of reinforcing the multiplicity of positions and philosophies that exist, and to begin the process of honing skills in critical thinking and in academic writing.

The Critical Self

The role of reflection in and on the design process has been documented extensively. Nevertheless, despite this, Nicol and Pilling [25] noted that courses are very seldom designed around the act of reflection. Indeed, it would appear that typically little time is provided specifically to reflect on progress, or hence to make the reflective process explicit.

In reviewing the learning process, the incorporation of specific reflective functions was deemed crucial to developing critical awareness of personal progress relative to the learning process and, importantly, relative to peers. There is evidence to suggest that in the intensity of design studio, students can lose sight of the overall learning path, concentrating instead on the immediate task. However, it is argued that there is advantage in the student developing an understanding of the progressive development of projects, in order to develop a clearer mental map of their own learning as they progress.

Within the reflective process, students inevitably seek to position their progress and development in relation to others, and the conventional currency for doing so, developed in the secondary schooling system, is grades. This is the culture that they are generally familiar with, bringing a level of expectation of, and reliance on, finite marking systems. Instead, as a means of weaning students from such systems, great emphasis is placed on feedback as a means of orienting the student with respect to performance from a more qualitative perspective. A consequence of secondary schooling, with its focus on achievement, is that students are conditioned to expect success, only to find weak performance both alien and demotivating. For many this is hard to accept. In transforming attitudes to learning through the process, a central objective has thus been to convey that failure is not only acceptable, but within the context of a truly reflective process, can produce a powerful learning experience. However, through an explicit process of reflection and dialogue, students are encouraged to confront and address weaknesses, and this has yielded

positive patterns of students seeking to self-improve. Where this occurs, it is a clear indication of students taking charge of their personal learning.

Of course the development of the critical self embodies the aforementioned ability to establish, argue, and justify a personal position or stance. Indeed, early realisation of this on the part of the student was deemed instrumental in enabling the rationalisation of varying, sometimes conflicting, staff opinion, and the acceptance of the indeterminacy of the subject. Of course, recalling Dutton's concept of 'power asymmetries' the management of the tutor-student dynamic is crucial to facilitating the development of individual positions, coupled with the ability to debate their legitimacy. Minimising the effects of power has proved to require careful reconsideration of the tutor role, this representing a fourth 'hidden strand'. The overriding change that was introduced involved increasing the capacity of the tutor to listen, permitting the student(s) to openly express themselves, and enabling the staff to view both what is, and what is not, taking place. Attempts were made to invert the traditional tendency for the tutor to quickly dominate a conversation, thereby subverting and subordinating the view of the student. Students were routinely required to present their ideas and opinions, or respond to specific questions and issues, but in an effort to avoid over-familiarity and the establishment of predictable patterns of discourse, the format of the discussion was frequently changed. For example, whilst the group leaders were typically oriented to leading the discussion, they were asked to take on a purely listening role within specific discussions. This democatised the dialogue, opening the door to less confident students who sometimes had strong ideas but were commonly denied a platform due to the strength of their peer(s). The technique also served a diagnostic role giving staff

a much stronger sense of the individuals within the cohort.

The Professional Persona

Design studio typically acts as the place where socialisation and professional assimilation begins to be developed, or as Dana Cuff [26] elegantly expresses it, the place where 'the ethos of the profession' is born.

It quickly became apparent from initial dialogue that early understanding of the nature and role of the profession was often preconceived and narrow, and sometimes misguided. It was thus considered important to discuss the role of the architect, and the profession's position within broader industry and societal contexts. Hence from the start we talked with the students about challenges currently facing the profession – from issues of energy and resources to economics and professional unemployment, and importantly they bring their views, preconceptions and expectations. In this way the complexity of the professional world was confronted, hopefully initiating processes that lead to the individual developing thoughts about their own professional lives.

The 'Hidden Strand': The Tutor Role

Vital to the success of the experiment, was a coherence of tutor approach, attitude, and action. Herein lay a number of challenges as architecture education suffers from deeply engrained beliefs, behaviours and orthodoxies; in other words a context in which achieving change can prove difficult.

Effective learning necessitates an engagement with new material and information leading to the individual taking ownership of it in ways that are personally meaningful. The teacher therefore becomes the facilitator of the learning process, helping 'bridge the gap

between the structures of the discipline and the structures in the students' minds' (McKeachie [27]).

In order for the individual to have their views openly acknowledged, for liberation of discourse, and for the peer-based process to become established, the tutor role took on a form that effectively inverted that of the traditional academic leader, although of necessity aspects of leadership never disappear. The crux, however, was enabling a spirit of democracy and trust between students, and between students and staff. Greater emphasis on observation and listening imposes new challenges for staff, as does the ability to carefully manipulate group dynamics to ensure equity within groups. To be effective, clarity of objectives and processes required to be shared by the entire team, necessitating weekly briefing / discussion sessions, which also served as points where progress could be reviewed. Moreover, such sessions were vital to ensuring levels of mutual staff confidence in the light of changing practice, as well as consistency in teaching and observation.

It is difficult to know the consistency of message from staff when they are not tutoring in group mode, in terms of whether or not they revert to convention. The situation is inherently less manageable, and it became evident that vestiges of traditional tutor model remained, and it is clear that the transition to a new system of peer-based pedagogy will take several iterations to fully develop and hone. This is perhaps especially true with respect to Stage 1 students, whose introduction to studies coincides with developing individual identities, and the freedoms and challenges of university culture, new ways of working, and greater self-sufficiency in life.

Pitfalls

There are additional pitfalls. Shimazoe and Aldrich [28] have recognised the fact that interdependent learning is more palatable to some students more than others, and this was supported by experience. Equally, the avoidance of stereotype is important in the grouping of students, this relating to the diagnostic exercises introduced at the outset. Both point to the further development of both process and skill in future iterations. Equally, it is not uncommon for tutors to develop quick, and often premature opinions about the capabilities of a student. The team worked hard to discuss work in a way that reduced this phenomenon, at least explicitly, but the notion that the dye is cast early on, or that learning is a linear process, is deeply flawed.

Initial Evaluation

Student responses received from the initial year of operation indicate a positive response, these being borne out by the views of staff (who of course have the ability to compare with prior regimes). Encouragingly, the views of the senior students involved in peer learning sessions were also strongly supportive of the process, with some reflecting rather ruefully that the experience had not been theirs. In terms of outputs, the process can be seen to have delivered strong results, this view being backed up by professional peer review through the external examination system.

What is most significant, however, is that the nature of the projects has not fundamentally changed from previous years. What has changed is the reconsideration of the educational requirements and objectives that are played out through the projects, and hence the manner in which the projects are undertaken and directed. The clarity that this process of re-evaluation has brought has fostered a greater rigour and is beginning to provide opportunities that allow learning to fully benefit from the whole student group in ways that hitherto it has not.

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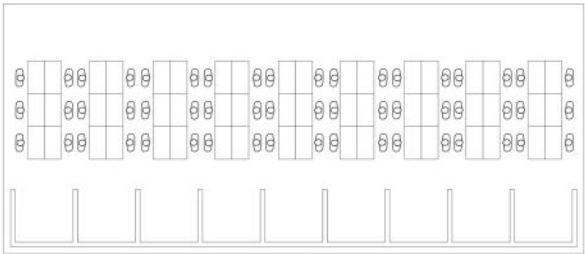
Appendices

Figure 01: Overall Studio Layout
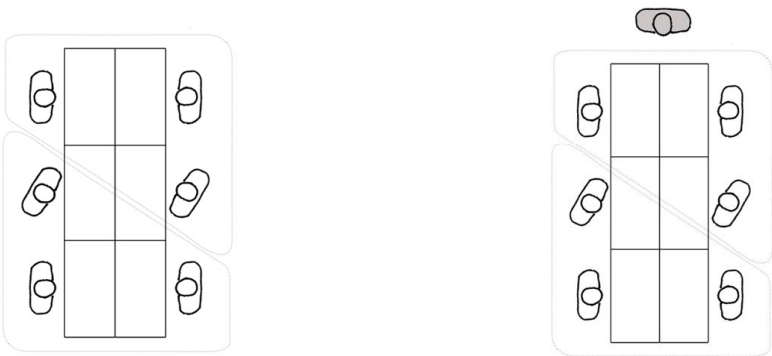
Figure 02: Layout of Basic Groupings

Retrofitting for sustainability: Intervening the thermal performance of non-domestic buildings

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Abstract:

Retrofitting existing buildings for energy sustainability is a recently developed area of research and study in architectural design. A significantly high share of energy is used to maintain indoor thermal comfort in non-domestic buildings due to their poor thermal performance. Therefore existing buildings in developing countries can benefit greatly from low cost passive retrofits to reduce energy use.

Passive architectural elements of a building are important design variables which act as modifiers of outdoor climate into favorable indoor climates in buildings. Passive elements in a building include the microclimate, form, and the building envelope. Intervening thermal performance of these elements in existing buildings can improve indoor thermal comfort conditions.

This paper uses a critical case study building describing its thermal performance and climatic response to illustrate problems in non-domestic buildings in Colombo. The outdoor to indoor thermal comfort modification was analyzed using air temperature, humidity and air velocity data and measures. The results concluded that the poor thermal performance of the building is caused by the building's poor climatic response. Critical areas of the building were identified to have the potential for retrofitting passive design strategies to improve building energy sustainability.

Key words; sustainability, passive design, thermal performance, microclimate, existing buildings, retrofitting

1. Energy use in buildings in Colombo

Energy efficiency in buildings is identified as having the greatest potential for cost effective reduction for CO2 emissions by 2030 among all energy consuming sectors. (Cheng.C-2008) The high potential for buildings to reduce energy consumption andthe need for developing countries to follow sustainable development in sectors leaves the building industry in developing countries in a strong position to optimize energy for a sustainable built environment.

Energy use is a serious issue for existing buildings in Colombo (graph 1 and 2) account for a substantial percentage of total electricity consumption in buildings.

Energy optimization in buildings is a successful method to reduce the demand of electricity of a building by a significant percentage.
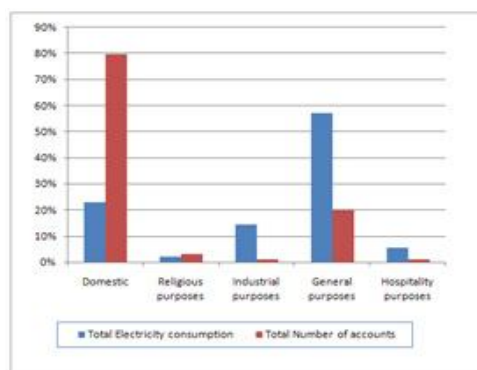
Graph 1 -Electricity consumption in Colombo, Source: CEB-2007

Architects contribute for a sustainable built environment through minimizing energy use, and water use, proper waste disposal methods and maintaining indoor air quality. Energy optimization is the most effective method in which Architects can contribute to energy sustainability for existing buildings. Passive design strategies are the most effective when optimizing energy in existing buildings in Colombo due to many physical restrictions of existing buildings and of their financial limitations.

In many developing countries investing in energy efficient active systems for cooling is a costly option. However developing countries can take on the green challenge in a different angle. Without concentrating solely on active systems to provide indoor thermal comfort, developing countries can invest in retrofitting simple passive design strategies in buildings that have a positive impact on indoor thermal comfort.

2. Retrofitting for Sustainability

Sustainable retrofitting is the application of an additional architectural scenario to improve the building energy efficiency. Retrofitting existing buildings for energy sustainability is a recently developed area of research and study in architectural design. Cost effective energy savings by retrofitting office buildings can be in the order of 20–30%. (E. Dascalaki-2002). There are several avenues for retrofitting non-domestic buildings to enhance their energy performance. Retrofitting active systems such as energy efficient HVAC and passive systems such as solar passive design are two examples of different retrofitting strategies.

Improving a building thermal performance (reducing the cooling load) can significantly reduce the buildings energy consumption. Low energy architecture is a field that deals with designing buildings that use minimum or optimum energy during its life cycle. Application of passive design strategies in buildings is one of the most common application in low energy architecture.

3. Measures for building thermal performance and climate response

3.1 Heat gain

In hot-humid climates because of the high outdoor temperature heat gain in building is a serious problem to achieve thermal comfort. Primarily heat is gained intoa building by conduction through walls and other exposed surfaces, convection through openings and radiation through direct exposure to sunlight. Passive solar design is one of the most effective strategies to counteract heat gain.

3.2 Heat output

Heat entering the indoors of a building through walls, windows and openings should be guided out of the building through manipulations in the building microclimate, envelope and form. In many instances the heat output strategies are coupled with air movement for effective cooling. Heat discomfort inside buildings is correlated mainly with environmental temperature and the airspeed over the body (Givoni-1998). Therefore heat output is an important measure for indoor thermal comfort.

3.3 Air movement

Due to the high temperatures and humidity year round, heat dissipation from the body does not happen to a desirable level in order to achieve thermal comfort in hot-humid climates. In the tropics high humidity and temperatures are almost equal to the temperature of the human body. [O.H. Koenigsberger - 1973] Therefore Movement of air is very important as it can aide some moisture of

the body to precipitate and create a sense of thermal comfort hence air speed is important factor in determining comfort in a building.
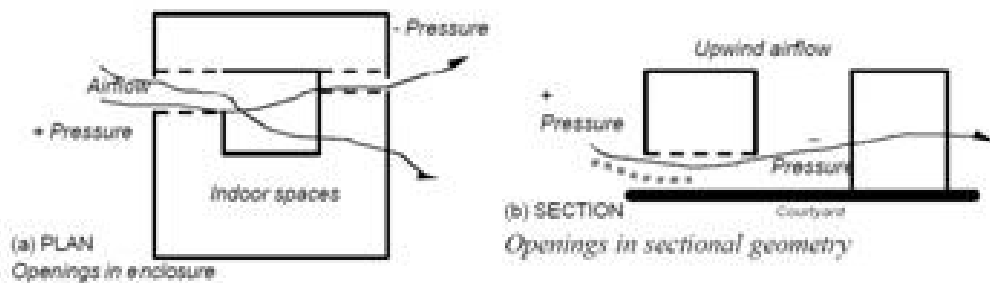
Fig. 1 and 2- A courtyard model for heat transfer

4. Methodology

This paper uses a critical case study building describing its thermal performance and climatic response to illustrate problems in non-domestic buildings in Colombo. The administration block of the University of Colombo was selected for this purpose due to high energy usage patterns.

The Administration block was constructed in the early 80's by Thuraraja Architects to house the administration facilities of Colombo University. The building has a compact and deep plan form. It has four identical floors. The interior has an open layout plan in both wings of the building with internal partitions of wood, single brick or aluminum. Every workstation does not operate a computer. The interior of the offices appear to be spacious and the internal layout is functioning well.

The building form and internal open plan exhibits characteristics of modern Architecture which was prominent in the 70's when the building was designed. The facades on the south and North are identical. The repetitive elements of the facade, the white exterior, Slab roof (though originally it was designed as a hipped roof) tie it even closer to the modern style of Architecture.

4.1 Thermal performance analysis

The outdoor to indoor thermal comfort modification was analyzed using air temperature, humidity and air velocity data and measures.

a.) The micro climate temperature and humidity data was recorded by Hobo data loggers from 9a.m-4.30p.m. Data was collected on a hot-humid day during working hours as the indoor thermal conditions would be most problematic at this time. The data loggers were fixed at 1.5m above ground level. Samples were taken at 60 seconds intervals.
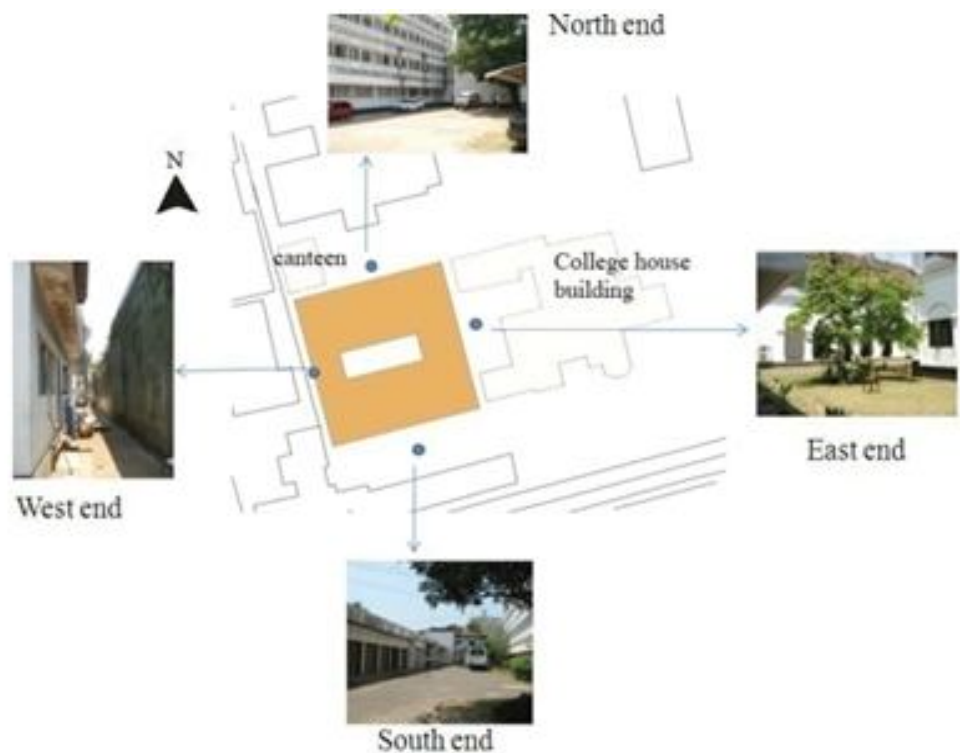
Fig.3 - Location of data loggers in the micro climate.

b.) The indoor and courtyard temperature and humidity data was recorded by Hobo data loggers from 10.00 a.m-.-4.30p.m. The conditions of the experiment were kept to the maximum possible level of a normal work day, with the exception of the air-conditioning in some floors. The measurements were taken with the lights in the working premises switched on and the air conditioning switched off. The windows were open only in the naturally ventilated floors during measurements.

c.) Air velocity was measured at the window sill height (1.2m- 1.5m) and illustrated in a wind rose chart to determine the impact on temperature measurements. Measurements were taken at the same locations of the data loggers.

Fig.4- Location of data loggers on ground floor

4.2 Climatic response

The building climatic response using passive design strategies was evaluated in relation to the stipulated design variables (building micro climate, form and envelope). The charts I, II, III in Annex I, were developed through an extensive literature survey.

DESIGN VARIABLES / THERMAL PERFORMANCE MEASURES	BUILDING MICROCLIMATE	BUILDING FORM	BUILDING ENVELOPE
HEAT GAIN	x	x	x
HEAT LOSS	x	x	x
			x
AIR MOVEMENT	x	x	

Chart 1- Measures for evaluating building climate response

5. Macroclimate Analysis
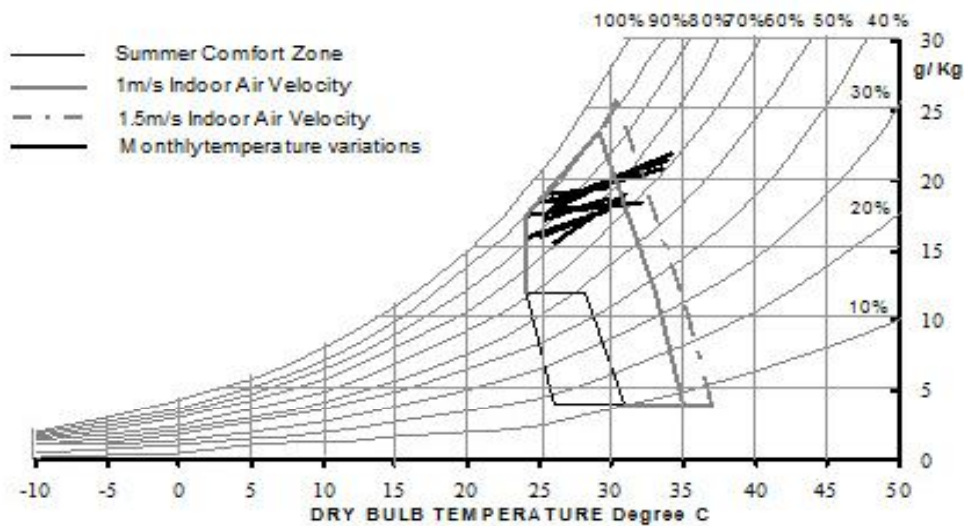
Graph-2- Bio-Climatic chart indicating the comfort zone for Colombo

The above bio-climatic chart shows that the comfort zone for Colombo is a temperature between 26°C-28°C with relative Humidity at 65% in the absence of Air movement.

If the temperature cannot be controlled at the above levels (26°C-28°C) then air movement inside the building has to be maintained at 1.8 m/s to achieve thermal comfort.

6.0 Building Microclimate Analysis
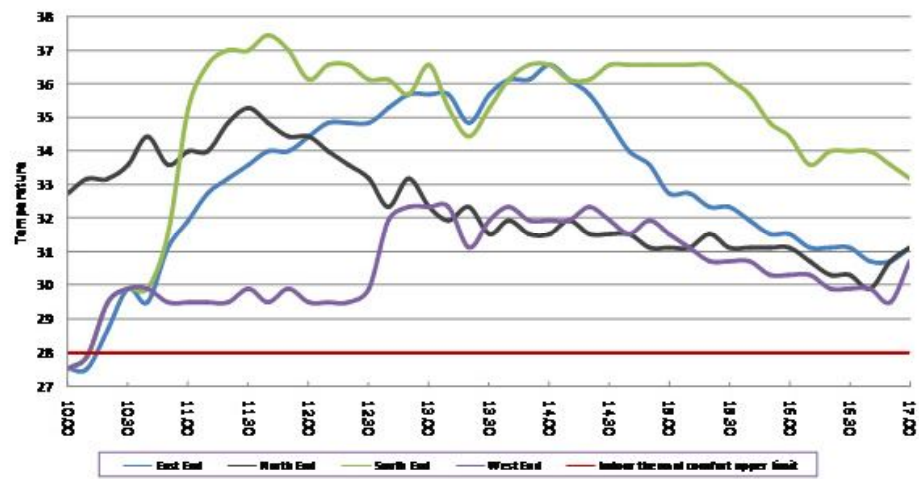
Graph-3- Air temperatures of the building micro climate
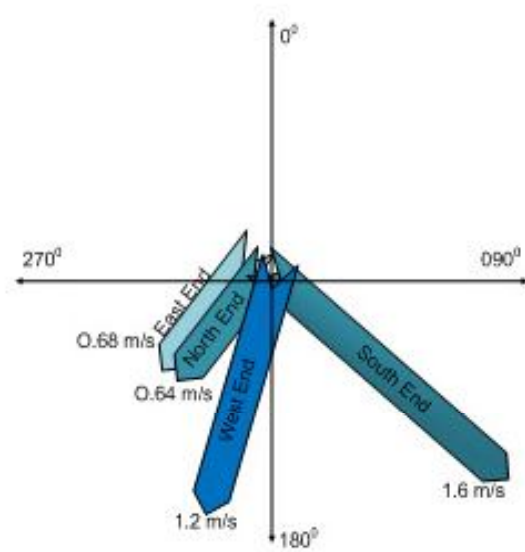
Graph 4- Maximum air velocities and directions in the Microclimate

6.1 Indoor Environment Analysis
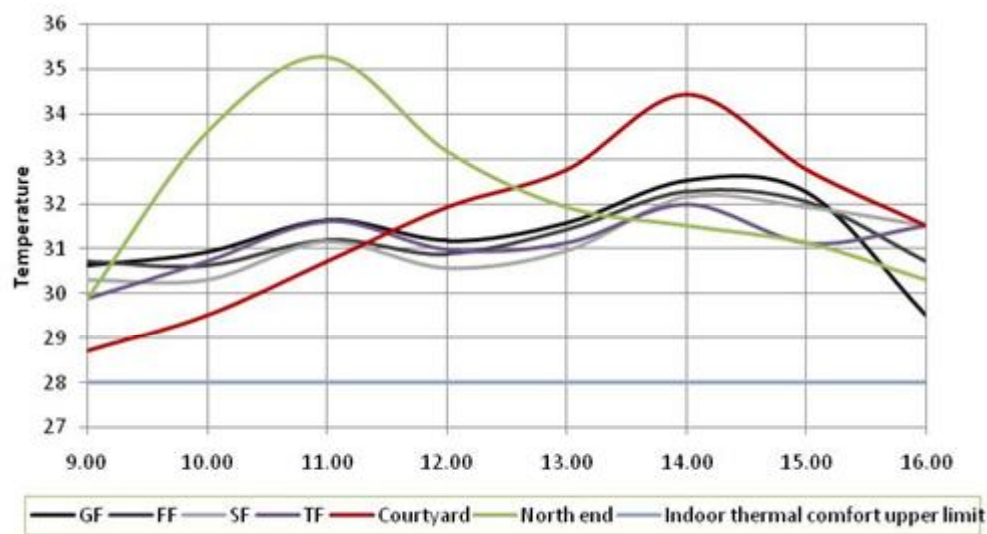
Graph 5- Air temperature of North wing, courtyard and North end
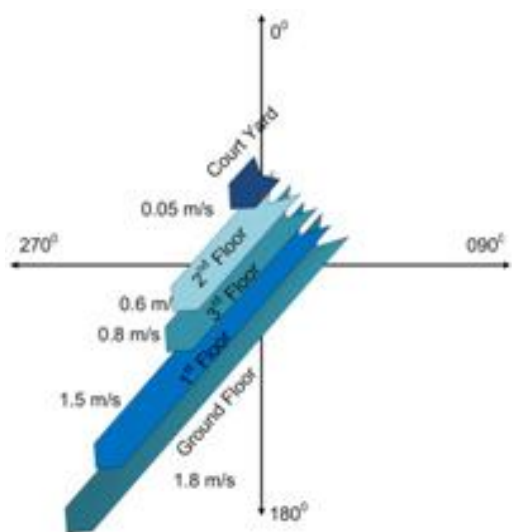
Graph 6- Maximum air velocity and direction in the North wing
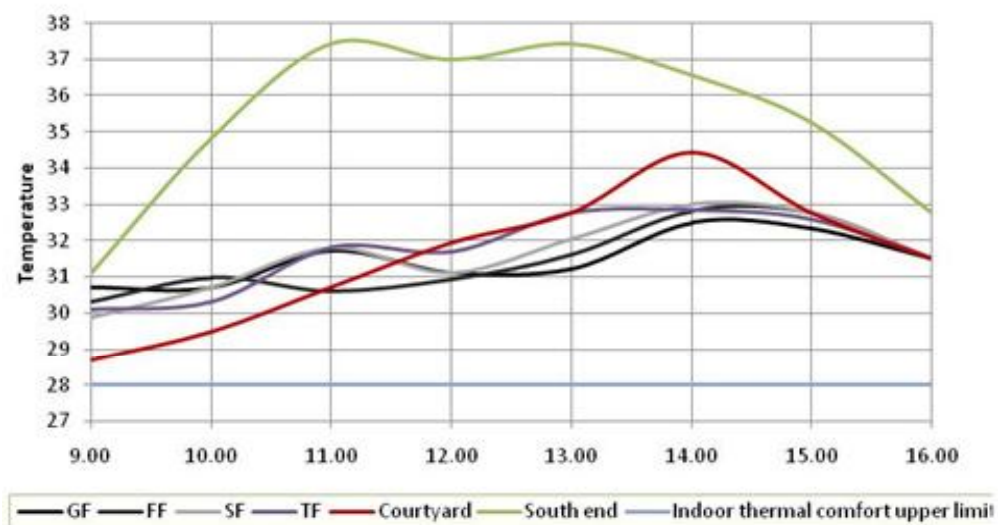
Graph 7- Air temperature of South wing, courtyard and South end
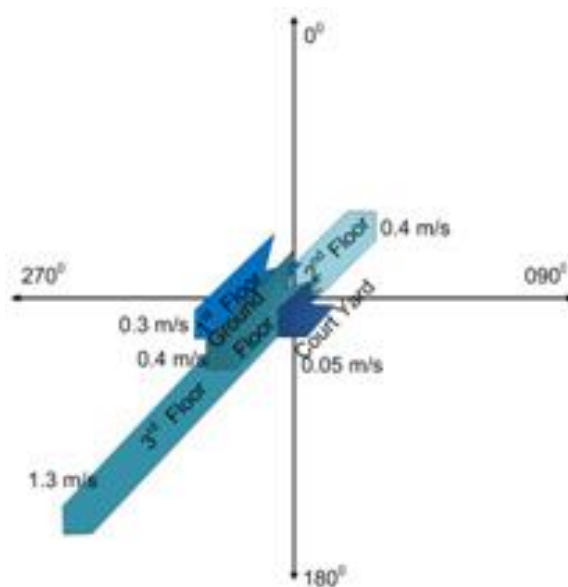
Graph 8- Maximum air velocity and direction in the South wing

7. Thermal Analysis Summary

7.1 Heat gain

• The microclimate exhibit temperatures (graph 2) above the stipulated indoor comfort temperatures. Therefore high temperatures in the micro climate have to be modified to create thermal comfort indoors.
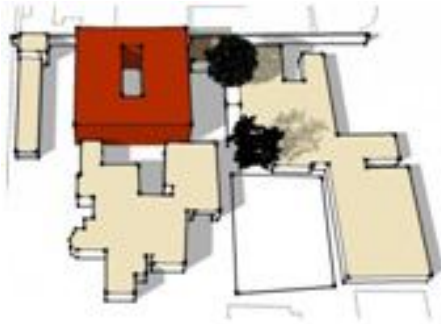
Fig.5-A model of the microclimate with shadows at 10.30 a.m.

•   The south end temperatures (graph 2) are most problematic due to lack of shading and a high reflective ground surface (tarred surface). The west end records the lowest temperatures (graph 2) as it is shaded by the boundary wall.

• The ground surfaces of the microclimate are tarred on the North and South end, while the west has a concrete surface and the east end, a grass surface. Except for the east end the other three surfaces reflect radiation heat in to the building.

•   The micro climate has not been modified to control heat gain into the building. The lack of passive design strategies assessed in chart I,II and III in Annex I is responsible for the poor thermal performance of the building microclimate.

• North and South wing gain heat through direct sunlight and convection from windows and louvers which are not shaded from the exterior. The building envelope has not employed any passive design strategies (chart I in Annex I) to minimize heat gain in to the building.

Fig.6- Section through the window illustrating heat gain through direction radiation and convection.

Fig.7- Exposed building façade

• The courtyard and the section are exposed to direct sunlight increasing heat gain. The Building form is not composed in order to gain maximum ventilation into the building with minimum heat gain through convection.

Fig.8-Cross section through building illustrating heat gain through direct radiation and convection
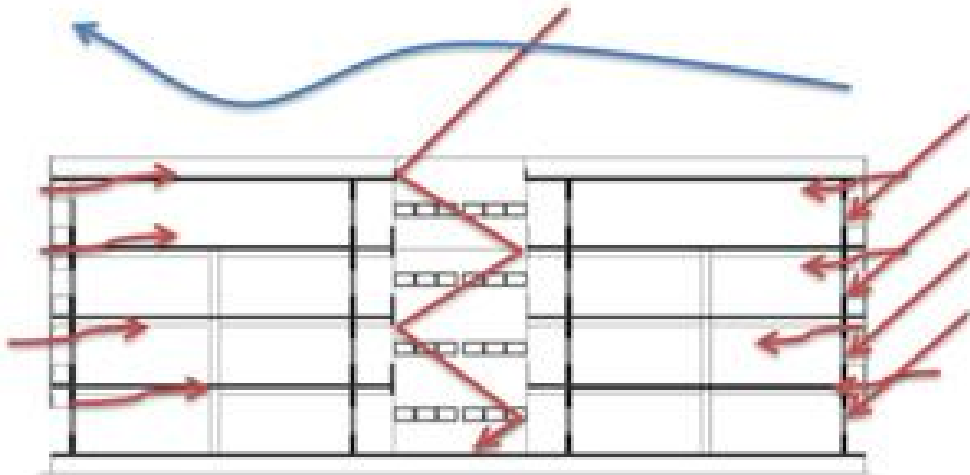
Fig.9-Courtyard and corridors exposed to direct sunlight

• The corridors record higher temperatures than the interiors most of the time. The corridors are exposed to direct sunlight making it thermally uncomfortable during working hours.

7.2 Heat removal and air movement

Heat removal and Air movement strategies can be considered closely to each other as many passive design strategies facilitate both actions.

• The microclimate air velocity is very low (graph 3) and does not help to promote air movement inside the building due to the obstruction of surrounding buildings (fig.3). The lack of wind is due the obstruction of surrounding buildings. The building is constructed in a linear angle to the 'college house' building with a very small gap that prevents wind movement in the east.

• Air movement inside the building (graph4) is well below the stipulated levels (graph 1) causing indoor thermal discomfort. The lack of air velocity inside the building is due to the compact form of the building and the poor performance of the courtyard.

• Chart 2 indicates that passive design elements employed for heat output is poor regardless of the central courtyard. A courtyard is usually employed in a building to facilities indoor air movement and heat transfer (fig.1 and 2).

The courtyard in the case study gain heat through direct radiation but is not designed for heat removal through air movement due to the depth of the courtyard and complete closure from all sides.
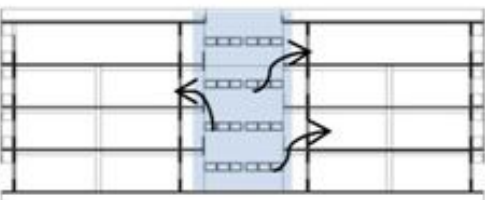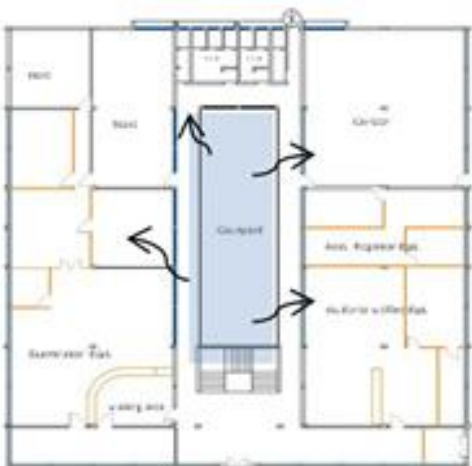
Fig.10. and 11 –Blocked heat transfer and air movement from courtyard

7.3 Climatic response evaluation

The chart I, II and III in annex 1 demonstrates the levels of climatic response of the passive building elements. The following chart presents the summary of the evaluation.

Fig.8- Compact building form

DESIGN VARIABLES / THERMAL PERFORMANCE MEASURES	BUILDING MICROCLIMATE	BUILDING FORM	BUILDING ENVELOPE
HEAT GAIN	not applied	poor	poor
HEAT LOSS	not applied	poor	poor
AIR MOVEMENT	not applied	poor	poor

good   poor   not applied
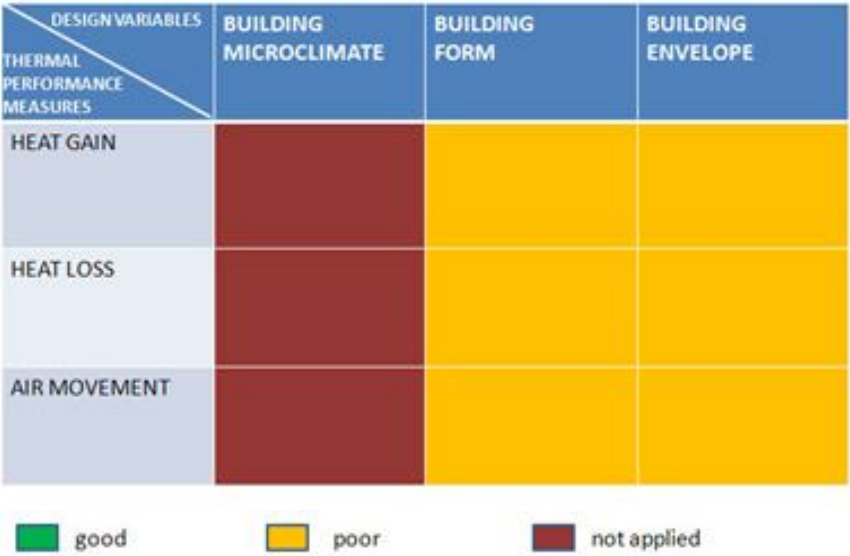
Chart 2- Climatic response summary

7.4 Potential for retrofitting of the Administration block

There are many areas in which the building climatic response can be improved.

The building envelope has the highest potential for retrofitting passive designs. The building microclimate has an average potential and the building form has the lowest potential because of the restrictions in section and form.

DESIGN VARIABLES / THERMAL PERFORMANCE MEASURES	BUILDING MICROCLIMATE	BUILDING FORM	BUILDING ENVELOPE
HEAT GAIN	high	low	high
HEAT LOSS	average	high	average
AIR MOVEMENT	average	low	high

high   average   low

Chat 3- Potential for retrofitting passive design strategies of the Administration block

7.5 Concluding remarks

• The thermal analysis of the microclimate and the comparative analysis of the indoor environment suggest that the building microclimate and interior spaces are thermally uncomfortable.

• The poor thermal performance of the building is caused by the building's climatic response.

• The building envelope has the highest potential for retrofitting with passive design strategies. The building microclimate has an average potential The building section and form is restricted due to practical reasons that would incur a high capita cost. Therefore the building form has to the lowest potential for retrofitting.
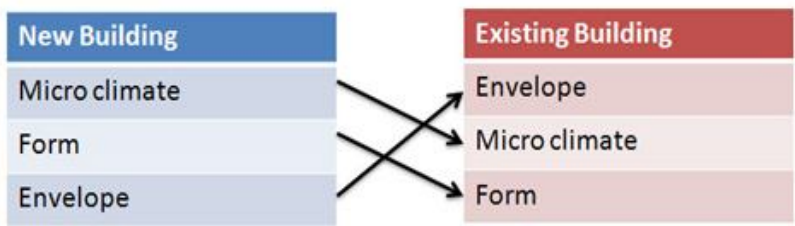
Fig.12- Potential for improving energy efficiency through sustainable retrofitting in existing building

8.0 Further directions-Retrofitting proposal

The detailed investigation in this study will help to identify exactly which passive design strategies should be employed in retrofitting the administration block to minimize indoor thermal discomfort.

The design solutions would consist of a combination of strategies that are suitable for the administration block taking into account its existing architecture, structure, materials, surrounding etc.

The study will also be further validated through an indoor thermal simulation of the retrofitting proposal.

Chart I- Assessment of passive heat gain control strategies in the existing administration block

ASSESMENT OF PASSIVE STRATEGIES IN THE EXISTING ADMINISTRATION BLOCK	Design strategy	Rating
HEAT GAIN CONTROL ➡	External light colour shading	red
	Internal dark colour shading	green
	Overhangs and Fins or the combination for effective shading	red
	Innovative skins to reduce heat gain	red
	Second skin to reduce heat gain	red
	Selecting a material for the envelope with high thermal mass for day time activity spaces.	green
	Selecting a material with low thermal mass for night time activity spaces.	red
	Insulating the roof with a ceiling.	red
	Plant canopies to provide shading as well as a greener environment	red
	Smooth texture for effective solar radiation reflection	green
	Light colour for effective solar radiation reflection	green
	Low heat gain transparent or opaque materials use for the openings	orange
	To minimize the heat gain into the building by providing shade to windows and other openings.	red
	To provide shade around the building for the use of walk ways, and sheltered out door space.	orange
	Provide suitable cover (paving, vegetation) for maximum heat absorption and minimize reflected radiation.	red
Rating	Vertical landscaping, "street boulevard"	red
good — green	Maximize effects of Shadow Umbrella	red
poor — orange	Rectangular building	red
not applied — red	North-South orientation	red
	A spread out building form.	red
Legend	Use of a three sided courtyard	red
Building envelope	Ideal Interior layout is an open plan, or a collection of interlocking spaces.	red
Building Microclimate	Interior Spaces for long period use in the south	red
Building Form	Use of transitional spaces.(Atriums, Verandahs, Porches, Sky courts)	red
	Use of corridors close to the exterior of the building to act as a buffer zone to the outside	orange

Chart II- Assessment of passive heat removal strategies in the existing administration block

ASSESMENT OF PASSIVE STRATEGIES IN THE EXISTING ADMINISTRATION BLOCK	Design strategy	Rating
HEAT REMOVAL ➡	Openings oriented to the south	green
	Large openings	orange
	Cross ventilation	orange
	Innovative skins to facilitate heat removal from inside	red
	Second skin to facilitate heat removal from inside	red
	Plant canopies to provide shading as well as a greener environment	red
Rating	Louvers to continue indoor ventilation	red
good — green	To optimize the use of the topography for natural air movement.	orange
poor — orange	To provide wind breaks, especially in front of the windows.	red
not applied — red	Buildings to be constructed in non-linear pattern in different heights to promote wind movement.	red
	A spread out building form.	red
Legend	The use of a breezeway.	red
Building envelope	Use of a three sided courtyard	red
Building Microclimate	Interior Spaces for short period use in an intermediate zone	orange
Building Form	Transitional spaces.(Atriums, Verandahs, Porches, Sky courts)	red
	Use of corridors close to the exterior of the building to act as a buffer zone to the outside	orange
	Wind scoops	red

Chart III- Assessment of passive air movement strategies in the existing administration block

ASSESMENT OF PASSIVE STRATEGIES IN THE EXISTING ADMINISTRATION BLOCK		Design strategy	Rating
AIR MOVEMENT	➡	Openings oriented to the south	🟩
		Large openings	🟧
		Cross ventilation	🟧
		Innovative skins to facilitate air movement	🟥
		Second skin to facilitate air movement	🟥
		Louvers to continue indoor ventilation	🟩
Rating		Vertical landscaping "street boulevard"	🟥
good	🟩	To optimize the use of the topography for natural air movement	🟥
poor	🟧	To provide wind breaks, especially in front of the windows	🟥
/not applied	🟥	Maximize effects of Shadow Umbrella	🟥
		A spread out building form	🟥
Legend		The use of a breezeway.	🟥
Building envelope	🟩	Use of a three sided courtyard	🟥
Building Microclimate	🟪	Interior Spaces for short period use in an intermediate zone	🟧
Building Form	🟥	Transitional spaces.(Atriums, Verandahs, Porches, Sky courts)	🟥
		Use of corridors close to the exterior of the building to act as a buffer zone to the outside	🟧
		Wind towers	🟥
		Wind scoops	🟥

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Embedded Technology as a Test Case for Evaluating the Effect on Curriculum Development and Innovation of a National Award Standard for Architectural Education

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Keywords: National Standards, Curriculum Change, Intelligent Building, Architectural Education

Abstract

This paper describes the new document identifying Awards Standards in Architectural Qualifications in Ireland. It also reports the application of these standards in testing the existing curriculum of an architectural educational programme. Finally it evaluates the robustness of the guidelines in accommodating curriculum change in the context of technology change, by considering the specific case of introducing education aimed at assisting students and architects to contribute to the development of the "intelligent" building.

The author served on the Expert Committee charged with drawing up the Awards Standards in Architectural Qualifications in Ireland with the Irish Higher Education and Training Awards Council (HETAC). The new document identifies the knowledge, know-how and skills, and competences that graduates should achieve at different levels in their architectural education. The Standards were used to 'test' the curriculum for the BSc(Hons) Architecture and the Masters in Architecture programmes at the Cork Centre for Architectural Education. The results are used to evaluate the utility of the HETAC document in supporting curriculum development.

The paper also investigates the potential impact of the Awards Standards document on curriculum innovation. To evaluate the extent to which the new guidelines encourage, or inhibit the incorporation of curriculum changes driven by technology change, a specific case is considered. The issue of introducing to the curriculum objectives and learning outcomes required to support the design of "intelligent" built environments is evaluated in the context of the Awards Standards. The proposed curriculum changes are based on preliminary findings of the NEMBES research project, an Irish Government funded (PRTLI-IV), multi-disciplinary team developing a Centre of Excellence for the application of embedded technology in the built environment.

Awards Standards in Architectural Qualifications in Ireland

Irish law requires that HETAC determines "standards of knowledge, skill and competence to be acquired by learners" (HETAC, 2011). The document produced in relation to architectural qualifications draws upon many other documents including the Article 46 of the European Directive (2005/36/EC), advice from the Royal Institute of the Architects of Ireland and the Heads of the Schools of Architecture in the Republic of Ireland. It identifies the knowledge, know-how and competences at different levels of higher education using short phrases, rarely more than 30 words in length. For example, under "Know-How: Design Skill" at level 9 (Masters level), the graduate is expected to "generate and test advanced and innovative design propositions which respond to rigorously researched issues and contexts" (HETAC, 2011).

An Existing Curriculum appraised against the Award Standards

By mapping the module descriptors of the architectural programmes of the Cork Centre for Architectural Education (CCAE) against the Awards Standards, it was possible to identify those modules which addressed the Standards' specifications. Table-1 summarises the findings in relation to the areas of Knowledge and Know-How in a matrix which indicates where the course can present evidence of meeting the Standards. The table illustrates that in this case, all areas required by the Standards document are addressed. A more rigorous analysis would draw attention to the fact that all issues are not addressed equally, neither in terms of the number of modules, nor in terms of the distribution of academic credit allocated over the five years of architectural education. (Whilst most modules represent five ECTS credits, Design Studio and Dissertation represent 15 credits, and many of the M.Arch modules are weighted at greater than 5 credits). However this asymmetric treatment is not surprising. The standards requiring "Development ... of knowledge" are related to research, and in CCAE this tends to be more concentrated at the later stages of the five year educational programme. In contrast there is more attention devoted to "communication" at the early stages of the programme, as it is considered in CCAE as a fundamental skill required for the development of other design skills. This may not be the case in all educational institutions. An Awards Standards document should not create a straight-jacket leading to uniformity in education with all schools offering very similar programmes of educational content and delivery sequence. "A diverse range of potential programmes ... is compatible with these Award Standards" (HETAC, 2011).

The mapping exercise indicated that the Standards would have a potentially useful role in evaluating curricula in three areas: (a) identification of omissions, (b) relative weighting given to different aspects and (c) timing and sequencing of the delivery across the programme.

Embedded Technology in Architectural Design

The so-called "intelligent building" is a prime example of change driven by technological innovation. Successful exploitation of the technology depends upon a great deal of learning from all involved in the design team, including the architect. The learning required depends not only on an increased knowledge of new industrial products, but also a familiarity with the constraints of the new technology, and issues such as inter-operability, distributed versus centralised logic, the division of logic programming between manufacturer and system integrator, the potential for feature interaction, or interference, between systems and components automatically set in motion by pre-determined combinations of stimuli in the built environment. The operation of the intelligent building depends upon embedded technology, a network of communicating sensors and actuators integrated in the fabric of the construction, and the software to exploit the capabilities of the hardware for the benefit of building owners and users. A number of papers by the current author have drawn attention to the problems presented by communication breakdowns between traditional and newer members of the design team charged with the development of an intelligent building (e.g. McCartney, 2003). The sequencing of information exchange within the design team, and the different information formats required by different disciplines may necessitate changes to the traditional design process. (McCartney, 2007). The types of design tools that might be required to model and test intelligent environments have

been demonstrated in O'Neil et al (2009). The development of the "intelligent" building therefore provides an interesting case with which to explore the pressures for technology driven curriculum change in architectural education, and to test whether the National Awards Standards inhibit such change. The NEMBES project in Ireland is developing proposals for updating the curriculum to enable architects to manage the design of intelligent built environments. These recommended changes can be summarised under seven headings:

(1) Knowledge of existing intelligent environments, and their potential functions

(2) A critical perspective on the functions and achievements of existing intelligent environments

(3) Knowledge of the components of embedded technology, alternative systems and their special features and constraints

(4) Know-how regarding the design of embedded technology systems, and integration with building materials, components and construction assemblies

(5) Know-how in communicating architectural design intentions to disciplines, such as specialist areas of IT&C, which may not be familiar with the building industry

(6) Ability to identify key questions regarding the overall functioning of the building system including issues of feature interaction, interoperability of equipment, special maintenance requirements, added value potential from multi-functionality, and appropriately test design proposals

(7) Ability to adapt the design process to the special demands of embedded technology

When these curriculum change requirements are tested against the CCAE architectural curriculum developed in Cork, it can be seen in Table 2, that the greatest opportunities for implementing such changes occur in the final stages of the five year programme; mostly in years four and five, with only one module in the first three years presenting significant opportunity for incorporation of the new "intelligent building" curriculum. There are however many opportunities in the final two years of the programme. The numbers of the seven areas of change identified above have been mapped on to the modules and the Knowledge and Know-How sections from the Award Standards in Table-2. All components of the Awards Standards offer opportunities to incorporate curriculum changes that would support the "intelligent building" educational innovation.

Conclusion

The framework developed, and the vocabulary adopted, in the Awards Standards document does achieve a level of differentiation which makes it useful for encouraging and evaluating the potential for a learner's development through the progressive stages of architectural education, whilst at the same time maintaining a level of generality which, in the case under consideration, does not present any barrier to significant curriculum change driven by technological innovation. Therefore in this case, it can be concluded that a national standard defining the awards granted in architectural education can play a useful role in curriculum development, without leading to ossification in the face of rapid changes in the technological context in which architecture operates.

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Matrix table (rotated). Column group headers:

- **DESIGN**: THEORY & PRACTICE | PROGRAMME | PLANNING
- **CULTURAL CONTEXT**: HISTORY & THEORY | FINE ARTS | CONSERVATION
- **TECHNOLOGY & ENVIRONMENT**: STRUCTURES ENGINEERING & CONSTRUCTION | BLDGS. PEOPLE ENVIRONMENT
- **COMMUNICATION**: CONVENTIONS FOR COMMUNICATION
- **PROFESSIONAL PRACTICE**: KNOWLEDGE, REGULATION & PRACTICE
- **RESEARCH & PERSONAL DEVELOPMENT**: USE OF KNOWLEDGE

MODULE TITLE	MODULE
Design Studio 1	1_1
Construct/Struc/Mats-1	1_3
History_Theory-1- Ancient-	1_4
Design Studio 2	1_5
Construct/Struc/Mats-2	1_6
History_Theory 2: Baroque-	1_8
Applied Technology-1	1_9
Applied Technology-2	1_10
Design Studio 3	2_1
Applied Technology-3	2_2
Construct/Struc/Mats-3	2_3
History & Theory-3/Modernity	2_4
Design Studio 4	2_5
Environmental Design 1	2_6
Applied Technology-4	2_7
History & Theory-4:Contemp	2_8
Design Studio 5	3_1
Conservation: Theory/Practice	3_2
Applied Technology-5	3_3
Hist_Theory 6: Landscape Theory/Pra	3_4
Design Studio 6	3_5
Environment:Design 2	3_6
Applied Technology-6	3_7
History & Theory-4: Urbs & Civitas	3_8
Design Studio 7	4_1
Dissertation 1	4_2
Architectural Technology Current Pra	4_3
Design Studio 8	4_4
Dissertation 2	4_5
Professional Practice	4_6
Architectural Technology-Innovation	4_7
Context	5_1
Technology as Transformer	5_2
Brief Formation	5_3
Major Design	5_4
Documentation & Dissemination	5_5
Exhibition & Implementation	5_6

Legend:
- ■ concentrated coverage
- ▨ partial coverage

TABLE 1 Matrix showing which modules of the Cork programme address the Knowledge and Know-How and one of the requirements identified in the Awards Standards for Architectural Qualifications in Ireland (HETAC 2011)

MODULE TITLE	MODULE	DESIGN — THEORY & PRACTICE	DESIGN — PROGRAMME PLANNING	CULTURAL CONTEXT — HISTORY & THEORY	CULTURAL CONTEXT — FINE ARTS	CULTURAL CONTEXT — CONSERVATION	TECHNOLOGY & ENVIRONMENT — STRUCTURE ENGINEERING & CONSTRUCTION	TECHNOLOGY & ENVIRONMENT — ENVIRONMENT	COMMUNICATION — PEOPLE BLOGS CONVENTIONS FOR COMMUNICATION	PROFESSIONAL PRACTICE — KNOWLEDGE REGULATION & PRACTICE	RESEARCH & PERSONAL DEVELOPMENT — USE OF KNOWLEDGE
Design Studio 1	1_1										
Construct/Struc/Matr-1	1_3										
History_Theory-1: Ancient	1_4										
Design Studio 2	1_5										
Construct/Struc/Matr-2	1_6										
History_Theory-2: Baroque	1_8										
Applied Technology-1	1_9										
Applied Technology-2	1_10										
Design Studio 3	2_1										
Applied Technology-3	2_2										
Construct/Struc/Matr-3	2_3										
History & Theory-3: Modernity	2_4										
Design Studio 4	2_5										
Environmental Design 1	2_6										
Applied Technology-4	2_7										
History & Theory-4: Contemp	2_8										
Design Studio 5	3_1										
Conservation: Theory/Practice	3_2										
Applied Technology-5	3_3										
Hist. Theory 6: Landscape Theory/Pri	3_4										
Design Studio 6	3_5										
Environment Design 2	3_6						1	1			
Applied Technology-6	3_7						1	1			
History & Theory-4: Urbs & Civitas	3_8			1,2	1,2						
Design Studio 7	4_1										
Dissertation 1	4_2										
Architectural Technology/ Current Pr	4_3						1,2,3	1,2,3			
Design Studio 8	4_4						4,5,6	4,5,6			
Dissertation 2	4_5				1,2		1,2,3	1,2,3			
Professional Practice	4_6										
Architectural Technology-Innovation	4_7						1	1			
Context	5_1						1,2,3,6	1,2,3,6			
Technology as Transformer	5_2						6	6			
Brief Formation	5_3						5	5			
Major Design	5_4		4,6,7				6,7	6,7		6,7	4
Documentation & Dissemination	5_5						1,2,3,7	1,2,3,7		7	
Exhibition & Implementation	5_6		4				1,3,4,7	1,3,4,7		4,7	

major tech. innovation opportunity

minor tech. innovation opportunity

Numbers in boxes refer to the types of curriculum change required, as identified in the paper

TABLE 2 One that maps opportunities for technological innovation occur in years 4 and 5 of the Cork programme, distributed across all sections of Knowledge and Know-How in the HETAC (2011) Awards Standards for Architectural Qualifications in Ireland.

Post Colonial Attitudes in the Delivery of Western Architectural Education in China

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Abstract

Western academics involved in the delivery of joint-courses in China are normally accorded the status of 'foreign experts'. This description, and a tendency among many westerners to be ignorant of the motivations and pedagogical underpinnings of educational policy in China, may lead to critical or even condescending attitudes when encountering the educational practices exhibited in Chinese universities. This can frustrate the development of a critical and co-operative teaching and learning relationship with Chinese staff and students. Anecdotal evidence also suggests that many Chinese academics without experience of western education show little interest, and sometimes suspicion, of educational practices different from those with which they are familiar.

This paper looks at the relationships which have developed over a period of almost 10 years between an architecture school in New Zealand and an architectural school in China. The work done by New Zealand staff in joint course which they established has been characterised by an unconscious assumption of superiority by the western academics which was reinforced by the favourable response which their teaching drew from Chinese students and occasionally from Chinese staff who have studied in the west. Over time, however, an undercurrent of critical resistance was observed in the Chinese staff. Analysis of this was initially intended to be based on propositions contained in Edward Said's seminal essay on "Travelling Theory" (and the later essay "Travelling Theory Revisited") which explored what happens to theories and practices based on theoretical understandings when they move from place to place.

Very soon, however, it became clear that there was a need to acquire more exact information on what the attitudes off the different parties were before any more sophisticated analysis could be started. This paper therefore describes an initial survey of attitudes and responses to the existing joint course as perceived by western staff, Chinese staff who have been educated in the west, Chinese staff educated in China and the Chinese students to whom it is delivered. The results are collated and analysed and future paths for research and collaboration are identified.
336 words

Keywords: Architecture, Education, China

BACKGROUND

This paper describes an attempt to develop a better understanding of the attitudes and behaviours which various parties bring to an international joint course in architectural education. The particular joint course is one which dates from 2005 and is delivered in China by a school of architecture from New Zealand and a school in the provincial capital of a prosperous coastal region in eastern China.

The underlying purpose of the joint course from the point of view of the Chinese university is to meet the requirements of the Chinese Education Ministry to form links between Chinese universities and overseas partners. There is no secret in the fact that students enrolled in such

a course as this also enable the Chinese university to exceed its normal cap on student numbers and therefore to generate additional income, which in this case is enhanced by the supplementary fee which is charged for entry to the course. From the New Zealand school the purpose is largely financial, in that cohorts of Chinese students not only pay a fee for the education which is delivered to them in China but some students, whose abilities will have become known, will choose to continue their education in New Zealand as full fee-paying international students. In fact about 15% of each year cohort do fulfil this expectation and progress with a satisfactory subsequent level of success in New Zealand.

The structure which delivers the joint course is a simple one. Chinese students are enrolled into the course in their first year of study. During that period they receive one or two occasional lectures from visiting NZ staff (in this paper sometimes referred to as 'western' or 'foreign' staff) in order to begin a process of familiarisation with delivery techniques common in the west. They are also doing supplementary English language papers from the beginning of their enrolment but otherwise study a largely standard Chinese curriculum.

In their second year of study they continue with the normal Chinese curriculum but, in addition to occasional lectures on various topics, are offered a short one-week design studio project by visiting NZ staff.

This is designed to open-up their experience to what are assumed to be the somewhat different design studio delivery strategies normal in the west and the projects they do are constructed to be of an unexpected and exploratory nature. Such an approach is intended establish an awareness of some of the differences which students might expect to find in a New Zealand

school of architecture should they decide to continue their education overseas, and is the projects they do are quite different from the more normal approach found in their home school of architecture which stresses a typological basis to most projects and structures them in an ascending hierarchy of size. To date these projects have consisted of exploratory and imaginative exercises based on drawings by Giovanni Piranesi or texts by Italo Calvino. A further point of difference from local practice is that the completed student work is pinned up in the studio or in adjacent corridors and subjected to a public critique, creating something of a party atmosphere to which they are not normally accustomed.

It is in the third year that the engagement with the NZ teachers becomes more formal. In their fifth semester of study students are presented with a semester-long studio design project. This is typically opened by a 2-3 week introduction by the foreign staff, delivery is continued by the Chinese staff who co-teach the project and towards the end of the semester the western staff return for a further 2 weeks to provide final critique. New Zealand academics therefore design and 'book-end' the delivery of the projects. This pattern is repeated in year four with either the same project as is delivered to the year three students or, more recently, a different one more closely aligned with the local Chinese curriculum which at this level looks for large urban projects.

The underlying initial intention of all these projects, one clearly in the minds of all the New Zealand staff delivering them (although largely undiscussed), is to expose students to a different kind of teaching from that with which they are familiar. When in China the visiting foreign staff always teach in pairs (to groups of about 30 students) and encourage students to notice and if possible to participate in an interplay

of opinion and commentary between them about the projects that are being worked on. Considerable effort is made to relax the studio atmosphere and to generate a sense that the projects are experiments, that the staff don't necessarily start with clear ideas about the possible outcomes of the project, that multiple different successful outcomes are possible, and that creative imaginative leaps, including game-playing of various kinds, are encouraged. There is a frequent insistence that the staff don't know 'the answers' to the problems raised in the projects – and that they might not be prepared to reveal them to the students even if they did.

The attitudes which prompted this approach were largely unconscious but may be assumed to be based on an uncritical assumption that the methods, techniques and attitudes common in western architectural education as found in studio design projects are necessarily better than those found in Chinese schools of architecture. Starting from this implicit premise New Zealand staff sought to destabilise the understandings about architectural education which the Chinese students may have started to acquire in order to render them more receptive to new models. One consequence of this process is that the local staff become marginalised, a tendency which is accelerated by their generally poor knowledge of English which makes collegial cooperation between them and the New Zealand staff difficult to achieve. This difficulty is enhanced by the suspicion that many of the Chinese staff manifest, such as, for instance, a disbelief that a topic like feminism might have architectural consequences, or that a project might be based on other premises than typology. The belief that architectural education in China is inferior to that commonly found in the west may or may not be true: but is unsupported, at least in this particular case, by any systematic knowledge of the practices of Chinese

architectural education and is un-mediated by significant input to the projects by the Chinese staff who are required to maintain the delivery of them in the periods between when they are started and concluded by the visiting foreign academics.

Matters relating to the sense of superior competence that New Zealand (and doubtless other) 'foreign experts' carry with them into China are complicated by some of the reactions which they experience there. While it is notoriously difficult to fully understand the cultural dynamics which underpin such interchanges there is little doubt that, at least in the case of this joint-course, many of the teaching practices which the New Zealand programme brings to China appear to be well-regarded not only by students there but also by some of the Chinese staff. But even in this latter case there is an interesting proviso, for it appears that only those Chinese staff who have had some experience of western architectural education value the teaching methods employed by the visiting foreigners. Locally educated Chinese staff appear less supportive, or perhaps just less interested, in the projects being delivered. The unsurprising result of this apparent endorsement of their work by students who may be assumed to still be open to new teaching practices and by those staff who have had the opportunity to experience and value them is to confirm in the minds of the New Zealanders that they have ownership of the best teaching techniques. By direct extension Chinese teaching practices are seen as inferior. These are not attitudes which it is useful to bring to a cooperative teaching situation.

Although the projects offered to joint course students in China are nominally constructed jointly by New Zealand and Chinese staff they have to date invariably been written by the westerners with little more than limited agreement to them by the Chinese staff. It has proven somewhat

difficult to ascertain how the Chinese staff feel about this but a rather complacent initial belief that normal western projects were all for the best has more recently been replaced by a sense that Chinese staff may resent the appropriation of parts of their programme without full consultation and that a more cooperative process of project development needs to be introduced in the future. More than this, however, it has become increasingly clear that all of the underlying assumptions carried into China by the foreign teachers are untested. For this reason it was decided to try and ascertain exactly what were the attitudes and beliefs which the different parties brought to the joint course.

DESIGNING THE SURVEY

It was necessary at the outset to ascertain exactly what information might usefully throw light on the attitudes of the parties. It was determined quite early on that it was attitudes and beliefs rather than facts about behaviour which were at issue: behaviours are determined by multiple factors beyond the scope of this enquiry. In any case the relationship between 'facts'- whatever that elusive word might mean – and behaviours is not always easy to ascertain.

After taking advice it was decided that this research was likely to be complex and extended but that a general survey questionnaire would be the easiest way of obtaining the information which would enable an initial impression of the scope of work to be made. A paper survey was decided upon since this meant that it could be administered directly by the researchers and that questions about its purpose and significance could most easily be answered.

There was some initial apprehension that some groups, particularly the Chinese students, would be nervous that the survey might reflect in some way on their

grades and it was felt necessary to take steps to explain to them that this was not the case. The fact that the administrator of the survey was known to them as a teacher doubtless helped to relieve any misapprehensions which might have arisen in this area.

A questionnaire was designed to capture the attitudes of the people involved in the joint course. While the initial assumption was that it was the New Zealanders who would be the main objects of investigation the scope of the survey was extended to include a wider spectrum of participants. These fell into different groups and included Chinese students, Chinese staff and western staff. The Chinese staff group was further divided into those who had received all their education in China and those who had received a degree in the west. There were therefore four separate target groups. In the case of each group participation was voluntary and the participants remained anonymous.

The survey questionnaire was composed in five parts, the first two of which were designed to be completed only by Chinese students who were studying on the joint course in China, a third for the Chinese staff and the last two of which were to be answered by the New Zealand staff. The third section, answered by the Chinese staff, was similar but not identical to the sections answered by New Zealand staff. The reason for this was that the Chinese co-author of the survey had some particular issues about local teaching practice to answer which were not appropriate to ask of New Zealand staff.

The first section consisted of 16 questions of a general nature designed to relax the students and to get them to respond to questions about why they were studying architecture and how they felt about being architecture students.

The second section consisted of 7 questions which presented the students with some issues about the nature of their education and whether or not they saw any value in continuing to study architecture overseas. A sub-section to this part asks students 4 questions specifically about studio practice.

Section three was administered both to locally educated Chinese staff and to those with foreign education. It consisted of 9 questions about western and Chinese education including some on the studio practices currently in use in their university.

Section four consisted of 10 questions related to general differences which might be perceived to exist between architectural education in China and architectural education in the west.

Section five consisted of 6 questions specifically about studio practice and was designed to indicate whether there were thought to be any differences between these in China and the west.

The catchment groups – Chinese students still in China, Chinese staff with experience of western education, Chinese staff without that experience and New Zealand teachers who had worked in China – were of different sizes.

The group of Chinese students in China was the largest with 50 participants, all of them aged between 20 and 22. 40% of these students were in their second year of university study, 40% were in their third year and 20% in their forth year. 20% had had some experience of study with western teachers, almost all of which is assumed to have been on the joint course.

The group of Chinese staff without experience of western education numbered 10 of whom 60% were under 40, 30% were between 40 and 50 and 10% were

over 50 years of age. 60% were lecturers, 20% were Associate professors and 20% were professors. Chinese staff with some overseas education numbered only 3 – really too small a sample to provide useful results. All were under 40, 2 were men and one was a woman. All were lecturers bilingual in Chinese and in English.

The New Zealand staff who had taught in China numbered ten. Of these staff 30% were under 40, 20% were between 40 and 50 and 50% were over 50. Two were Associate Professors and the other 80% lecturers. They were educated in a range of western countries.

The final results from the four target groups fall into two sections. The first of these is from the Chinese students and tells us something about their attitudes to architectural education. This was not part of the initial intention of this research but early in the exercise it became apparent that it was necessary to derive this information partly because it would feed directly into the next period of teaching by New Zealand academics in China and partly because the attitudes and feelings of the students represented some sort of a measure of the issues that were being explored through the staff surveys.

The second section involved the Chinese and New Zealand staff and was closer to the original intention of this research, which was to evaluate their respective attitudes to the educational imperatives of the other. This produced some fairly clear results. These were supplemented by the written comments which some of the staff made on their questionnaires. Although the survey was not designed to invite such responses they proved useful in supplementing the questionnaire results and in clarifying attitudes.

ADMINISTERING THE SURVEY

The survey was trialled on a small group of students and staff before being delivered. Minor adjustments were made to some of the questions at this point but subsequent evidence suggests that these revisions could usefully have been more extensive. For instance marginal comments or subsequent conversation revealed that some New Zealand staff responded neutrally to questions because they assumed that it was knowledge rather than attitudes which was being investigated. Others said that they felt hesitant to criticise particular issues too strongly. For these reasons the survey may well be rephrased and repeated at another Chinese university. This will provide the opportunity to explain the purposes of the survey in greater detail and to use larger samples (particularly in the staff groups) responding to slightly more extensive and more focussed questions.

Administration of the survey was carried out in China by the Chinese co-author of the paper (who had by far the largest task) and in New Zealand by the New Zealand co-author to the much smaller group of staff who had taught in China. The survey was delivered to all parties in English but some verbal introduction to the Chinese subjects was in their own language. Collation of results and initial analysis happened simultaneously in China and in New Zealand.

ANALYSIS OF THE RESULTS

The results of the survey indicate the following points.

About one third of the Chinese students believe that western education is in some ways different to the Chinese architectural education system and more than half of them are dissatisfied with the (Chinese) design studio education they are currently

"receiving. Chinese students also report that they react positively to excitement by the teacher. (It is perhaps useful to hear the views of a Chinese teacher on this: *"This is a very weak side of the Chinese teacher. I found most of them never get excited about anything."*)

The question about the teacher treating studio projects as experiments was something that half the Chinese students were unsure about. The Chinese co-author of this paper comments,

During the 12 years of education the students have received from Primary School to High School the rule has always been: do as the teacher says, the teacher is the authority of knowledge so there is always a right answer which is printed in the textbook or given by the teacher. Students may feel lost when the authority figure is appears unsure."

A disconcerting 70% of the Chinese students report that they seldom or never read architectural journals. 78% of them intend to continue their study overseas and over half hope to work overseas after graduation. These figures represent a significant expectation in this generation of Chinese architecture students to operate globally.

Chinese students are more likely than Chinese staff educated in China to believe that the education they receive is different from western architectural education. More frequent access to the internet and better English language skills may account for this difference.

The responses of the Chinese staff who had not experienced western education revealed mixed opinions. There was no consensus about the similarities or differences between western and Chinese architectural education although 70% of the respondents believed a mixture of both would provide the best overall educational outcomes. None, however, thought that western education was

superior to Chinese – but nevertheless no fewer than 90% of them believed that western education was better at developing creative thinking than was Chinese education. The disparity between these last two outcomes may be taken as reflecting a view that creative thinking was for them not of decisive significance in architectural education, and indeed 80% of them believed that their system was better at transmitting factual knowledge which it might be concluded was viewed as their main priority. Their marginal comments indicate a belief that a Chinese education fits graduates better for a career in China than any western education.

Only 20% of the Chinese-educated staff disagreed that western staff were more excited by their teaching than were Chinese staff and only 20% of them saw a need for more interaction between staff and students in their own studios. If their existing staff-student studio culture was generally approved, however, the content of their studio projects was often not, for 60% of them expressed agreement that the nature of the projects they offered should be revised.

A Chinese staff member comments:

"Staff with Chinese education background are not as eager as the students to change the projects in the design studio. Of course there are rules formulated by the National education Committee to restrict teaching programmes which limit innovation. But the most reason is because they were educated in this way for many years and most of them don't want to change. The same projects are repeated since they studied themselves."

A preoccupation with practical matters perhaps derives from the almost invariable tendency for Chinese schools of architecture to operate also as Design Institutes. Most staff are therefore regularly involved in practice either for their university or privately. One of them comments:

"Most staff are just busy doing their own projects, and they bring these experiences back to instruct the student projects. These experiences are very practical, but for cultivating young architects for the future it's a kind of tragedy. It makes the students work year after year only in clichés. And it's funny, the student work looks 90% similar when they're instructed by the same teacher."

In addition to the questionnaire results they expressed some dissatisfaction with the teaching methodology current in their own university, saying that,
"we should choose some excellent methods from western education to overcome the rigid mode in our system right now and to decrease some 'right or wrong' conclusion which we always continued filling with the students through the years."
They also advocate that the Chinese universities should ,
"Let more teachers to go abroad to widen their mind, and not just organize some trips like tourist visitor"
and
"Pay more to the teacher so they can have some time to improve their knowledge to keep up with the international level and put more energy into teaching. To keep them from busily earning their substance for life, they should be better treated than they are now."

Chinese staff who had experience of architectural education in the west constituted a very small sample, but their responses were notably different from those of their locally educated colleagues.

All of them thought western education was different from Chinese education (compared to only 40% of their locally educated colleagues) but the percentage who thought the best results came from a mixture of both was almost identical at around 70%. They were split about the merits of the Chinese system in preparing students for practice but unanimous that western education was best at developing creative thinking, and they also all considered that the western curriculum

was more useful than the Chinese – a result difficult to reconcile with their view that it was the Chinese system which best prepared students for practice. All of them thought that the Chinese curriculum addressed largely factual matters and all thought that western teachers were more excited about their teaching than were Chinese staff. These staff were equally unanimous that there needed to be more interaction between staff and students in Chinese universities (only 20% of their Chinese-educated colleagues agreed) and that present studio practices needed to be revised (50% of their Chinese-educated colleagues agreed).

Their comments were generally insightful. They noted that, while teaching practice in their own university was largely fact-driven,
"I think not all Chinese universities are like this; the trends in Beijing, Shanghai, so to say the first-lined mega-cities are different."

It is worth noting, however, that their own university ranks in the top 20 (of over 100) architecture schools in China and is therefore probably typical of normal good practice in that country, although not at the same level as the elite Chinese universities.

New Zealand staff reported attitudes which confirmed the original suspicion that they believed western architectural education to be superior to the architectural education they had seen being delivered in China – and sometimes they believed this very strongly. They assert that the design studio is more important in western education than in China and that western education best prepares students for a career in architecture. It was interesting to note that in more than one case marginal comments revealed that the New Zealand staff admitted to knowing very little about the Chinese education system but nevertheless generally had negative views about its effectiveness. For example

comments prefaced by the remark that,
"I don't know what Chinese architectural education is like"
may be followed by others such as,
"Enthusiasms are a problem for Chinese culture",
"Chinese education is nervous of creativity"
and
"Chinese students are used to being told things by the authorities".

Generally there was a consensus among the western staff on many of the questions asked. There was agreement that studio work is the most important part of a western programme but that this is not the case in China. They also largely agreed that students learn best when the projects are delivered in an experimental mode and without the teacher directing their work. The attitudes revealed by these responses are supported by the Chinese students, two thirds of whom agree that experimentation in studio is something they like.

CONCLUSIONS AND NEXT STEPS

This survey has provided some initial information about the attitudes of staff and students involved in the Joint Course. It has also revealed that more work needs to be done in trying to understand the reasons why these attitudes might be held and the teaching practices which support them. Future investigations will enquire separately into student and teacher groups and will try to examine more closely the issues which have been identified here. These will include the balance of the curriculum and relations between teachers and students. Also of considerable interest to the New Zealand staff teaching in China is the generally positive reaction to their work by their Chinese students which this survey reveals. Encouraging comments are often received from students by New Zealand staff in China but it was always uncertain whether these were prompted either by politeness of by the normal deference which Chinese students often

display towards their teachers. In this case the fact that they responded anonymously and that the survey was administered by Chinese staff would appear to remove those possibilities. In this matter at least all parties can be reassured that the joint course is operating to the satisfaction of students.

Overall however, the survey indicates that there are considerable and at the moment largely un-addressed differences between the beliefs and attitudes of the Chinese and New Zealand academics who are required to cooperate in this joint course, and, no less interestingly, between those Chinese academics who have had experience of western education and those of their colleagues who have not. All of these differences contribute to problems in the delivery of the joint course and need to be understood and where possible resolved if it is to develop positively.

Initial steps already instituted involve the Chinese university where possible allocating western educated staff as co-writers and deliverers of future projects. This is expected to make collegial cooperation much easier than the previous model which involved a more-or-less random allocation of Chinese-educated staff, many of whom spoke little or no English, to the projects. A freer exchange of views and opinions should follow from this move. No less important is a need for the New Zealand staff to openly discuss, first among themselves and then with their Chinese colleagues, the differences in attitude and process which they might be bringing to their work. But much further work remains to be done; this survey marks only a beginning.

Paper Ends

APPENDIX - SURVEY RESULTS

SECTION 1 – CHINESE STUDENTS

	%
Q1.1 Did you have any ideas or thoughts about architecture before you started to study in the university?	
☐ yes	61
☐ no	21
☐ hard to tell	18
Q1.2 You have chosen to study architecture because...	
☐ It's well paid and a very rapidly developing business in China	25
☐ I have a personal interest in architecture.	34
☐ Its very popular with students, and highly recommend by others	2
☐ I took advice from my parents or friends	32
☐ All of the above	5

If you have other reasons please describe them below:	2
Q1.3 When you are working on design projects, what influence does the advice of the teacher have on you?	
☐ I have few ideas myself, so I just do what he or she suggests	12
☐ I usually make changes to meet the teacher's requirements	14
☐ I sometimes take the teacher's advice	49
☐ I don't care what the teacher says , I just follow my own thoughts	8
☐ I sometimes do all of the above	11
Q1.4 Are you satisfied with your teacher in the design studio ?	
☐ Yes , I am very satisfied . He / she has been very helpful	41
☐ I would have appreciated more help than I got	20
☐ No, I am not satisfied with the help I have received because	36
☐ I have no idea	2
☐ I don't care	1
Q1.5 Do you have fun while involved in the process of designing ?	
☐ Yes , always , absolutely in every project	25
☐ Sometimes , it depends on the project	32
☐ Sometimes , it depends on teacher	12
☐ Sometimes, it depends on my physical and mental circumstance	27
☐ Hardly ever	0
☐ Never	4
Q1.6 Are you able to spend more than 6 hours considering your design studio project outside class hours in addition to the 10 hours in design studio very week?	
☐ Yes, and even more	48
☐ 4-6 hours very week	32
☐ 2-4 hours very week	11
☐ 1-2 hours very week	7
☐ I only work in the design studio class	2
Q1.7 When in the design studio, do you listen to discussion between the teacher and other students about the project?	
☐ Yes I can see the some similar problem of my own work	39
☐ Sometimes	55

☐ No, I'm not interested	2
☐ Only when I'm bored	4
Q1.8 Do you have other hobbies or interests besides your study? (You may choose more than one option)	
☐ I don't have spare time	23
☐ I'm not interested	5
☐ It's not important	4
☐ Yes	68
Q1.9 Are there any famous masters whose works you worship?	
☐ I just appreciate myself	3
☐ I don't find it necessary	14
☐ No	5
☐ No, but I'd like to find one	23
☐ Yes	55
Q1.10 Do you generally spend most of your time refining a design or finishing the drawing or rending?	
☐ I spend more time considering, refining and developing the design	36
☐ Visual realization and presentation takes most of my time	23
☐ It 's about 50% - 50%	33
☐ It varies between projects	8
Q1.11 Do you feel most comfortable trying to produce awesome distinguishing ideas or do you try to produce safe ones which can hardly be criticised ?	
☐ I prefer an awesome idea	19
☐ I prefer a safe one	24
☐ I can't tell which is awesome and which is safe	44
☐ I don't know	13
Q1.12 Do you talk about architectural ideas with your friends or roommates?	
☐ Yes, we often discuss architectural ideas	82
☐ I have no interest discussing architecture in my spare time	8
☐ We'd rather talk about something else	3
☐ Only the teacher's ideas and opinions are important to me	7

Q1.13 Does the study of architecture change your life in anyway, even by very specific or small things? For example do you become aware of the different scale of the street or of ground surfaces or material colours?	
☐ Yes, totally , I learned to observe the world as an architect.	80
☐ I have no interest discussing the design studio in my spare time	4
☐ We'd rather talk about something else	16
Not at all. all the things are the same before	0
Q1.14 Do you regularly read architectural magazine or essays ?	30
☐ Yes	67
☐ Not very often	3
☐ Never	
Q1.15 Are you proud of your work?	
☐ Yes, every project	53
☐ Several times	41
☐ Only once	2
☐ Never	4
☐ I don't care	0

SECTION 2 - CHINESE STUDENTS

(A = Strongly disagree, B = Tend to disagree, C = Undecided, D = Tend to agree, E = Agree)

STATEMENT	A	B	C	D	E
2.1 I can study anywhere.	36	30	8	8	18
2.2 I am satisfied with the architectural education I am receiving.	10	44	6	30	10
2.3 Being able to graduate and work as an architect is very important to me	2	12	16	28	42
2.4 I hope to be able to study overseas.	6	10	10	26	48
2.5 I hope to be able to work as an architect overseas	12	8	26	14	40
2.6 I intend to continue my studies overseas.	10	10	2	20	58
2.7 I look for these facts when considering a course of study overseas	%				
Reports from overseas friends	12				
Advice from teachers in China	5				
Advice from parents	9				
Experience of overseas teachers I've met	13				
Costs	15				

Wider career prospects	13
Greater educational choice	12
Opportunity to work in another culture	12
Chance to improve language skills	10

SECTION 2b – CHINESE STUDENTS
(A = Strongly disagree, B = Tend to disagree, C = Undecided, D = Tend to agree,
E = Agree)

QUESTION	A	B	C	D	E
4.1 Students learn better when the teacher is excited by the project he or she is offering.	10	10	8	24	48
4.2 Students like it when the teacher is excited about their work.	4	8	4	20	64
4.3 Students learn best when the teacher directs their work and knows the answer to all their questions.	10	30	18	24	18
4.4 Students like it when the teacher treats the projects as experiments to which the answer is not always known.	2	24	8	30	36

SECTION 3a – CHINESE STAFF WITH EXPERIENCE OF STUDY OVERSEAS
(A = Strongly disagree, B = Tend to disagree, C = Undecided, D = Tend to agree,
E = Agree)

STATEMENT	A	B	C	D	E
3.1 Architectural education in China is very similar to architectural education in the west	0	0	0	0	100
3.2 If you think they're different, which will best prepare students for a career in architecture	Chinese: 33	West: 0	Both: 66		
3.3 Chinese architectural education prepares you for practice better than western education	0	33	33	0	33
3.4 Western education develops creative thinking better than education in China	66	33	0	0	0
3.5 Western classes and projects are more useful to a student than the Chinese curriculum	66	33	0	0	0
3.6 The Chinese curriculum is largely about facts and the western curriculum is largely about attitudes	100	0	0	0	0
3.7 Western teachers are more excited by their teaching than Chinese teachers	66	33	0	0	0
3.8 Studio practice in China should involve more interaction between teachers and students	100	0	0	0	0
3.9 The nature of the projects we offer in Chinese design studios needs to be revised	100	0	0	0	0

SECTION 3b – CHINESE STAFF WITHOUT EXPERIENCE OF STUDY OVERSEAS

(A = Strongly disagree, B = Tend to disagree, C = Undecided, D = Tend to agree,
E = Agree)

STATEMENT	A	B	C	D	E
3.1 Architectural education in China is very similar to architectural education in the west	20	20	30	10	20
3.2 If you think they're different, which will best prepare students for a career in architecture	Chinese: 30	West: 0	Both: 70		
3.3 Chinese architectural education prepares you for practice better than western education	50	0	20	10	20
3.4 Western education develops creative thinking better than education in China	60	30	10	0	0
3.5 Western classes and projects are more useful to a student than the Chinese curriculum	30	0	20	0	50
3.6 The Chinese curriculum is largely about facts and the western curriculum is largely about attitudes	60	20	0	10	10
3.7 Western teachers are more excited by their teaching than Chinese teachers	50	20	10	0	20
3.8 Studio practice in China should involve more interaction between teachers and students	10	10	30	20	30
3.9 The nature of the projects we offer in Chinese design studios needs to be revised	40	20	10	10	20

SECTION 4 – NEW ZEALAND STAFF

(A = Strongly disagree, B = Tend to disagree, C = Undecided, D = Tend to agree, E = Agree)

STATEMENT	A	B	C	D	E
3.1 Architectural practice overseas is similar to architectural practice in China	20	60	20	0	0
3.2 Architectural education overseas is similar to architectural education in China	30	60	0	10	0
3.3 Chinese education is most likely to prepare a student for a career in architecture	20	40	40	0	0
3.4 Chinese architectural education prepares you for practice as an architect better than western education.	30	40	20	10	0
3.5 Chinese architectural education teaches you more facts than western education.	0	0	20	60	10
3.6 Western architectural education develops more creative thinking than Chinese architecture.	0	0	0	70	33
3.7 In China design studio projects are the most important part of the curriculum.	20	50	30	0	0

3.8 In NZ design studio projects are the most important part of the curriculum.	0	0	0	20	80
3.9 Foreign teachers appear more excited about the design projects they offer than Chinese teachers.	0	0	40	20	40
3.10 In my experience the Chinese curriculum is largely about learning facts and the western curriculum is about learning attitudes.	0	0	10	60	30

SECTION 5 – NEW ZEALAND STAFF

(A = Strongly disagree, B = Tend to disagree, C = Undecided, D = Tend to agree, E = Agree)

QUESTION	A	B	C	D	E
4.1 Students learn better when the teacher is excited by the project he or she is offering.	10	0	0	40	50
4.2 Students like it when the teacher is excited about their work.	10	0	10	40	40
4.3 Students learn best when the teacher directs their work and knows the answer to all their questions.	60	10	20	0	10
4.4 Students like it when the teacher treats the projects as experiments to which the answer is not always known.	0	10	20	30	30
4.5 In China or overseas the design studio projects are the most important part of an architectural education.	10	0	60	0	30
4.6 Western teachers appear more excited about the design projects they offer than Chinese teachers	0	0	20	50	30

ON THE TEACHING OF WONDER

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Abstract

Educational institutions that impart a high level of critical and intellectual rigour in their students are usually considered as "good". However, when one compares regions that have these "good" institutions with regions where the intellectual rigour is comparatively weak, one finds that the state of professional practice may not be that different. It appears that the quality of education in a region is not necessarily correlated with the quality of architecture that it produces, even though the professional practices may be inhabited by the same people who once inhabited these "good" colleges.

To sustain consistency across drastically different contexts (academia and commercial practice being a case in point) requires a rooted sense of self, which cannot be produced by abstracted externalities such as theories or philosophies. The 'self' is an entity that can be produced in its fullness only experientially rather than intellectually.

But to merely stay within itself would be narcissism; the self finds fulfillment by anchoring to a higher reality. And to be moved by a higher reality is to be possessed by wonder. The paper will argue that by clinging solely to standards of intellectualism conventional education limits itself. For a more holistic construction of the self, education should embrace experiential foundations oriented towards the inculcation of wonder. The paper will outline some implications of this approach on architecture and on education.

Keywords: Wonder, Education, Experience, Rigour

Introduction

Architectural education, when it seeks to rise above a vocational level of training in technical skills, tends to orient toward a goal of intellectual rigour. Take as an example the requirement that the student present a project to a jury – a central requirement in architecture schools all over the world. This involves (a) the act of presentation, (b) subsequent assessment of the work, and (c) discussion that links presentation and assessment. This would not be possible if the system was only seeking tacit intuitive response. The basis for a common discussion is an intellectualization of the task at hand, which demands of the student that the work represent an idea that can stand on its own, and the presence of that idea becomes the basis for discussion and evaluation. The goal of education subsequently becomes the certification of the degree of sophistication with which the student can (a) ideate on architecture, and (b) feed that ideation into the production of architecture. Colleges with a curriculum that sustains the critical rigour imparting this intellectual sophistication are considered "good" educational institutions.

However, when one compares regions that predominantly have these "good" institutions with regions where the intellectual rigour is comparatively weak, one finds that the state of professional practice may not be that different. This should not be judged by professional journals or exhibitions in the region,

where the quality of architecture on display is a function of the quality of editorial and curatorial abilities. But if one takes as the sample the quality of contemporary buildings encountered in a typical journey through a city, one finds that the most countries have a similar mix of quality produced by professionally trained architects: a small percentage of high quality architecture, a large mass of banal or ordinary buildings, and some that many people find downright ugly. It thus appears that an education system that imparts critical rigour does not necessarily lead to good architecture in the region.

Authenticity and the Rooted Self

Theories and philosophies are abstract externalities that can get disconnected from personal experience. When the student becomes dependent on such externalities, he/she does not develop the internalised rooted definition of self that can remain consistent across changing contexts. Subsequently, if there is a drastic change in context such as a move from the abstractions of academia to the commercial and logistical imperatives of practice, the student is unable to sustain a common thread and unconsciously adapts to whatever the context demands. The educational system in a region can be focused on intellectual rigour, and yet can exhibit a strong capacity for amnesia, so that the quality of the educational system is not necessarily correlated with the quality of the region's commercial practices, even if the practices are inhabited by the same people who once inhabited the colleges.

One should note that in any batch of students, there will be a few who already have a rooted sense of self, and are able to sustain the internal drive and rigour to be consistent in their thinking irrespective of what happens. But these students may have got their sense of self from a source other than what the educational institution provides. The quality of an educational system is not to be judged by what it can do with the good student, for a good student usually thrives wherever he/she is. The quality of the education system should be judged primarily by what it does with the average student.

But the sense of self cannot just be absorbed within itself, for that would be a descent into a narcissistic subjectivity. It should have a larger framework of reference against which it measures itself. The philosopher Charles Taylor[i] points out that without this framework the self will never achieve its ingrained quest for authenticity. Taylor locates the basis of arriving at authenticity in everyday acts, pointing out that it can only be derived through dialogue. Just like language, the impulse to achieve it may be innate to the human condition, but it can only be realised by engagement with other human beings. But authenticity also has a moral dimension, rising above personal freedom and desire to define a higher beacon – that Taylor terms as a "horizon of significance" – of what we ought to desire. For example, if men and women are to be considered equal it is neither because of their visibly common attributes nor their differences, but because overriding these commonalities or differences are higher properties of value that define them both, such as the productive capacity for love, memory or recognition. Without a horizon of significance every choice becomes equal, whether it is one that is petty and self-gratifying or one that seeks a moral idealistic ground.

In other words, to find authenticity is to first find a common ground between the self and a wider horizon of significance, and then to internalize that common ground to the point where it becomes an integral part of one's intuitive and tacit belief system. With this anchoring in a higher realm, the sense of self can stay

anchored and avoids fluctuations with superficial changes in circumstances.

If one is achieving authenticity through connections across different levels of meaning; that implies that meaning is hierarchically structured. And to see significance in a hierarchy is to see a connection between the secular and the sacred. Huston Smith[ii] defines a primordial tradition common to all spiritual traditions that recognizes that:

> a) Reality is not one-dimensional but has multiple levels: the levels typically observed in most spiritual traditions being the terrestrial (everyday life), subliminal (dreams, emotions,archetypes), celestial (the divine with form), and infinite (the divine beyond form or attribute).

> b) These levels are not disconnected but are different dimensions of the same reality.

> c) Each and every one of these levels is not an abstract construct and is experientially knowable

It is not important whether one agrees with Smith's articulation of the hierarchy; what matters is the fact that reality is hierarchically structured. And if one puts aside the question of whether the higher levels are divine, and accept the fact that they constitute horizons of significance, then the sacred and the secular rest on similar views of the world. As the writer Jeanette Winterson puts it, *"The arts fare much better along religion than with either capitalism or communism. The god-instinct and the art-instinct both apprehend much more than the physical biological world. The artist may not believe in God, but the artist does consider reality as multiple and complex"*.[iii] It is then necessary to come to terms with the implication of hierarchical structures of meaning.

Hierarchies of Meaning, Experience and Wonder

Michael Polanyi points out that a hierarchical structure has certainty at one end, but the other end is less explicit and invariably involves transcendence.[iv] An example is the system of speech that hierarchically involves the levels of (1) voice production; (2) phonetics; (3) syntax; and (4) meaning. Each level has rules that govern its own operations, but also has boundary conditions that leave itself open to modification by a higher level. Higher levels cannot be reductively described in terms of the lower level. The more one rises in the hierarchy, the more intangible the level is; the more the intangibility in the range of these hierarchies, the more meaningful it is; and the more meaningful it is, the higher the sense of transcendence.

To continue this thread, one can examine the hierarchical structures of consciousness of the embodied self from the bottom up as (1) *Body* (sensory awareness); (2) *Mind* (recognition); (3) *Ego* (sense of "I" versus "You"); (4) *Emotions* (likes and dislikes); (5) *Intellect* (causes and effects, conceptualizations); (6) *Will* (meaning and purpose); and (7) *Identity* (awareness of the self).[v] Here too we can recognize the quality of the hierarchy as getting more intangible and tacit at higher levels. These levels named here form the sense of self as constrained by the individual body, and form the threshold for attending the world that lies beyond the limits of the body.

But we also have to admit that there is a world beyond our own body: that there are other beings and things; that they seem to have life and intelligence; and that this intelligence is not random but has order, meaning, purpose and identity. The key question is how one considers these levels beyond one's body. Are they to be seen as separate from the body? Or are they to be considered as forming a unity with

the body (a wider reality of which the body is only a part)? To perceive the world in terms of the former question is to constrain our understanding to the mundane. To perceive it in terms of the latter is to admit the sacred. And to know the sacred will be to admit the intangible transcendence at the higher levels of the hierarchy.

Rationality is a method that tends to be reductive, seeking to first identify constituent elements and then their cause-effect relationships. It can start with observations of the universe beyond one's body, but collapses all understanding to the level of explicit intellectual structure, where this structure can be internalized and comprehended by an individual brain. As argued earlier, in a hierarchical system the higher levels tend to be intangible, so to construct a model that overemphasizes explicit intellectualization is to filter out tacit experiential awareness from the model. And in the process emotions, meaning, purpose and identity are also sanitized out of the model.

In addition, this filtering creates a schism between the experiencing self and the universe beyond that self's body. Rationality has an inherent tendency to create a fractured self, and this is a major failure in the current convention of education.

To heal this breach is to admit the intangible, so it can only be achieved through tacit experience rather than explicit intellectualization. To be at one level of reality, be aware of higher levels, and to sense the unity between one's immediate experience and these higher levels is to know the realm of the sacred. And to be overwhelmed by the joy, inspiration and immense and rich potential in the higher levels is to be consumed by wonder.

Wonder comes naturally to us as children,

but we lose it as we grow up. This is partially because the overwhelming novelty of experience tends to reduce with age, but also because our education system pushes us toward rational certainty as it devalues tacit awareness as idiosyncratic and subjective, and therefore evading any standard of rigour. Rationality therefore has an inherent tendency to seek validation outside the experiencing self leading to a fractured self.

But to devalue an experiential foundation as lacking rigour is a judgment that is possible only when intellectualism is the sole qualifying standard that is permitted. Can one judge this on the qualifying standard of experience and seek experiential certainty and rigour? I will return to this question in the last section on teaching wonder, but one must first pause to look at the implications on architecture once we base the quest on experiential awareness.

Architecture and the Aesthetic of Wonder

Rationality seeks validation in standards of objectivity, and therefore foregrounds origins from beyond the subjective self. As a result discussion on architectural aesthetics tends to look to origins of meaning such as the intentions of the architect and the tectonic qualities of form and space. But an analysis that privileges experiential awareness will need to foreground origins generated by the experiencing self, privileging the perspective of the *inhabitant.*

An aesthetic of wonder, as seen from this angle, will be founded on:

1. The Exactitude of Art: Jeanette Winterson observes, *"The question 'What is your book about?' has always puzzled me. It is about itself and if I could condense it into other words I should not have taken such care to choose the words I did".* [vi] We tend to believe that

art offers us meaning brought into being by the intention of the artist. But what it really offers is an exactitude which stands in resistance to the entropic and constantly shifting mess of everyday life. Its impact lies less in the power with which it conveys the artist's intention, and more in the qualitative refuge of inhabitation it offers that allows one to take a measure of who one is. This requires that art be inhabited, and if the other arts involve a conceptual inhabitation, architecture offers it in a literal bodily sense.

2. <u>The Sensation of Space:</u> Erno Goldfinger [vii] points out that we are always in some way within architectural space, and can therefore never see all of it in front of our eyes. The space has to have certain qualities, such as enclosure, that allow us to build a concept of it in our mind, and only then can we comprehend it. Architectural space is not just perceived, it has to be conceived and we have to think about how the space responds to the inhabitant's urge to conceive it. Juhani Pallasmaa [viii] spotlights our privileging of the visual in architecture, particularly our valorization of central focused vision (which tends to create a separation between spectator and object) over peripheral vision (which locates us within space). We therefore tend toward the precise delineations of form that focused vision foregrounds rather than the gradations of texture and scale that peripheral vision relies on. [ix] We must value this holistic sensation of space to the inhabitant over the communication of an idea, thus foregrounding how space responds to the position and scale of the human body.

3. <u>Layering and Hierarchies:</u> Spaces should be layered in a hierarchy of scales so that the extent to which one conceives the space can vary depending on the mood of the inhabitant: if one is in an introverted mood the layer close by is taken as the limit, and an extroverted mood places the limit at a layer further away. It is possible to provide this richness and multiplicity of experience within very simple spatial structures.

4. <u>Stillness:</u> This occurs when the overall form and its details exhibit the same spirit, so that the same presence offers itself even if one's gaze or body is moving. When one looks at modern architects who have achieved this (to name some examples: Frank Lloyd Wright, Carlo Scarpa, Geoffrey Bawa, Tadao Ando) one finds that they are internationally acknowledged as masters, but unlike other masters they do not induce schools of followers or imitators. To achieve this quality one has to go through the rigour of first principles oneself; there are no "isms" or other shortcuts available.

5. <u>Extension</u>: As one is typically executing architecture through individual projects, this is a way of responding to the urge to wonder by setting up the boundary conditions of the project in a manner that demonstrates that it is not a thing in itself, but always unified with larger hierarchies of realms, scaling eventually to the level of infinity (typically depicted by nature and light). Some ways of depicting extension are:
   a. Vista: A long view to a larger realm.
   b. Interlock: A connection that sets up a set of connections to larger realms.
   c. Light: Highlighting the luminosity of light.
   d. Nature: Highlighting the rich presence of nature
   e. Depth: Using devices such as courtyards or pools to rescale the sense of depth

6. <u>The Aesthetic of Absorption:</u> It is egotistical to assume that meaning in architecture is a direct consequence of the architect's intentions. Meaning is a process that begins after the architect's job is over, and is primarily a product of the way in which architecture is inhabited, day after day, year after year. This inhabitation

breeds memories which make the place meaningful, and one has to design to facilitate a culture of inhabitation that leads to the building of memory. Given that this aesthetic power develops over time, we would call it an *aesthetic of absorption,* in contrast to the *aesthetic of expression* that is typically the obsession of architects. Yogic philosophy talks of the concept of *praana*: the energies (such as breath) that move through the body and bring it to life, without which the body is a lifeless shell. Inhabitation is to architecture what *praana* is to the body.

Teaching Wonder

Education is conventionally based on reason and explanation, and does not know how to deal with wonder given that it cannot be brought into the classroom in an explicitly documented form. Wonder is therefore considered idiosyncratic and lacking rigour. But if one shifts to experiential criteria of judgment, one finds that tacit phenomena are not so idiosyncratic. Christopher Alexander[x] describes an experiment where subjects are shown pairs of photographs. People who are asked which one of the pair they like give idiosyncratic responses. People who are asked which one *feels more like a part of you* lean overwhelmingly to one side of the pair. Another example is the knowledge of a famous pianist whose knowledge of music is purely tacit, yet is so tangible that it possesses commercial value: people are willing to pay substantive amounts to hear a performance or purchase recordings. Tacit phenomena can be shared, and the learning can be rigorous, but instead of relying on intellectual analysis will rely on experiences, and sharing will also be experiential. An educational structure that is based on the rigorous learning of wonder will seek:

1. <u>Humility:</u> One will have to break away from the mindset of conventional education which is founded on the personality-centric recognition of genius. Wonder requires an attitude of humility, seeing the subject of inquiry as an entity that is greater than any individual, believing that to express yourself is to use your body as a channel through which this greater entity can flow. [xi] Wonder is an act of submission of the ego to a greater truth. This is not to negate the idea of personality for to do so would be an error, but one must realize that to stop at the level of personality is an even greater error. [xii] What architects have to say about architecture becomes of less importance than cultivating the sensitivity that allows architecture to speak for itself, and the architect must see himself/herself as nothing more than a channel for this voice.

2. <u>Practice (Riyaaz):</u> The core of experiential learning will be a rigorous structure of experiential practice. Training in Indian classical music is based on the idea of *riyaaz:* a pattern of rigorous, immersive and repetitive practice.[xiii] Riyaaz, although it is repetitive, is to be differentiated from rote learning. Firstly it requires a concentrated awareness that immerses the student in the sounds being generated. But more importantly, although the rigorous repetition may initially feel overly pedantic, the student endures in the total faith that through this practice a journey is begun, somewhere further in this journey a greater truth will reveal itself, and the journey is validated by the source of joy that this revelation proves itself to be. Ramakant Gundecha, a renowned exponent of the *Dhrupad* tradition, states that a sound is transformed into a note by its position in the composition. [xiv] One may conceptually understand this position through understanding scales. But by repetitively experiencing the note greater levels of subtlety are revealed, the note positions itself with greater exactitude, till one day it hits the spot and the existence of the self, the note and the composition are unified into a single reality. Without riyaaz this would remain an abstract

process, limited in its expressive power with the self condemned to a distance. For an architect riyaaz may include the immersion in a site to the point where one is unified with the spirit of the place; to touch a material (like wood) often enough till its grain, texture and behavior feel like extensions of the body; or to meditatively immerse oneself in spaces often enough till one *feels* the connections between the scale of the body and the scale of the universe.

3. <u>Stillness, Subtlety, Intimacy:</u> Recognizing unity across the hierarchical levels of consciousness is like trying to look into deep water: if there is churn at any level vision is limited, but if every level is perfectly still one can see clearly from top to bottom. Similarly one cannot have churn at any level of consciousness, whether caused by continuous flitting from one thought to another, or through predetermined intellectual concepts or stories into which any experience is slotted so one does not attempt to look deeper. The mind has to be trained to be still (anyone who has attempted meditation will realise the difficulties encountered and the rigour required in this quest). Just as one may be trying to listen to a soft voice telling us something important but cannot do so because of a roaring din going on, the 'noise' of intellectualism can obstruct our ability to recognize the subtle dimensions of existence that are essential to exactitude. To achieve the intimacy of union between the self and these subtle dimensions of exactitude requires an investment in time (just like developing intimacy with a lover or friend). Eventually one realizes that one does not need to seek grand plans for grand ideas, and one has to develop the sensitivity to recognize the infinite in what is immediately adjacent.

4. <u>Reason:</u> Shifting the foundation from reason to experience does not mean that reason no longer has any role to play. Without the critique of reason, one can get trapped within subjectivity. The monistic Hindu philosophy of Advaita Vedanta speaks of a technique of *superimposition* and *denial*. Through reason one defines what is to be examined, and one then superimposes this against one's own experience to test its authenticity. What does not resonate with the voice within is to be denied and rejected. By repeatedly doing this, one develops the capacity to *discern* what is authentic. The problem with reason arises when we see it as an end in itself, seeking to make all judgment in terms of logical structures. But reason has an important role to play when it submits itself to the test of experience. Reason critiques experience and experience critiques reason, and through this conversation one develops the essential capacity for discernment.

5. <u>The Guru:</u> The word 'guru' means 'dispeller of darkness'. The teacher is not seen as an expert with a privileged relationship with knowledge, for the truth has an independent existence within each person. The teacher is that person who guides the student in how to lift the veil of darkness over his/her self to reveal the hitherto unperceived light that has always been shining within. But the guru plays another very important role. When beginning the practice that sets the student out on the journey towards enlightenment, a total faith is required to that revelation will occur further along the journey. The guru, having embarked on this journey far earlier and acquired a resultant level of visible mastery, helps to sustain the faith of the student by being a personal symbol of the light at the end of the tunnel. It is a rare student who can sustain this journey without the guidance of a guru. This means that the teacher cannot be a person who speaks to a room full of anonymouspeople: the relationship between the guru and disciple has to be intensely personal.

6. Conversations and Notations:

When one is sketching, during the development of a design concept, all logical thinking gets pushed into the background and sketching becomes an immersive practice relying on the tacit relationships between hand, eye, pencil and paper. Then one may put the pencil down, lean back; examine the sketch, and logical thinking surfaces in a reflection upon the sketch. This reflection provokes a new impulse to start sketching again. What is happening here is a conversation that develops between the sketch and oneself, and the sketch acts as a system of notation that allows this conversation to take place. Experiential learning thrives on these conversations, and needs the notation systems that facilitate them. Alan Colquhoun[xv] writes about how the Beaux-Arts school developed (for the first time in history) the idea of drawing as an elaborate system of notation in architecture, which in turn led to a new ability to reflect and theorize on architecture. Musical notation, which evolved around the same time, facilitated the emergence of more complex forms of music such as the symphony. Notation is a way of taking your experience out of yourself and placing it in front of you so that you (and others) may step back and reflect on it. This is crucial in any education system to ensure that one produces learning; recognizing that learning is not a process that slots neatly into instructional modules.[xvi] For architects, an underutilized form of notation is the portfolio. This is typically produced at the time of graduation and is a summary of learning and identity produced in order to seek a job or admission into a course of higher study. Unfortunately, it typically remains a one-off exercise, and could be a powerful tool if used as a form of notation that one is committed to for every year of one's life.

7. Spaces of Engagement: A system of learning that depends primarily on reason will construct spaces of engagement (such as the classroom, studio, or design practice) as vehicles for promoting the delivery of individual genius. It will foreground the question "What is my philosophy of architecture?" A system that depends primarily on wonder will rephrase this question as "How can architecture, as an entity that is greater than me, speak through me?" It will seek spaces of engagement that facilitate experience, practice and conversation. In such spaces, the lateral relationship between peers is important, so it will also raise the question "Who is my fellow seeker?" recognizing that the teacher is also a seeker.

8. Innocence: Innocence is a prerequisite to wonder; not in the connotation of naiveté, but in the ability to suspend all pre-condition, judgment and ideology to achieve the liberation of reveling in experience in its pure essence of being. This is different from the innocence of a child, as it involves a threshold that must be crossed. Ram Dass observes, *"Occasionally people show me their new babies and ask me if that peaceful innocence is not just like that of the Buddha. Probably not, I tell them, for within that baby reside all the latent seeds of worldly desire, just waiting to sprout as opportunity arises. On the other hand, the expression on the face of the Buddha, who had seen through the impermanence and suffering associated with such desires, reflects the invulnerability of true freedom."* [xvii] In supporting the student in crossing this threshold, the primary mission of education should shift from the certification of sophistication to the preservation of innocence.

Conclusion

I conclude with a quotation (that summarises the cause) from Kabir (1440 – 1518), the mystic poet from India:

You bury yourself in books and tomes,
And you drone on lecturing others.
You have not searched the palace within,
So if you die jabbering, who cares.

A subtle essence sounds within,
Why listen to the din outside.
You are deaf to what the music tells you.
The unstruck drum resounds.

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i   Charles Taylor, *The Ethics of Authenticity,* 11th ed., Cambridge, Massachusets, Harvard University Press, 2003

ii   Huston Smith, *Forgotten Truth: The Common Vision of the World's Religions,* Harper Collins, San Francisco, 1992

iii   Jeanette Winterson, *Art Objects: Essays in Ecstasy and Effrontery,* Vintage Books, London, 1996, p.136

iv   Michael Polanyi, *Transcendence and Self-Transcendence,* http://www.missouriwestern. edu/orgs/polanyi/mp-transcendence.htm

v.   Here too, the recognition of a hierarchy is of more importance than the precise delineation of the levels of the hierarchy

vi   Winterson, p.165

vii   Erno Goldfinger, *The Sensation of Space,* The Architectural Review, November, 1941

viii   Juhani Pallasmaa, *The Eyes of the Skin: Architecture and the Senses,* Wiley-Academy, Chichester, 2005

ix   Pallasmaa goes on to delineate how all our senses play an important role in our experience of architecture. In its over valuation of vision, architecture as a discipline has typically not taken this holistic perspective which would be crucial to a proper understanding of the sensation of space.

x   Christopher Alexander, The Nature of Order: An Essay on the Art of Building and the Nature of the Universe; Book One: The Phenomenon of Life, The Centre for Environmental Structure, Berkeley, 2002

xi   All creative expression arises from this sense of flow. For a detailed study see: Mihaly Csikszentmihalyi, *Flow: The Psychology of Optimal Experience,* Harper & Row, New York, 1990

xii   For an elaboration of this theme see: Soetsu Yanagi, *The Unknown Craftsman:* A Japanese Insight into Beauty, Kodansha International, Tokyo, 1989

xiii   This is not to say that training in other traditions of classical music is not based on this idea of practice. I will confine my remarks to the Indian tradition here solely because that is the tradition with which I have the greatest familiarity.

xiv   Ramakant Gundecha   ध्वनी स्वर और राग (*Dhvani, Svar aur Raag),* Unpublished essay, 2009, trans. Tara Kini

xv   Alan Colquhoun, *The Beaux-Arts Plan in Essays in Architectural Criticism: Modern Architecture and Historical Change,* MIT Press, Cambridge, 1981, pp. 161-168

xvi   For a detailed exposition on learning versus instruction see: John Tagg, *The Learning Paradigm College,* Anker Publishing, San Francisco, 2003

xvii   Ram Dass, *Foreword to:* Duane Elgin, *Voluntary Simplicity,* 2nd ed., Harper, New York, 2010, p.xix

PANEL OF REVIEWERS