6th International Forum on Engineering Education 2012 (IFEE 2012)

Tutor-Based Approach toward Sustainable Architecture Education

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Abstract

A teaching expert is a valuable asset to any educational institution. These experts are invaluable not only in developing the specific fields of knowledge but also invaluable to other institutions that require their services. Thus, each educator and teacher must strive their utmost to better themselves in their specific field of expertise as well as in other knowledge to reinvent themselves and be able to look at their knowledge in a more meaningful and dynamic fashion and not stick to the same views all the time. But there is tendency to a belief among practitioners that who has some experience in architecture is fully equipped for teaching. This paper discusses the importance of tutor training in architecture education.

Keywords: Architecture education; tutor training; Rasch measurement.

1. Introduction

Architecture is a multidisciplinary field of study that draws on the arts, science and social sciences. The aim in educating architects is seen as developing the imaginative, conceptual and practical skills necessary for students to identify human needs and aspirations, and to be able to meet or express these in space and form. Donald Schon asserts that these defining of abilities can be called ‘thinking like an architect’. It would be students’ capacity to see unfamiliar situations as familiar ones, and bring their past experience to bear on the unique case. The design tutor is to develop these abilities. The crit or project review is a form of teaching to which schools of architecture have subscribed for decades, and this historical continuity would seem to suggest that in the past it has been a successful mode of transmitting the knowledge and skills of the architect to the next generation of the profession but continuity of a social institution may reflect more than functional effectiveness.

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Much of the knowledge and skill inherent in good design tutoring remains tacit, in the sense identified generally by [1] and delineated in the design studio by [2]. This is an unwritten norm that says learning can take place in the job. But learning in tutors’ position in the meaning of gaining experience is good but in case of try and error would be crucial. On the other hand there is a belief among practitioners [3] that they assume that who has some experience in architecture is fully equipped for teaching. Moreover, much of the actual practice of design teaching takes place in the relative privacy of the design studio. Many aspects of design teaching thus remain barely articulated. Teachers frequently hold on to the old ways, the proven methods, and the tested techniques. And yet if they do not adopt both in terms of course content and teaching, it is likely that graduates will not acquire the range of skills required of today’s professionals, whilst academic staff will wear themselves out using old techniques in new situations. In order to cope with the knowledge explosion and the rapid rate of change in society, architects like other professions need to develop the habit of monitoring, evaluating and managing their own learning and of learning from practical experience.

Higher education in general and schools of architecture in particular have witnessed considerable change over decades. Most have increased their student intake and reduced the number of tutors and are trying to retain the same academic standards in a much shorter academic year. Modularization has led to further fragmentation of integrated subjects such as architecture. It has also required teaching to become much more quantifiable and emphasis learning processes rather than teaching input. Traditionally this has involved one to one tuition, which many schools can now ill afford. The design focus is self absorbing and time consuming and its evaluation involves assessing the designed artifact rather than the student’s academic progress. Teachers are expected to reduce students contact time in order to maintain a cost effective staff-student regime. This climate of change in higher education has produced particular difficulties for design courses such as architecture. Most teachers in schools of architecture have not received formal teacher training. They generally come straight from practice and tend to replicate their own student experience whilst learning on the job, and therefore tend to lack understanding of the theory of educational processes; this makes it difficult for them to be objective about defining explicit teaching and learning outcomes within the holistic teaching environment. The tutors have the explicit responsibility of advancing the art of architecture in their own way, as well as developing the potential of each student for whom they are responsible. Thus they must have an architectural agenda as well as an educational one. Yet none of them is trained as a teacher, they could perhaps have relied on memories of their own education than called hit-and-miss the tutoring. Mumford describes negative capability in the learning process is the ability to allow people to learn on the job from their mistakes in both academic environment and the work place. Since education of art and architecture are sophisticated and they are completely based on tutor and students, and the studio culture is seen as sacrosanct and central to learning by the act of practicing design buildings, tutors and instructors should fully prepare for this position. While much has been written about the education of architects [2, 4-6], relatively little has been said about the preparation of teachers of architecture. There are many holistic problems statements and suggestions, but there were no measurement tool to monitor this problem and some executive suggestions. The main target of this paper is to monitor and evaluate tutor’s performance in jury sessions, as the key member of design studio and assessment sessions, and to show the necessity of preparation for volunteers of joining to academic as in part time or full time tutors.

So in the first, phase this paper will explain about the tutor role in design studio then by introducing universiti Kebangsaan Malaysia and second year design studio as case study and Rasch measurement model and mini facet software will analyze the tutor’s performance. Modelling demonstrates this claim that young tutors with less experience and part time academics needs to be have some formal training to gain experience. Graduations from architecture degree or having practical experiences separately are not enough to make one a studio masters. This paper also will present some recommendations on some learning workshops and supportive workshops to prepare creative architecture tutors.
2. The Role of Tutor in Architecture Education

The aim in educating architects is seen as developing the imaginative, conceptual and practical skills necessary for students to identify human needs and aspirations, and to be able to meet or express these in space and form [7]. Donald Schon asserts that these defining of abilities can be called ‘thinking like an architect’. It would be students’ capacity to see unfamiliar situations as familiar ones, and bring their past experience to bear on the unique case. The design tutor is to develop these abilities. It should be part of students’ capacity to see-as and do-as that allows us to have a feel for problems that do not fit existing rules. Moreover, each new experience of reflection- in action enriches his repertoire. Seeing – as is not enough, however. When a practitioner sees a new situation as some element of his repertoire, he gets a new way of seeing it and a new possibility for action in it, but the adequacy and utility of his new view must still be discovered in action. Reflection in action necessarily involves experiment. Students would be expected to acquire the material by reading, listening and watching, familiarizing themselves with examples of practice problems matched to appropriate categories of theory and technique. Coaching would consist in observing student performance, detecting errors of application, pointing our correct responses [2,4]. It is in the nature of the studio principle for the tutor to be exploring unknown territory with the students for whom he is responsible [8]. Much of the knowledge and skill inherent in good design tutoring remains tacit, in the sense identified generally by [1] and delineated in the design studio by [2]. Moreover, much of the actual practice of design teaching takes place in the relative privacy of the design studio. Many aspects of design teaching thus remain barely articulated. Assessment and grading of students’ projects is another role of tutors and academics. In any discussion about the jury in architectural education we quickly find how slippery the object of scrutiny is. As Crooks [9] notes, assessment guides students’ judgment of what is important to learn, affects their motivation and self-perceptions of competence, structures their approaches to and timing of personal study and affects the development of enduring learning strategies and skills’. There are different assessment method and grading models that designed and implemented by pioneer universities in architecture education and followed by other universities around the world. Step by step by improving the definition of education and assessment these models have improved and changed. One of these systems is comparative method. In this appraisal model the student’s projects will compare with each other. In fact jurors or the related tutors that are going to give marks in submission day, judge the quality of projects holistically then they rank the projects. Grades follow in descending form best project to worth one. Comparing students with each other is unfair, because students are from different backgrounds and talents [10]. Students deserve to be graded on the basis of the quality of their work alone, uncontaminated by reference to how other students in the studio perform on the same or equivalent tasks, and without regard to each student’s previous level of performance [11]. In comparative system, the holistically attitude to the projects judgment leads to neglect Student’s Creativity and abilities in some contexts. Students can’t be aware of their weak and strong points and by this way they can’t do any effort to increase their marks and just lucky students who are skillful in graphic design are able to impact jurors for better grades. On the other hand making pair-wise comparisons just among small set of students submissions is possible. It will be very difficult in large amount of projects and students. In recent years, universities have made explicit overtures towards criteria-based grading and reporting. Under these models, grades are required to evaluate student’s achievement in fulfilling juror’s expectations. These expectations can be explain in different form. We name these expectations as course objectives. The objectives are assumed to provide the basis for the criteria, but exactly what the criteria are is in essence left undefined [11]. These objectives should be known by instructors, students and especially external jurors. Because invited jurors have their certain tendency and assumed objectives that would be the base of their grading. This incoherency may lead to variant in given marks by different instructors and students dissatisfaction.
3. Case study and Research Method

According to [12], academic excellence is student’s achievements which are based on university’s assessments such as test, assignment, presentation, final exam and etc. Assessment should reflect these understandings by employing a diverse array of methods, including those that call for actual performance, using them over time so as to reveal change, growth, and increasing degrees of integration. Such an approach aims for a more complete and accurate picture of learning, and therefore firmer bases for improving our students' educational experience [13]. To monitor and evaluate how the tutors’ performance and their consistency is in jury sessions, architecture department of Universiti Kebangsaan Malaysia and second year design studio has chosen as case study. The reason to choose second year architecture students is that in this step they are not expert enough in managing their project base on critique and receiving and giving comments. In this step they are trying to make experiences by iterating their design process under supervision of their studio masters. First and third year students perceive the review as a sound forum for promoting and learning about the client and user issues, though second year students tended to become more skeptical and tutor role would be more crucial relatively. Final submission of the third project which was designing a medium size building in a dense urban context has chosen. 23 students were presented their designed projects to the jurors. The students were using Auto cad and Archi Cad to present their design. Before the submission day students have been informed about the objectives of the projects and assessment tasks which are going to be assessed by jurors. Also an evaluation sheet has been prepared for all the jurors that were containing the objectives and criteria for the assessment. The defined evaluation sheet for this submission day was included 3 main criteria which were included oral and graphic presentation, design development, and model. Each of these has defined into different tasks for marking. The tasks are as below:

a) Oral and graphic presentation:
   - Attire and composition
   - How clear the information is
   - Focus and explanation

b) Design development:
   - Study on architectural language and understanding of the issue
   - Understanding of the precedent study
   - Concept and idea development
   - Design approaches
   - Respond to the site
   - Spaces and spatial integration
   - Completeness of drawings (sketches and technical drawing)
   - Building proportion, scale, texture, colour, and how it is composed

c) Model
   - Completeness of the model
   - Detail of the model, proportion, scale, texture and colour
   - The use of materials, finishing and detailing

The importance of each objective and task also has defined by percentage and level of satisfaction of jurors in each task was defined from fail, poor, average, good to excellent. Four jurors were attending in submission day 4 jurors were attended one of them were PhD holder with more than 10 years experience, the other one was a senior lecturer with more than 15 years experience in practice and academics, and two young lecturers with 3 years and 1 year experience respectively. Before starting the jury session, they had a meeting with master of the
studio and discussed about the project and objectives in detail and each of the jurors received 23 evaluation form. Each student has given 10 to 15 minutes to explain his idea and the development process and planning details. After that jurors got time to ask questions and give comments. Finally the evaluation forms were collected from all jurors to be the base of total mark to students.

3.1 Rasch measurement model and mini Facet Software

Item Response Theory (IRT) has been developed in recent years to overcome some of the problems and assumptions associated with Classical Test Theory (CTT) and to provide information for decision-making that is not available through CTT. IRT does not require assumptions about sampling or normal distributions, which makes it ideal for performance assessment with different item structures. It also does not require that measurement error be considered the same for all persons taking a test. Rasch analysis often provides for a lot of information not available through CTT. The Rasch model assumes an underlying construct (the INTASC principles in this case), as opposed to an exploratory method such as factor analysis. IRT allows users to create an interval scale of scores for both the difficulty of items and the ability of the persons tested. These scores are reported in units called logits and are typically placed on a vertical ruler called a logistic ruler. Just like a yardstick measures length in inches, the logistic ruler measures persons’ ability on one side of the ruler and item difficulty on the other in logits. Just as two inches are twice as long as one inch; two logits are twice as big as one logit. An item with a logit score of 10 is twice as difficult as an item with a logit score of 5. A person with a logit score of 50 has five times the ability as a person with a logit score of 10. This is different from other scores like percentile ranks, where we cannot say that a person at the 50th percentile has twice as much ability as a person at the 25th percentile. Because logits can be added, subtracted, multiplied and divided comparisons and statistical studies can be made which again makes it useful for educational gains, displays of strengths and weaknesses, and comparisons of demographic groups. (Statsoft Inc 2011). Three IRT models are available. The simplest and most efficient one for this application is called the Rasch (or one parameter) model. Use of the Rasch model provides evidence of both the validity and the reliability of the test or scale. The Rasch model uses mathematical formulas to calculate the probability that a person will get an item correct and that an item will be answered correctly by a person. When the probabilities are very different from what actually occurs, the results show that the data do not fit the expectations of the mathematical model. It does this through the use of fit statistics. There are two fit statistics – infit and outfit. Outfit statistics are more sensitive to extreme scores. High infit statistics, therefore, are a little more problematic than high outfit statistics. In analyzing Rasch data, users typically are concerned when the mean square (MNSQ) fit statistics exceed 1.5, it means the higher statistic, the more questionable the information. Through the use of fit statistics, the Rasch model helps the user identify any items that are not fitting the model (thereby decreasing both the validity and reliability of the test), and any candidate whose scores do not appear to be consistent with the model. In this latter instance, the user is able to identify test takers who were anxious or who were not measured fairly. The user can also identify items which are more difficult than others, thereby allowing users to modify teaching to improve performance. The development of Rasch Measurement Model in social science educational measurement has rapidly expanded to other areas of education including technical and engineering fields. And the problem can be solved with use of Rasch measurement model in architecture too. Rasch moves the concept of reliability from establishing ‘best fit line’ of the data into producing reliable repeatable measurement instrument [14] This measurement model uses empirical data directly from the lecturer’s assessment on student for a given task and transformed them into logic scale which have equal interval [15]. Rasch analysis can be applied to assessments in a wide range of disciplines, including health studies, education, psychology, marketing, economics and social sciences. Rasch models are used for analyzing data from assessments to measure variables such as abilities, attitudes, and personality traits. For example, they may be used to estimate a student's reading ability from answers to questions on a reading assessment. Rasch models are particularly used in psychometrics, the field concerned with the theory and technique of psychological and educational measurement. Analyzing data according to the Rasch model, that is,
conducting a Rasch analysis, gives a range of details for checking whether or not adding the scores is justified in the data. This is called the test of fit between the data and the model [16]. In this thesis to evaluate the data from the studio we used Mini Facet software. The key in data has tabulated base on each student with different jury. So 1302 digit have had key in to the software.

4. Findings

To monitor tutors’ performance, statistical analysis has done and the results are reveals in figures below. Figure 1 shows that teacher3 is the strictest assessor among the other teachers since Teacher3 logit measure is at 3.17logit. And the next logit measure is only at 1.39logit, a difference of 1.78logit. Teacher4 is the most lenient among them all with logit at 0.96 measures. However further scrutiny, reveals that Teacher4 has Z-Std or high negative residual. Teacher4 under-rate easy criteria, and over-rate on difficult criteria.

![Fig. 1. Teachers Measurement Report](image)

Teacher one rated student twelve, on item D1 with a ‘2’ but in actual teacher one is expected to give student twelve a ‘3.7’ or ‘4’. Similarly, teacher one rated student18 on item D6 a ‘4’ however teacher1 is expected to rate student18 a ‘1.9’ or ‘2’.Teacher2 rated student1 on item M1 a ‘1’, but teacher two is expected (calculated by Rasch) to rate student1 a ‘2.7’ or ‘3’. In the tutor performance Rasch also confirms the concerns. As figure 3 shows teacher three with minimum experience and degree among other tutors has more unexpected marks and teacher number two which was the studio master with degree and experience has no unexpected marks and judgment.

![Fig. 2. Unexpected Responses by tutors](image)
Fig. 3 shows the results of all facet vertical rulers. The first column includes measurement values which have calculated by the software. The next columns include teachers, students, criteria and scales, respectively. Distributions of students in getting marks in different criteria by different teachers are shown by the star icons. It is observable that the measurement values of the teacher 1, teacher 2 and teacher 4 are close to each other while the measurement value of the teacher 3 is more than other teachers. Giving criteria in the brief would have an important influence on the form of questioning, but in tutors’ and jurors’ responses their first consideration was the strength and weakness of the students’ design. The tutors and members of jury have their own preference and priorities, and would tend to bias their questioning to accommodate these personal interests.

The obvious thing here is subjectivity of jurors attributed to personal preferences due to understanding and experience in certain domains and weakness in other. This contributes to other problems such as:

a) Lack of transparency in grading.

b) Fixation on certain design issues while ignoring or simplifying other design issue that leads to boring and repeated discussion.

c) Weakness towards strong presentation versus commitment to design standards and program requirements

d) Hidden agendas among jurors.

e) All these make the idea of tutor training, having more discussion session among invited jurors before holding submission session and explain the jurors about the objectives and expectations.
5. Recommendation

A study [17] has shown that in order to develop successful work-based learning, old prejudices must be set aside and new understanding and skills required. Instructors will need to be trained to understand and operate these programs, develop new teaching strategies and provide clear support documentation. Students need to be adequately supported in work-based learning. By developing learning contracts, students become independent learners and managers of their own educational process. This is the best way to create lifelong learners. One way which is implementing in some universities around the world is inducting inexperienced teacher by twinning in the unit with a more experienced teacher who, in an informal way, acted as a mentor. The new teacher then shared responsibility for the unit for at least a year, during which time he or she would experience the full round of the academic year, from the confusion of the introductory projects, through the doldrums of early spring, to fruition in the final portfolio. Only then would he or she go on to set up a new unit of his or her own. Such twinning can benefit the mentor as much as the mentee. It is a way of bringing new ideas into the school. Part-time tutors have expressed their enthusiasm for and enjoyment of being part of the studio team, and this has attracted some particularly bright and able young practitioners. They feel that working with a studio master across years is an invaluable experience and gives them good educational experience of many tutoring techniques. The other way is setting up workshops with aim of enabling practicing architects to become reflective studio teachers, able to define their educational aims, choose appropriate methods, implement a program, and reflect on what has been achieved, with a view to refining their practice in the light of experience. Such workshops are holding in some British Universities like UEL (University of East London). In these workshops trainees attend one day a week for one year. In the first semester the trainees observe what is happening in the unit; the first obligation of the trainee, to observe, is not that easy. Trainees find it hard to hold back from action and only gradually recognize that it is an unusual privilege simply to be present. What happens in the studio will not be perfect and may sometimes be chaotic, but it is what students in the school are experiencing as their education. In the second they contribute under supervision to the teaching; and the third term they take more responsibility. At the end of the course they produce a proposal for a unit of their own. In many ways the course is modeled on the studio principle of the unit, with trainees and their teachers wrestling with the question” How should we teach architecture?” As in an architectural design, it involves a movement from analysis to proposition. Because of the many tacit elements in design studio teaching, this is not simple question of transmitting received wisdom. With the intention that trainees should have the opportunity to develop their own ideas about teaching on the basis of this experience the most fruitful educational problems are open-ended and teachers do not know all the answers. The program relies heavily on experiential learning. In the first semester each trainee presents one paper reflecting on his or her own education and another on some significant event he or she has observed in the students’ experience in the unit. During the second term the focus is on contextualizing the teaching of architecture within current models of professional knowledge and theories of learning in higher education: the trainees write a paper discussing a particular text and a second paper reflecting on students’ experience of crits and reviews. As teachers frequently hold on to the old teaching ways, the proven methods and the tested techniques and yet if they do not adopt both in terms of course content and teaching, it is likely that graduates will not acquire the range of skills required of today’s professionals, whilst academic staff will wear themselves out using old techniques in new situations. In these workshops each individual tutor will bring her or his own personality and flavor to the student’s learning experience through the studio. Important to achieving parity whilst maintaining variety id the recent development of clear guidelines on assessment criteria being made available to the students, as well as written feedback on reviews. Tutors are becoming more confident about developing their own new methods for studio teaching. There is more discussion about studio teaching methods, and two studios often join together to develop new methods. At the weekly lunches, studio masters who are less successful have perceived the need to change and are generally supported and helped by more confident colleagues.
6. Conclusion

Learning from faults at the job in terms of gaining experience is completely acceptable and is a positive part of each project but in case of education would be a concern. Since it is the nature of artistic fields like architecture and each project is unique to itself and each student and his background, talent is unique to itself so the master of the studio needs to be prepared for this sophisticated challenge before entering to the class and also need support in further steps and years. Young tutors and Part time instructors would express enthusiasm and enjoyment of being part of the studio team, and this has attracted some particularly bright and able young practitioners. Part time tutors may feel that working with a studio master across years is an invaluable experience that gives them good educational experience of many tutoring techniques. The skills which are required to teach successfully cannot be acquired in the context of practice. Teaching is a separate order of things, tied to practice certainly, but by analogy, not by stricture. It may be that some colleagues in architecture fear that any form of training might stifle the creative spirit of design tutoring, leading to mediocrity and uniformity. Exchange of idea and experience among senior lecturers and the tutors with more practical lectures can produce fertile base to improve architecture education and having more creative education in architecture filed. In this way teaching can, of course, be a very effective kind of learning. Taking different roles produces different learning.

References