Preface

WHY STUDY TEAMWORK?

The genesis of this book can be traced to the Australian Learning Teaching Council (ALTC) funded discipline scoping study Understanding Architectural Education in Australasia (Ostwald & Williams, 2008). In particular, it responds to Recommendation 12, which states “universities, students and employer groups are not only calling for more group work in professional programs, but also for each member of a group to be separately assessed and graded” (p.38). To address this recommendation, a further study was funded by the ALTC in 2011/13: Enhancing and Assessing Group and Team Learning in Architecture and Related Design Contexts. 1 The project sought to answer three key questions: “how do we teach teamwork skills in the context of design?; how do we assess teamwork skills?; and how do we fairly assess individual contribution to team designs?” To resolve these questions, Enhancing and Assessing Group and Team Learning gathered, developed, trialled and documented good-practice models of teaching design via collaboration and of assessing individual contributions to collaborative design. The project also investigated “how best to support through teaching and formative assessment (in a discipline where summative assessment still dominates) the learning of teamwork skills.” These skills include those that are particularly needed to design collaboratively e.g. idea selection and development, shared understanding through graphic communication, and reflective practice; and those skills commonly needed for teamwork irrespective of field e.g. leadership, management, delegation, consensus seeking and the capacity to effectively handle conflict.

The research presented in this book is largely devoted to these learning and teaching issues. But while Enhancing and Assessing Group and Team Learning provided impetus for this book, it has been foreshadowed by the last ten years of my own research, which has charted evaluations of strategies for teaching and assessing teamwork. This work has been iterative in nature, developing research methodology for evaluating design teaching in an area where such methods have not commonly been used or documented. After all, most design teachers have been trained as designers and not researchers. This has certainly been true of the discipline of architecture, where my own path is shared by the great majority of educators in my field – from architect to teacher to researcher. The evolution of my own research on teaching design has been the classic one of learning from mistakes. Indeed, the research was first prompted by the urge to address early mistakes I had made in my own teaching.

At the final review of the very first design unit I had taught in which teamwork was a focus, a security guard was posted at the door of the studio to bar entry to an excluded student who had previously thrown a chair at a team mate’s head during a heated design meeting. The incident was an extreme reflection of passions running high when students are designing in teams. A key reason for such conflict is that
design is a highly subjective activity where there are as many solutions to a brief as there are designers, and where it is often difficult to clearly determine which solutions are best. From talking to students and reading their evaluations of my teaching, I came to realise that many students’ teamwork experiences were negative and distressing. The poor evaluations for my own design subject echoed the almost universal unpopularity of team assignments in my school at that time.

This unpopularity reflected not only the problems students had with conflict but also the ad hoc nature of teamwork teaching and assessment in many design schools. This situation was not restricted to design schools, but was symptomatic of international trends throughout higher education of increasing numbers of teamwork assignments to reduce assessment workloads under the pressure of increasing staff-student ratios. Commonly, design assignments requiring students to collaborate were not devised to teach and assess teamwork or collaborative design skills, rather they were being used opportunistically to assess less work than would be produced by individuals. It was my firm belief that design subjects requiring substantial collaboration from students should assess design collaboration and teamwork skills, and thus should also teach these skills. But this belief prompted the question posed by Enhancing and Assessing Group and Team Learning: how do we best assess and teach teamworking in design? This question in turn prompts the question at the centre of Collaboration and Student Engagement in Design Education: what research methodologies and conceptual frameworks can we use to evaluate strategies for teaching and assessing design collaboration? As there is no straightforward answer to this question, we address it via fifteen recent research projects. These studies are conducted by design teachers who evidently believe, as I do, that design collaboration skills can be explicitly taught. But the andragogical approaches of design teachers are, as you will read in this book, many and varied and so we must be able to propose methods to evaluate the effectiveness of those teaching strategies.

THE CHALLENGES

It can be argued that design must always be a team [or collaborative] process. Design cannot advance without dialogue and collaboration: without criticism, feedback or confirmation. Design ideas cannot be tested and moved forward without the opinion of at least two people. Collaboration skills are essential in the design industry where large teams of professionals negotiate multiple design options. For instance, in the field of architecture the design process can include over fifty kinds of participants and consultants. Designers MUST be able to design as part of a team, yet design schools have historically largely failed to teach this essential professional competency. Moreover, research that evaluates strategies for teaching design collaboration or that puts foreword a conceptual framework for such evaluation has been minimal. Indeed, this book is the first that we are aware of that is dedicated to research on student collaboration in the context of design.

That is not to say that design schools do not require students to design collaboratively. On the contrary, the design students we surveyed in Australia and Canada have told us that there is far too much teamwork in their courses. In addition to the need to meet the requirements of the accrediting bodies of design courses, there are many reasons other than reducing assessment workloads for the ubiquitous use of teamwork assignments in design schools. Teamwork learning is seen as being more representative of work in a professional practice where design is nearly always a collaborative activity. Not only is collaborative design seen as more authentic, but it can result in ideas and knowledge being brought together for design outcomes that are superior to those that individual students might arrive at (Barber, 2004).
Educators also recognise that teamwork can lead to improvements in student learning due to a number of reasons: the development of interpersonal and critical thinking skills (Dochy, Segers, & Sluijsmans, 1999; Gokhale, 1995; Sluijsmans, Dochy, & Moerkerke, 1999), the promotion of inclusive learning (Cohen, 1994), moving students from passive to active learning (McGourty, Dominick, & Reilly, 1998), the ability to tackle more substantially-sized projects (Biggs, 1986), improved peer learning (van den Berg, Admiraal, & Pilot, 2006) and capacity for lifelong learning (Hanrahan & Isaacs, 2001). 

But teamwork learning in design education is not without particular challenges requiring serious pedagogical consideration. In particular, three broad issues will be addressed in this book. First, many students leave academia without having been taught the knowledge and skills of how to design in teams. Second, the design of teaching, assessment and assignments needs to be informed by a clear understanding of what leads to effective teamwork (R Tucker, 2012). And third, in academic contexts there is a need to individually assess students, which means that most design assignments require individual submissions or, when students work in teams, require evaluation of individual contribution. This final issue is made even more difficult in design contexts because of the subjective nature of design evaluation and because of the difficulty of assigning authorship to a creative work, meaning that ‘social-loafing’ is difficult to detect. Thus, students state that by far their most crucial concern about teamwork is that they are assessed ‘fairly’ to recognise individual contribution, so that teammates cannot freeload on their efforts.

To sum up, this book will present research on how best to support through teaching and assessment the learning of teamworking skills in the design disciplines, and research on how to evaluate such teaching and assessment. We hope the studies will help design teachers develop and evaluate innovative approaches to collaborative studio-based learning in both multi-disciplinary and mono-disciplinary contexts.

THE CONTENT

This book is a collection of 15 studies investigating numerous and varied aspects of student collaboration and engagement when designing. Although many forms of collaboration are discussed, the majority of authors have focused on what they term teamwork. This prompts the question: is there a difference, when talking about the processes of designing and of learning how to design, between collaboration and teamwork? Certainly, all teamwork involves collaboration, but is all collaboration teamwork? One definition of teamwork used in the book, which differentiates group work from teamwork, would suggest not. For the distinction acknowledges the key difference between students collaborating on one assignment (teamwork) and students working together on individual assignments (group work). The process of designing commonly requires students to exercise both forms of collaboration.

An example of the use of both forms of collaboration can be drawn from architecture – the discipline that accounts for half of the 15 studies described in this book. When architecture students design collaboratively their work usually commences with context studies requiring them to collect information on a broad range of design influences. This may include a range of physical data (maps, views, climate, physiography, hydrology, flora and fauna, access etc.), and cultural data (design precedent, built heritage, habitation patterns, demographics etc.). To cover such a breadth of research, different areas of study are apportioned to different students, who then return to the group with this information to be shared. As this group work is carried out by individuals, it can also be assessed individually. If students are collaborating on one scheme, the proceeding design process is generally teamwork. The teamwork is then bookended by group work at the end of the project when students work on the production of presentation models.
and drawings. As the design phase of the collaborative process is normally teamwork, it follows that the majority of studies in this paper are focused on teamwork. But not all of this research is on teamwork, and indeed this is as it should be because a successful andragogy for teaching collaboration should always acknowledge, and sometime assesses, both teamwork and group work.

As its title implies, this book is also about engagement – what has been defined as representing both the time and energy students invest in educationally purposeful activities and the effort institutions devote to using effective educational practices (Kuh, 2003). While none of the 15 studies can be said to specifically focus on or measure levels of engagement, each of the ten case studies evaluate methods of engaging students with design learning, for designing collaboratively is by definition an activity that demands student engagement.

While Enhancing and Assessing Group and Team Learning was a learning and teaching investigation rather than research per se, it was designed to collect data that could be analysed. And so as well as teaching symposiums and focus groups with students, four survey instruments were distributed to teachers and students. The first two were pilot surveys circulated at the four partner universities participating in Enhancing and Assessing Group and Team Learning (Deakin University, The University of Newcastle, The University of Tasmania and Victoria University), and the second pair of surveys was nationally distributed to all design schools across Australia. The second student survey was also distributed to cohorts in the six Canadian schools of architecture. 28 teachers and 196 students completed the pilot surveys, and 40 teachers and 417 students completed the second pair of surveys. Data from Enhancing and Assessing Group and Team Learning directly informed two of the first five chapters of this book; including Chapter 1, which provides a conceptual Framework for Understanding Effectiveness in Student Teams – a framework that provides context for many of the other 13 chapters. Findings from the surveys have also been published elsewhere (see, for instance, (R. Tucker & Abbasi, in press).

**CONTRIBUTORS AND THE ORGANISATION OF THE BOOK**

During Enhancing and Assessing Group and Team Learning, symposiums were held with design-teachers who were passionate about teaching collaboration, and who represented the great majority of universities that teach design in Australia. Visits were also made to discuss the project with six schools in Canada:

- University of British Columbia School of Architecture and Landscape Architecture
- Faculty of Design at Kwantlen Polytechnic University
- University of Toronto, John H. Daniels Faculty of Architecture, Landscape and Design
- University of Waterloo, School of Architecture
- Université de Montréal École d’architecture
- McGill University School of Architecture, Montréal

From these exchanges grew a community-of-practice of sorts, or at least a connection between like-minded teachers. And while the call for chapters for this book was circulated globally, the vast majority of the 28 authors originate from this community. Indeed, this is the reason why 22 of the contributors are from Australian design schools, and 3 are from Canadian design schools.

The book is comprised of 15 chapters divided into three sections: (1) Teaching Collaboration – Team Building & the Andragogy of Teamwork in Design; (2) Evaluating Collaboration – Teaching Case Stud-
ies; and (3) Preparing for Collaboration – Learning for Teamwork in Professional Practice. Half of the chapters have a clear focus on the discipline of architecture. This was not an intentional bias, despite the fact that the editor studied, practiced and now teaches architecture. Indeed, we are confident that the findings of all the studies are relevant to all the design disciplines.

The majority of chapters might be termed case studies, in that they focus on a particular case — a teaching strategy, a particular design course/subject, a particular design brief — that explores and evaluates a certain way of teaching students how to collaborate. The second section largely consists of case studies of undergraduate teaching. This section begins with three chapters evaluating examples of first-year teaching, and finishes with a study looking partly at a capstone unit (at the culmination of the second degree of an architecture program). In some of the other case studies, the cohorts discussed span disciplines and year levels. This is not the case, however, for the two case studies in the third section, which are both focused on teaching towards the end of programs that prepare students for professional collaboration in the workplace.

**Section 1: Teaching Collaboration – Team Building and the Andragogy of Teamwork in Design**

Focusing on teaching teamwork, in Chapter 1 Tucker proposes a 22-factor framework for understanding what impacts the effectiveness of teamwork when students are designing collaboratively. The framework is intended to help design educators integrate teamwork into their courses and better evaluate learning outcomes. The paper concludes with recommendations for teachers informed by the framework, covering aspects including: task structure, team formation, assessment and feedback, and teaching teamwork and team building skills. We have chosen this as our first chapter because it presents an overriding context for the many concerns discussed in the proceeding chapters.

Gavilanez, Ortlieb, and Carey report in Chapter 2 on integrating learning and teaching teamwork within an institutional learning outcomes framework. They write from the perspective of working at Kwantlen Polytechnic University, Canada – where teamwork learning has had an unusually core role, shaping curricula across the design disciplines. The research incorporates insights from beyond the design disciplines to engage student motivation in capability development, and the ways team teaching in design studios can contribute to the development of students’ teamwork and design capabilities.

In Chapter 3, Lee, Ostwald and Gu examine the cognitive challenges facing design teams and educators of those teams. They argue that an improved understanding of creativity and teamwork in design can be arrived at by understanding the relationships between four issues associated with design cognition: (i) cognitive space, (ii) design strategy, (iii) design productivity and (iv) spatial representation.

Tucker focuses in Chapter 4 on a key problem when using online self-and-peer assessment to individualise design grades for team assignments, namely rater bias – the possibility of students being biased when assessing their own and their peers’ contributions. Three rater-bias issues are considered: (1) self-overmarking; (2) gender bias and gender differences; and (3) out-group bias in the peer assessment of international students in multicultural cohorts. The chapter concludes with recommendations for design teachers.

In Chapter 5, Abbasi, Mills and Tucker deal with team building issues, in particular conflict in student design teams. A review of literature is presented to understand conflict within student design teams and explore strategies to manage it. Then, drawing upon the findings from two surveys offered to design students in 18 Australian higher education Institutions, recommendations are made for strategies
to prepare students for conflict situations through a number of support models that design instructors might adopt, including both preventive and intervention strategies.

**Section 2: Evaluating Collaboration – Teaching Case Studies**

In Chapter 6, Crowther, Scott and Allen present the first of our Section 2 case studies. The study considers how novice design students, in Queensland, Australia, perceive design consideration. They evaluate a large common first year subject in which students work in mixed discipline groups of six to nine, on two sequential design projects. Survey and reflective journal data are used to determine the pedagogical success of learning about collaboration through the act of collaborating in project-based design. The study shows that groups that emotionally engaged with collaboration and collaborated more effectively achieved higher academic grades.

In Chapter 7, the second chapter focusing on self-and-peer-assessment, Palmer and Hall compare two offerings of a first-year engineering design subject at an Australian university in the state of Victoria. The subject provides an introduction to engineering design and professional practice through project-based problem solving, and uses group work with self-and-peer-assessment for individualization of marks. The authors find that the use of student group work for learning and practicing group work skills demands assessment that accounts for the effectiveness of group design activities as well as the quality of the resultant design artifact(s).

In Chapter 8, Crosby and Morgan also focus on self-and-peer-assessment, this time in a first year interdisciplinary design subject at an Australian university in New South Wales. Over two iterations of a subject, group work was reframed as critical collaboration; drawing from momentum in the design professions for more participatory and collaborative processes. The online self and peer assessment tool SPARKPlus was used to encourage critical thinking in students about collaboration by asking them to reflected on it following their experiences.

In Chapter 9, Garduño Freeman investigates how mobile technologies can facilitate new ways of sharing, experiencing and understanding people’s connections with places. The chapter argues that CmyView, a mobile application and methodology that harnesses everyday practices such as photography and walking, can contribute to the core pedagogy of architectural education, the design studio. Garduño Freeman demonstrates that using CmyView enables students to work together, asynchronously, to understand how they each see their immediate urban environments in distinct ways. This helps students connect their own personal knowledge of architecture with their projective work in the design studio.

Bown, Gough and Tomitsch evaluate in Chapter 10 the teaching of participatory design thinking. Their students have visited local schools to engage children with design who are from areas of low socioeconomic status. The project aimed to draw on the value of service learning - learning through an engaged and socially meaningful task following principles of co-design. The authors show that service learning collaboration between university design departments and schools can mutually benefit both tertiary and secondary students.

In Chapter 11, Ang evaluates another model of participatory design learning, this time via intercultural collaboration between students from Australia and five Asian nations (Malaysia, Thailand, India, Indonesia, Sri Lanka). The chapter determines what elements of this model directly contribute to collaboration and student engagement. The potential for transformative learning and response to issues around global citizenship are discussed, along with future research.
In Chapter 12, Beyerle and Missingham present a comparative evaluation of two variations of teaching that structured individual student learning through group working. The teaching approaches draw on participatory design to develop collaborative learning and social-reflective practice in students. The authors describe means of developing creativity wherein a student’s skills, projects, and ideas come out of, and are intersected by, a complexity of social processes, oppositions and the spectra that define them.

In Chapter 13, Rider and Bowen examine the outlines, process, and structure of design teaching at an US university that has engaged students from multiple colleges. Their approach to teamwork uses an established framework for assessing interdisciplinary teams. The chapter describes in detail the opportunities and challenges of integrating non-traditional teamwork exercises into design education processes.

Section 3: Preparing for Collaboration – Learning for Teamwork in Professional Practice

In Chapter 14, Wragg and Barnes evaluate the value of group learning for developing graduates’ work-readiness and insight into professional practice. The two-capstone projects discussed stress collaborative problem-solving based on knowledge of the design context and the wider relational systems of industry practice. The authors show that project work approached from an expanded sense of the group, which delivers implementable proposals for clients, provides graduating students with authentic learning around the demands of practice.

Chapter 15 is appropriately positioned as our final chapter to reflect its position in the design curriculum of US architecture students transitioning to professionalism via the consideration of Narratives of ‘Becoming an Architect.’ In the study, Thompson explores themes of self-authorship in relation to collaborative design experiences. By providing a holistic understanding of the role collaboration might play in shaping individuals’ identities, he aims ultimately to show how design educators might value and structure team-based design projects.

To conclude, we hope this book will appeal to and assist a global audience of educators, researchers and practitioners from across the design disciplines. We roughly estimate that there are 100,000 design teachers in 10,000 schools of design in the USA, Canada, UK, Australia and New Zealand alone. However, and crucially, many of the fundamental principles we present are applicable to teaching and learning across all fields of education, not just design. And so we ultimately hope that the book provokes further consideration of student collaboration and engagement across all disciplines, and encourages research that evaluates andragogical strategies for teaching teamwork.

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REFERENCES


This project was led by myself (Tucker), and included three members of *Understanding Architectural Education* – Professor Michael Ostwald (who writes the foreword to this book), Professor Tony Williams and Louise Wallis.