
Dr. Henrik Schoenefeldt, 13 July 2013

During Lent term 2013 a new studio model had been piloted at the Kent School of Architecture with the aim of achieving a better integration of the T&E teaching within the architectural studio. In June 2013 the module convenor conducted a review, involving the students. This review was based on special questionnaires, handed out on the day of the final, which was followed by group interviews to explore some of the key issues raised in the responses in the filled out questionnaires in greater depth. These revealed that the students valued the new approach to studio teaching, stressing that it enabled them to investigate technical and environmental questions over the course of whole term but also in the immediate context of their evolving design proposals. However, the students stressed that the way the model was implemented needs improving, in particular in terms of the studio timetable and the organizations of the groups. The timetable and studio were found, at least initially as confusing. This report is a brief review of the new model from the students’ perspective. The first section outlines the rational of the new model, which is followed by a discussion of the student feedback and recommendations for improving the model.

1. The aims and objectives of the 2 plus 1 studio model

This model was developed as an integral part of an HEA funded research project, which involved interviews with students and educators in six different schools of architecture on the pedagogical challenges posed by the integration of Technology and Environment (T&E) into the architectural studio. The new studio model was used to explore how far formative assessment methods can be used to foster explorative learning styles in the more specialized technical areas of design, such as structural engineering and environmental design (ED). Fig. 1 shows the general structure of this new studio model. The first objective was to teach ED an activity rather than a purely theoretical subject. Similar to architectural design, students were to experience environmental design as an iterative learning process, in which design propositions are presented, critically reviewed and gradually refined over the period of a whole term. In the traditional teaching model, environmental design is taught separately from the studio and largely as a theoretical subject. As illustrated, among others, by Donald Schon, Sergio Altmonte and Mark Gelernter, the traditional approach does not address the question of how the scientific methods used in structural and environmental design can be used as means to critically evaluating and refining technical design solutions. In the new model the interactive learning approach of the architectural studio is extended to included technology and environmental design. The second objective was to achieve a closer integration of technical and environmental investigations into the overarching architectural design process. Educationist such as Levy, propose to address this issue through the Total Studio, which refers to a teaching model in which all technical teaching is delivered within the architectural studio, but the research conducted as part of the HEA project has revealed that this model poses some major pedagogical challenges in practice. Although it was very strong in promoting integrating design thinking within the studio, it did not achieve the same level technical rigor as the traditional model. It did not provide sufficient dedicated space for more focused and in-depth technical investigations before engaging in the process of full integration. An alternative model was introduced by Allen in
an effort to overcome this problem. In his Second Studio, he introduced a technically focused studio, running in parallel to the traditional design studio. This was very successful in getting students to participate in technical and environmental design investigations over the course of a whole term, but it did not sufficiently address the challenges of integrating technical studies into their architectural design projects. It reinforced the divide. The challenge is therefore to achieve a balance between more focused environmental and structural design investigations and the integrating of architectural, structural and environmental aspects into one unified design.

This balance was addressed by the adoption of a new studio teaching model, the 2 plus 1 studio, which has been developed by the MC. It combines a two-studio system with a series of intermittent Joined studio review sessions. This model was to achieve a reconciliation between the pedagogical principles underlying the Total and Second studio. The objective was to encourage students to think ‘technically’, ‘environmentally’ and ‘architecturally’ as an integral part of architectural design, but at the same time enables students to focus on more in-depth exploration of particular aspects. Initially students will explore technical design problems in their T&E studio and the work will be assessed independently from the studio in more focused T&E reviews each week. The T&E studio is to guide students, introduce methods of environmental design and help students gaining a deeper understanding of technical issues. In the ED studio are set weekly ED design assignments connected with their design projects and students are assisted in developing the skills and knowledge required to interpret the findings of the environmental design studies. At the end of each phase, students will consolidate their specific findings in a joint studio, where the focus is on the integration of the findings of their studies and students will explore the interrelationship between the architectural and environmental dimensions of their design proposals, which had previously been explored separately. This continuous process of formative assessment within the studios is structured through the use of weekly assignments, which comprise a combination of design studies and self-directed research. Each week students are provided with assignments in the three main areas, first architecture, second environmental design and third structural technology. These are joined by a common theme (fig. 2). The content of technical workshops, which introduce students to different technical design methodologies,
and the lectures are also based on the same theme. These assignments provide students with a clear brief for the in-progress work they have to produce for their weekly desk reviews within the T&E and architecture studios. The interviews, conducted as part of the HEA project emphasized that a key barrier to accommodating T&E explorations within the overall design process was the absence of a structured timetable, in the form of clear milestones at different stages of their projects. In design project it is common that the T&E components is treated as a separate exercise, done towards the end of the project and with limited impact on the development of their designs. In three of the interviews the students stressed that their use of environmental design methods tend to be limited to the evaluation, not the optimization, of their design proposals. The objective of this structured series of formative assessments was to achieve continuous engagement.

Fig. 2: The themes of the weekly assignments (Diagram: Henrik Schoenefeldt, January 2013)
**Integrated thinkers vs. technologists**

In June 2013 the module Dr. Schoenefeldt conducted a review of the new studio model, which was based on the 1) study of the students’ work, 2) analysis of special questionnaire handed out during the final review, 3) group interview with students and 4) the standard student assessment of the module. A preliminary review of this data suggests that the new studio model succeeded in incentivizing students to develop technical and environmental aspects of their design from the beginning. The review of the student work also suggests very strongly that the main impact of this new approach was a significant increase in integrated thinking. The level at which students have incorporated structural and environmental design strategies into their overall designs has markedly increased compared to last year, when the same module was still taught, using the traditional model. The majority of the final projects demonstrated that student conducted massing, form and orientation studies of exceptional depth, focusing on the exploitation of natural light, solar energy and ventilation inside deep plan buildings. The boundaries between 'T&E' and 'architectural design' were blurred and environmental and structural thinking had been absorbed within their architectural drawings. Environmental design was largely treated as a question of design, with a particular focus on a more strategic approach to Environmental and structural design. Previously T&E was considered a marginal technical issue of design. The interviews also illustrated that that the model, despite the rigid timetable, had sufficient flexibility to accommodate different approaches to integrated design. For instance, some students started the iterative process with the development of a purely architectural concept but at the next stage cross-examined their concepts from an environmental or structural perspective, while others used environmental or structural concepts as a starting point for the development of an architectural concept. Although this integrated approach should be welcomed it also raised some issues about the way T&E components are typically assessed. It was more difficult as much of the students T&E work did not always manifest itself in clearly identifiable technical outputs, but in the structural and environmental thinking underlying the architectural projects. The review had also shown that the organization of the studio groups and timetable, difficulties with fully implementing the joint review sessions and the low number of T&E tutors (compared to design tutors), acted as the main barriers to fully implementing the pedagogical model. These issue are to re-address next year.

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4. Note: A term coined by Dr. Henrik Schoenefeldt