TEACHING, ASSESSMENT AND QUALITY IN ARCHITECTURAL TEACHING

PAULA FEMENIAS[*]

Department of Architecture, Chalmers University of Technology

E-mail: femenias@chalmers.se

The paper presents a shorter project with the aim to enhance the quality of courses and design studios on the master level at Chalmers Architecture through constructive alignment. The intention was to carry out the project as action research and the examiners were involved in detecting weaknesses and working out improvement. The results show that there are weaknesses in course descriptions regarding aims and learning objectives which can be improved by the use of recommendations based on constructive alignment and Bloom's taxonomy. The project has also detected the need for further discussions among examiners about assessment of learning outcomes and grading and how to make these more tangible for students.

Keywords: architectural teaching, learning assessment, quality enhancement.

INTRODUCTION

Architecture as a field of knowledge is very complex, embracing technical, natural, social and cultural aspects. In architecture, artistic values, function and form need to be combined with economic restraints, safety, accessibility, disaster prevention and current building practices, just to mention a few factors. What is central in architectural practice is the ability to embrace all different aspects of the built environment in a design solution. As a consequence, teaching in architecture is to a high extent project-based and carried out in design studios.

Since the start of the introduction of the Bologna model, teaching at the Department of Architecture is undergoing changes. The new master programmes attract students from abroad and also student students from civil engineering. The new master programmes also involve degrees in grades from 1 to 5, where up to now, only passed/not passed were the examination criteria in architectural courses and studios. In addition, pedagogy and quality aspects on teaching and learning are currently stressed to a higher extent than previously. Several initiatives to prepare the organisation and its teachers for these changes have been initiated.

This paper presents the results from a shorter IMPACT project with the aim to enhance the quality of courses and design studios at master level at Chalmers Architecture. IMPACT was a strategic investment from Chalmers University of Technology Foundation to support the Bologna model introduction at Chalmers 2007 – 2009. The specific objective for the project which addressed courses and design studios at the master programmes at the Department of Architecture was to strengthen the constructive alignment in course descriptions. The intention was to carry out the project as an action research project, involving the examiners in detecting weaknesses and working out improvement for the new course descriptions for the academic year 2010 – 2011. The project was carried out for approximately one month in the autumn of 2009.

At present, two master programmes are given at Chalmers Architecture: 'Architecture', and 'Design for Sustainable Development'. The motivation for the IMPACT project was that

present project descriptions for courses and design studies need improvement. Many course descriptions are not clearly written, and they lack clear learning objectives:

- A majority of the course descriptions present aims and scopes that are too wide.

- In some cases, the descriptions give similar or partly similar aims as other courses in the same program. In addition, it is often difficult to distinguish different parts of the courses from each other.

- The learning objectives that are described do not support the assessment presented.

Many of the project descriptions are vague and lacking in precision of learning objectives and contents. Problems arise if the responsible teachers and examiners are absent for shorter or longer periods and other teachers have to give the course. The vague learning objectives also make it difficult to make the best use of course evaluations in order to improve the course for next year. It is difficult to evaluate which of the comments in the project evaluations are relevant.

The general aim of the project is to support a continuous process to enhance the quality of the courses and design studios in Chalmers Architecture master level programmes. The specific aims have been to:

1. Produce enhanced project descriptions for the compulsory courses/design studios in collaboration with the examiners for the academic year 2010/2011.

2. Write a short report with conclusions and a number of guidelines for examiners/teachers in order to support the process of defining learning objectives, learning outcomes and examination criteria in coming years.

METHOD AND APPROACH

The study is qualitative, based on literature studies and empirical studies. It has an action research approach as the aim is to produce change. The anticipated actionable knowledge is to be developed in collaboration with the users and the involved examiners as a means to ensure up-take of results [1].

The first phase of the project involved literature studies focusing on constructive alignment and assessment in architectural teaching. A limited scan was made on how assessment of architectural teaching is carried out at other architecture schools in Sweden and a few other countries (The Netherlands and UK). This search focused on the search for course descriptions which were published on the webpages of the different schools. Through contact with former colleagues at Delft University of Technology and The University of the West of England, Bristol, I could have more detailed information of their assessment methods in use.

In a second phase, the course descriptions published at the 'Studentportalen' were reviewed using theory from the literature studies. An interview guide was set up with some common and some individual questions to examiners. In total, 16 examiners at Chalmers Architecture responsible for in total 21 compulsory courses and design studios during the academic years 2009/2010 were interviewed. One examiner declined to be part of the project. Notes were taken during the interviews that lasted about 1 hour each. During this phase the project was presented.

In the third phase, proposals for improved course descriptions were made. The proposals were sent to the examiners with encouragements to improve the descriptions.

During the academic year 2009 – 2010, I took part in the pedagogical course for University Teachers called "The pedagogical project". This IMPACT project was used as a pedagogical development project in that course. Valuable comments on my work were then given at several occasions by Professor Michael Christie as well as fellow colleagues taking part in that course.

PEDAGAGICAL CONSIDERATIONS – CONSTRUCTIVE ALIGNMENT AND ACTION VERBS

Two main pedagogical concepts have been very useful for this project: Biggs' Constructive alignment [2] and Bloom's taxonomy with action verbs [3], [4]. These concepts have been used by Högskoleverket in their 'Quality evaluation for learning' report 2008:25 [5]. The presentation by Högskoleverket is very useful and will be recommended to teachers and examiners at the master programmes in Architecture.

Constructive alignment starts with the notion that the student constructs her/his own learning through relevant learning activities. The teachers should create a learning environment to support that process. The key is that all components in what Biggs calls the teaching system: the intended outcomes, the teaching methods used and the assessment tasks are aligned.

Biggs and Tang [2] describe four major steps in constructive alignment:

1. Defining the Intended Learning Outcomes (ILOs)

2. Choosing teaching/learning activities likely to lead to the ILOs

3. Assessing students' actual learning outcomes in relation to intentions
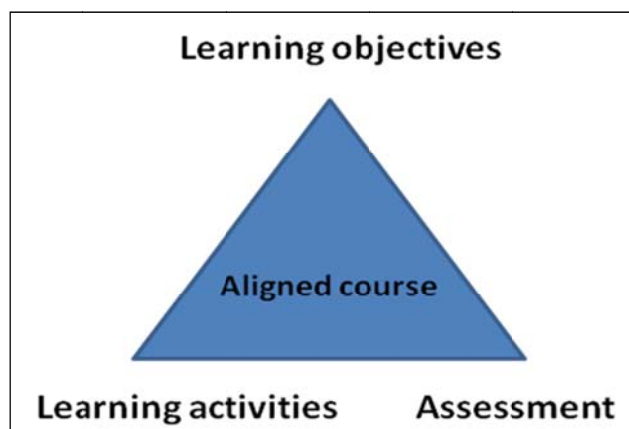
4. Arriving at a final grade

Fig.1. Constructive alignment after Biggs and Tang (2007).

Högskoleverket [5] points to the importance of grade systems and assessment criteria. They have identified four indicators to assess the learning progression:

- Are the objectives in the description of the exam covered by the learning outcomes of the course?

- Are the learning objectives possible to assess in an examination?

- Are the forms of examination and assignment in the examination relevant for the learning objectives?

- Are there specific grade criteria and are these available for the students?

Högskoleverket [5] also has some recommendations regarding assessment criteria for learning objectives:

- They should be clearly written and easy for the student to understand.

- They should describe one objective at the time

- They should describe results not processes

- They should describe the contents of the course

- They should describe tangible use of knowledge

- They should be written using action verbs

Example: "After the completed course the student should have knowledge about, know, have insights about, comprehend…" This is NOT tangible use of knowledge. Instead action verbs should be used to describe learning outcomes.

Bloom originally defined the action verbs in the 1950s [3]. The taxonomy deals with the varied aspects of human learning and is arranged hierarchically proceeding from the simplest functions to those that are more complex.

- **Knowledge** (remembering or retrieving previously learned material): arrange, define, duplicate, label, list, memorize, name, order, recognize, relate, recall, repeat, reproduce state;

- **Comprehension** (ability to grasp or construct meaning from material): classify, describe, discuss, explain, express, identify, indicate, locate, recognize, report, restate, review, select, translate;

- **Application** (ability to use learned material, or to implement material in new and concrete situations): apply, choose, demonstrate, dramatize, employ, illustrate, interpret, operate, practice, schedule, sketch, solve, use, write;

- **Analysis** (ability to break down or distinguish the parts of material into its components so that its organizational structure may be better understood): analyze, appraise, calculate, categorize, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question, test;

- **Synthesis** (ability to put parts together to form a coherent or unique new whole): arrange, assemble, collect, compose, construct, create, design, develop, formulate, manage, organize, plan, prepare, propose, set up, write;

- **Evaluation** (ability to judge, check, and even critique the value of material for a given purpose): appraise, argue, assess, attach, choose compare, defend estimate, judge, predict, rate, core, select, support, value, evaluate.

The taxonomy by Blooms has since been used and modified and up-dated for example by Andersson and Krathwohl [4] with the intention to make the action verbs more useful and comprehensive (Fig. 2.).
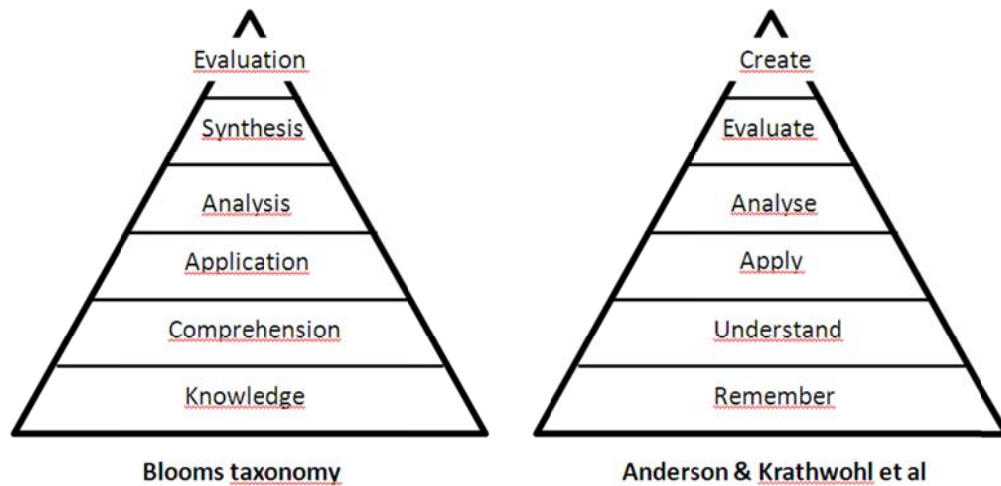
Fig.2. Action verbs according to Bloom [3] and further elaborated by Andersson and Krathwohl *et al* [4].

Biggs and Tang have further developed the taxonomy into the SOLO taxonomy for teaching and learning [2]. SOLO stands for: Structure of Observed Learning Outcomes. SOLO describes levels of increasing complexity in a student's understanding of a subject, through five stages, and it is claimed to be applicable to any subject area. The first level is Pre-structural – students are simply acquiring bits of unconnected information, which have no organization, and which do not really make any sense. The second level, the unistructural – the student makes simple and obvious connections, but their significance is not grasped. The third level, the multistructural – a number of connections may be made by the student, but the meta-connections between them are missed, as is their significance for the whole. The fourth level, the relational level – the student is able to appreciate the significance of the parts in relation to the whole. Finally, at the fifth level, the extended abstract level, the student is making connections not only within the given subject area, but also beyond it, able to generalise and transfer the principles and ideas underlying the specific instance.

According to Simons [6], teaching in natural sciences differs from engineering as natural sciences are descriptive while engineering includes synthesis and creation. Accordingly, teaching in architecture and engineering should attain the highest levels of Bloom's taxonomy and the SOLO-model.

METHODS IN ARCHITECTURAL TEACHING

Due to the nature of architectural knowledge teaching in architecture normally differs from other engineering teaching [7]. Teaching is carried out in courses but also in studios where the students have to define, refine and solve design assignments. The ideas developed by Schön [8] on the reflective practitioner are often used in design theory. An important part of the learning situation for professionals is by Schön defined as learning-in-action. In architectural teaching tutorial sessions and studies of earlier examples and processes of design are important elements.

Normally, courses and design studios in architectural teaching are not assessed through written exams but through assessment and judgment of a design assignment. This is a rather subjective process and the judgment is much dependent on the ability and experience (and also preferences) of the jurors. With the introduction of the Bologna model and the internationalisation of the teaching, grades should now be given in the same way as at the rest of Chalmers from 1-5. To date, there exist no common guidelines for the assessment and grading of architectural learning outcomes at Chalmers. There are normally two paths of assessment of acquired skills in architecture, the assessment of progression in the student's portfolio and the testing within separate courses and studios [9]. Architecture students should also learn the skills of critical appraisal and evaluation of their own and other students' and architects' designs, since self-assessments and peer-assessments are often used.

A literature search on assessment of architectural learning outcomes was carried out but did not result in many hits. Most articles found dealt with development and assessment of design skills in engineering [10] and product design [11] courses. A few dealt with assessment of architectural teaching and were from the Netherlands. Wolffe et al [9] reflect upon the issue of assessment of separate courses. They emphasise transparency, reliability and possibilities for comparisons between assessments as well as the acceptability of the assessment methods among users. I did not find any articles explicitly dealing with the problem of constructive alignment or definition of systematic assessment criteria in architectural teaching.

As a complement to the literature search, a limited scan was made of methods used in architectural teaching and assessment outside Chalmers. The methods for the scan were a literature search and a scan using the web pages of other architecture schools in Sweden and also Delft University of Technology in the Netherlands and University of the West of England in the UK.

Very limited information could be retrieved from the web pages of the searched architecture schools. I then decided to contact former colleagues at Delft and UWE to get further information. At UWE no information of an existing common system for assessment of architectural competences could be found. At Delft, common systems for the assessment of architectural courses exist, on a Faculty level and specially adapted assessment systems for different departments. The Dutch models are kinds of a questionnaire defining both product and process criteria for learning outcomes. I have not further discussed this with Delft but the models seem applicable on writing courses more than design studios. For example they assess methods, literature references, problem definition and layout.

At a conference I met with a teacher at the School of Architecture at Victoria University of Wellington, New Zealand. Pedersen-Zari has developed an interesting and systematic way of assessing and giving grades [12]. In her systematic assessment for a course in bio-inspired sustainable design she has defined on the one side how many percent of the total grade and on the other hand which weight in terms of importance that each sub-assignment has of the total grade. Then she has four different levels ranking from excellent to unsatisfactory. What specifically is assessed is the students' ability to: identify and document systems and suggest changes based on an understanding of ecosystems; ability to research living organisms and translate them into design; assessed from the information given at a certain date; a submitted report; and the tutor's knowledge of the evolution of the project. Further, the project will be assessed for its potential to intervene with a system, its ability to communicate intention, the ingenuity and the inventiveness.

ANALYSIS OF MASTER COURSES AND STUDIOS DESCRIPTIONS

Aims and learning objectives

The initial analysis of the written course descriptions showed that the majority are either too little described or over-loaded with information. Either there is non-existent use of tangible knowledge [5] or an over-use, where the whole taxonomy from the lowest to the highest level is involved in one learning objective. Högskoleverket recommends that only one goal should be described at the time. In general very wide and encompassing aims and learning objectives are described.

Examples of unclear objectives and non-use of tangible knowledge:

"Understand the background to the political and global vision of sustainable development, the different challenges and perspectives and how this may influence their professional work."

"Describe the Nordic architecture and town planning from the 1930s till today"

Example of 'over-use' of tangible knowledge and action verbs:

"*The social and institutional environment*: Recognize, explain, examine, analyse the social and institutional environment in a suburban area - i.e. focusing on the people living there and the people working/being active there – and on concepts in the field of sociology such as urbanisation, globalisation, governance, social exclusion, ethnicity, cultural studies, segregation, security, safety, etcetera.

The physical environment: recognize, identify, classify and explain the construction of the million programme, i.e. the planning as well as the infrastructure, the building construction and building materials. Illustrate, examine and analyse the planning and/or building constructions. Appraise, assess, value and create new planning and/or building constructions.

Participative tools and methods: ….[this goes on]."

A good example of learning objectives showing a systematic use of Bloom's taxonomy, starting from simple and reaching higher levels of application, and clearly stating one objective at the time is the following:

1. Explain systems thinking and its relevance for design, architecture and planning

2. Select systems thinking approaches that are relevant for a specific design, architecture or planning task

3. Structure knowledge through systems thinking by using selected approaches in descriptions

4. To tentatively analyse and synthesise complex knowledge by employing systems thinking in design work i.e. by combining and integrating different systems approaches

5. Translate such analysis and synthesis into a draft design proposal, using systems thinking as language of communication and justification (assignments 1 and 2)

6. Reformulate such analysis and synthesis into a more complex design programme

Contents of courses/studios

Regarding contents of the courses and studios, the most common are:

- Lectures

- Literature: gathering, study, seminars

- Written assignments

- Short or longer design assignment with supervision

- Presentations and communication

- Peer-review/assessment, cross critique

Assignments are either done individually or in (heterogeneous) groups.

Assessment methods and grading

Regarding assessment and examination, this is more or less explicit. Some examiners describe the examination in rather vague terms:

Example: "Submission of course assignments, active participation in joint activities, lectures, seminars, and cross-critics and the concluding exhibition on site."

Example: "Sufficient participation at joint activities and the submission of an essay."

Example: "Based on the studio project"

These examples do not fulfil the recommendation given by Högskoleverket [5] that the specific criteria for examination should be available for the students.

Other examiners have been more explicit:

Example:
- 100% attendance at lectures

- Active participation in the exercise and the literature seminar

- Active participation in group work

- Course assignment of sufficient quality, i.e. that fulfils the course objectives and presentation requirements

- To submit assignments before deadlines to possibly get a higher grade than 3

- To fill in the course evaluation

This example is more explicit but the assessment is still based on judgments of 'active', 'sufficient' etc.

Results from interviews

The interviews with the examiners focused on three main areas: 1) aims, objectives, and expected learning outcomes of the course/studio, 2) examination, assessment and grading, 3) other issues to improve the teaching-learning situation.

Aims, objectives and learning outcomes

Most young teachers and examiners have taken courses in pedagogy while parts of the older staff think that this is now too late. The knowledge of constructive alignment and action verbs is noticeable in the course descriptions written by those who have taken pedagogical courses.

Some examiners point to the lack of coordination of objectives between different master courses and also lack of coordination in the progression of learning from bachelor level. The knowledge acquired in one course in not always used in the coming courses. Some teachers also experience that sustainable development should be more present in all courses/studios.

In some cases the examiner is not the one who will decide the content or carry out the course. A number of teachers work on short contracts for the department. When I carried out the interview they did not even know if they would work on the course next year, thus the incentives to improve the course descriptions were small.

Examination, assessment and grading

A majority of teachers and examiners experience difficulties in giving individual grades. It is especially difficult in a course with up to 100 students. Many examiners give a 4 to all students that have fulfilled the requirements and done a good job. A few examiners give the students the possibility to get a 5 by doing an extra task. The difficulties in giving individual grades might be a problem that will pass as the examiners will get more experienced.

One examiner uses the grading system to push the student further. Normally he fails the majority of the student in the sub-assignment to push them to better results for the final submission.

Although most of the courses/studios are assessed using more or less the same methods: attendance at lectures, submitted assignments, active participation in group work, cross-critics, presentations, the examiners do not always agree on the requirements. Some teachers demand 80-100% attendance from the students at lectures, seminars etc. and that they read the compulsory literature. While others think that the student are adults and should by themselves understand the value to attend lectures and read the literature.

Most teachers use a combination of submitted assignments (written essays, reports, poster with designs) *and* oral presentations of the assignments. The oral presentation makes it easier to detect cheaters and free-riders in group work. Oral presentation can also give the students a chance to highlight interesting things in their approach. The oral presentations give them the training in ability to communicate an idea for different stakeholders. However, a few teachers think that the poster with the design should 'speak for themselves'. The participation in a final exhibition is often compulsory for all students in design studios.

Many teachers find it important that the students take active part in group work as this is part of their professional training. Many teachers also prefer heterogeneous groups with mixed background, former knowledge and origin (nationality).

Peer-assessment among students or what is called cross-critics is often used. This is an important part of design judgement but also used in literature seminars and essay writing. As student group grow larger peer-assessment becomes more important as teachers do not have time to give feedback on the student work during the course.

Both internal and external jurors are used to give final critiques concerning the design assignments. If possible reputed architects are invited to provide such critique. A few courses are constructed as architectural competitions with external juries. At least for one of these the examiner does not let the assessment of the external jury exclusively define the final grade of the students. The final grade is based on an internal assessment by the teachers and examiner.

Due to shortage of time, not all examiners use the web-based evaluation system for courses.

Most of the younger staff would welcome more explicit and common recommendations for examination, assessment and grading. A few of the younger and less experienced examiners have made attempts to develop systematic assessment models for their courses, similar to the New Zealand model described above.

Other issues

There are several organisational issues that will have an effect on the quality of the master courses:

- Several examiners complain about the difficult start of the autumn. They miss one person with the responsibility to guide the students. The courses often start day 1 and the students turn to the individual examiners with different organisational questions

- Some examiners experience that students who are not accepted to the master programme attend the courses.

- Most examiners experience a lack of coordination between different course/studios at master level. It can be especially tricky to coordinate the schema for students coming from different departments at Chalmers.

- Several examiners also experience difficulties in coordinating activities at Chalmers with other institutions and Universities and with external actors (for example partners in practical design assignments).

- Many examiners experience problems as the groups of students are growing. The resources for the courses are not large enough and the facilities at the department (design studios, lecture halls) are not fit for the size of the student groups nor for the way teaching is given today (e.g. lack of smaller seminar rooms).

- A few studios that relocate the teaching abroad experience lack of resources.

CONCLUSIONS

Some recommendations can be given for teachers/examiners to improve the way they formulate learning objectives and assessment of learning outcomes. Regarding organisational problems these have to be handled in other forums. Based on the idea of constructive alignmentsand Bloom's taxonomy of action verbs, the following would be good recommendations:

- Learning objectives should be clearly written and easy for the student to understand.

- Learning objectives should describe one objective at the time

- Learning objectives should describe results not processes

- Learning objectives should describe the contents of the course

- Learning objectives should describe tangible use of knowledge

- Learning objectives should be written using action verbs (you might consider staring from the simplest level of 'knowledge' arriving to the higher of 'synthesis' and 'evaluation' if this suits the aim for the course).

Furthermore:

- The learning objectives should be possible to exam and assess

- The forms of examination and assignment in the examination should be relevant for the learning outcomes

- The content of the course should cover the learning objective and outcomes.

- The specific assessment and grade criteria should be available for the students

The interviews carried out within this project show that the weakness in current project descriptions can on the one hand be related to the fact that many teachers are inexperienced in giving precise learning objectives and grades. Most of the younger teachers and examiners have taken courses in pedagogy while parts of the older staff have not. The knowledge of constructive alignment and action verbs is noticeable in course descriptions written by those who have taken pedagogical courses. However some weaknesses were also found related to organisational problems. Some examiners point to the lack of coordination of objectives between different master courses and lack of coordination in the progression of learning from the teaching at bachelor level.

Within the scope of this specific project the study points to define and set in practice common methods for assessment and examination of architectural teaching. More transparent assessment methods will largely benefit the students. Common and transparent systems for assessment and examination would be welcomed among the younger staff.

Finally, the project did not result in any considerate immediate changes in the course descriptions for last year. One explanation is lack of time another is some difficulties in the system, for example changes of examiners and lack of long-term perspectives for contracting teachers, and maybe some resistance to change. In fact, in the end very few of the examiners had time to consider my suggestions for improvements. This project must be seen as part of a continuous process for changes in teaching and learning assessment in the years to come.

References

[1] Argyris, C. (1999). *On Organization Learning*. Oxford, U.K.: Blackwell Publishers.

[2] Biggs, J. and Tang, C (2007) *Teaching for Quality Learning at University*, Third edition

[3] Christie, M (2009). "Bloom's taxonomy and action verbs" Unpublished paper used in the course TLC 102 – The pedagogical projects, in 2009.

[4] Anderson, L. W. and Krathwohl, D. R., et al (2000) *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. Allyn & Bacon

[5] Högskoleverket (2009) "Projekt utbildningens/undevisningens kvalité – GUN:s arbetsutskott för pedagogik och kompetensutveckling (PeKo)" Presentation av Kvalitetsutvärderning för lärande Rapport 2009:25 på Chalmers hösten 2009. Ppt funnen på Chalmers hemsida januari 2010.

[6] Simon, H. (1996), *The Sciences of The Artificial*, Third ediction, The MIT Press, Cambridge, US

[7] Linn, B (1998) *Arkitektur som kunskap.* Byggforskningsrådet Rapport 1998:1

[8] Schön, D. A. (1984) The Reflective Practitioner: How Professionals Think In Action. Basic Books.

[9] Wolffe M, Defesche, A and Wendelien, L (1999) "VALUED approach to the assessment of design skills in architectural education: a pilot study" *Quality in Higher Education*, 5(2), pp 125-132

[10]   Morris, R, Childs, P and Hamilton, T (2007) "Sustainability by design: a reflection on the suitability of pedagogic practice in design and engineering course in the teaching of sustainable design" *European Journal of Engineering Education*, 32(2), pp 135-142

[11]   Subic, A (2007) "Sustainable design and innovation in engineering education" Editorial *European Journal of Engineering Education*, 32(2), pp 111-113

[12]   Pedersen-Zari, M (2008). "Bio-Inspired Design" Unpublished course description from the Faculty of Architecture, Victoria University of Wellington, New Zealand.