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## **Building the Framework for Educational Change Through Interdisciplinary Design Learning: implementing Boyer's Scholarships of Integration and Application.**

### ***Case Studies from UNSW Faculty of the Built Environment***

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#### **Abstract**

In meeting the expectations of communities, industry and national government, universities are not only required to demonstrate their capacity to produce and disseminate knowledge but also to facilitate the application of this knowledge for social benefit. The professional disciplines in the Faculty of the Built Environment at the University of New South Wales, with their emphasis on practical knowledge and interdisciplinary modes of inquiry, are well placed to contribute to this prospect and demonstrate Ernest Boyer's model for the scholarships of integration and application.

This paper describes three innovative educational experiences undertaken in the Faculty. These projects focus on design learning and interactions with students from four disciplines: architecture, landscape architecture, interior architecture and industrial design. They illustrate how productive social knowledge can be generated through collaborative interactions between the university, students in educational settings, government and its agencies, industry and community. In that process, new possibilities for teaching and learning have evolved, along with opportunities for raising awareness of social issues and instituting positive change.

In presenting these case studies, this paper seeks to demonstrate the synergistic potential between universities and communities to provide unique teaching and learning opportunities and innovative solutions to benefit community.

## Introduction

As social institutions, western universities have demonstrated a remarkable capacity over time to survive and adapt to changing cultural, political and economic situations. One reason for this is community recognition of their role as custodians of social knowledge that informs actions for the public good. In contributing to our understanding of why this might be Bruce Kaye suggests,

‘It is because the university touches, in its activity and its vocation, something, which is fundamental to our humanity... Who we are, however, is both an individual and social matter. Who we are socially is the link between the university as an institution and the society in which it is located. The university, therefore in my judgment as a social institution of inquiry and learning, serves its society by maintaining a vital aspect of our humanity’ (Kaye 1994, p. 7).

Ideals of universities as social communities concerned with the education of the whole person for active citizenship for social benefit have been challenged by an emphasis on the utilitarian role of universities. Recent upheavals in national and international higher education settings reveal contemporary universities as sites of tension as they grapple with the ideological and functional complexities of reconstituting their role in the modern world (Johnston 1998, Marginson 2000, Barnett 2000).

Professor Gavin Brown expressed his view of this tension in his 1996 inaugural address as the incoming Vice Chancellor of Sydney University, one of Australia’s ‘sandstone’ research universities,

‘The chief characteristic of a university phenomenon... is a deafening silence. Too much of the rhetoric in Australia is intrinsically selfish. Government holds universities to account for delivering public benefit in the narrow sense - training, employment needs, research that fuels economic growth. Students are reminded of private benefit in the narrow sense, better job prospects, higher earning capacity and networking privileges. These are all matters of consequence, but remember that the true privilege gained by our students is the opportunity to contribute more effectively to our society, both spiritually and materially’ (*Australian* newspaper 1996, p. 27).

This view raises questions about how universities may reframe this site of tension to one of opportunity, capable of sustaining and energizing the social role of universities and their knowledge contributions to our contemporary world. In realising projective opportunities this paper positions interdisciplinarity and service learning, as integral to a framework for change, informed by Boyer’s scholarship domains of integration and application and illustrated by three Faculty based case study projects.

## Background

The English Oxford and Cambridge (Oxbridge) and American Ivy League universities with their pedagogical tutorial system and focus on the liberal education of the socially privileged for public citizenship, hold strong cultural value as an ideal of what a university should be in the western world. However, it is the influence of the German *Humboldt*, French *Grand Ecole*, Scottish *Civic* and to a degree, American Land Grant university models that have been

prevalent in the evolution of the modern research university (Gottlieb and Keith 1997, Johnston 1998). With their emphasis on the discovery of disciplinary organised scientific knowledge and corresponding pedagogical settings of the seminar, laboratory and lecture hall these institutional models challenged the pedagogical tutorial system focus of the elite Oxbridge style systems. In these influential models, research – the discovery of scientific knowledge, developed and disseminated in the private world of academe - is intrinsically valued, rewarded through peer review, defines academic 'work' and thus, the self conception of the professoriate (Brew 2001, Beecher 1980, Ben David 1972). The teaching or transmitting of this knowledge to even elite social groups of students was seen as a tolerated distraction and a chore usually delegated to graduate students.

However, the 1968 university student riots in Paris alerted the world to perceived archaic qualities of these institutions as well as the tensional nexus between research and teaching. During the ensuing time, worldwide philosophical thought and social debates challenged and exposed the limitations of the positivist view of knowledge that underpinned scholarship practices in the academy. The students whose very numbers, social and cultural diversity challenged the narrow view of the university as an elite institution harnessed these debates to fuel their demands for qualitative educational experiences and their participation in the governance of universities. Additionally, the deregulation of the tiered binary system of universities and polytechnics and the introduction of higher education fees (Australia and UK) precipitated the ongoing interventionist approach of governments and heralded the advance of systematic educational globalisation.

While the general inflexibility and self-interested protectionism of research universities contributed to external activism, for thoughtful academics the changing context provided an impetus and motivation to move forward. One such projection involved investigation of the constituent characteristics of academic work to develop an intellectual framework to advance the role and value of differing aspects of modern research universities. This was the case for the Carnegie Foundation in the United States and its president Ernest Boyer.

### **Boyer's Scholarship Domains.**

Ernest Boyer and his colleagues advanced a view in their 1990 report, *Scholarship Reconsidered: Priorities of the Professoriate* that the understanding of scholarship in a modern research university needed to be reconstituted so it was more inclusive and symbiotic. In revitalising and enhancing the modern university's relevance and commitment to contemporary society, Boyer proposed four intersecting Scholarship domains: discovery, teaching, integration and application.

He argued that the preferred ideal view of research – pure, original discovery - although traditionally highly valued by academics was dislocated from other core responsibilities in a contemporary university. Boyer proposed that discovery should be recast so that its focus was not just the production and dissemination of new knowledge but that its intellectual rigour, vivacity and presentation should be embedded in all responsibilities and activities that a research university community engaged with. In this way the scholarship of Teaching, Boyer proposed, was all about, 'transforming and extending knowledge by a process of classroom debate and a continual examination and challenging of both content and pedagogy' (Johnson 1998, p.253).

In arguing for a Scholarship of Integration, Boyer contended that, 'by integration, we mean making connections across the disciplines, placing the specialties in larger context, illuminating data in a revealing way, often educating nonspecialists, too' (1990, p. 18). As Johnson notes, 'he proposed that integration was what mitigated against rigidity within the system and provided nodes for the growth of new disciplines and applications (1998, pp. 253-254)

The Scholarship of Application concerns the activities of engagement, practice and service to society. In this domain Boyer proposed that an academic's expertise, disciplinary knowledge and professional practice could be applied with rigor and accountability to social problems of importance to communities. He was interested in how 'new intellectual understandings can arise out of the very act of application [where] theory and practice vitally interact and renews the other' (Boyer 1990, p. 21).

This next section of the paper will focus on the Scholarship of Integration as demonstrated by interdisciplinarity and the Scholarship of Application with reference to service learning.

### **Scholarship of Integration**

In their 2002 report, *Institutionalizing a Broader View of Scholarship through Boyer's Four Domains*, Braxton Luckey and Helland draw upon a range of scholarly perspectives and empirical data to gain an understanding of how Boyer's four Scholarship domains are actually implemented in universities. Like Johnston (1998) and Rice (1998) they caution that the Scholarship of Integration, the domain Boyer thought most relevant to society's future, was perhaps the least understood or developed in implementation and scholarly discussion. In explanation, Dauphinee and Martin (2000, p. 1) propose that 'perceptions of interdisciplinary work as risky and professionally unrewarding are among the forces that may discourage integrative Scholarship'. In assisting our discussions Rice suggests,

'Scholars are needed with a capacity to synthesis, to look for new relationships between the parts and the whole, to relate the past and the future to the present, and to ferret out patterns of meaning that cannot be seen through a traditional disciplinary lens' (Rice 1991, in Braxton et al. 2002, p. 47).

Braxton et al. comment that Boyer's vision of higher education was 'to build bridges across disciplines, and connect the campus to the larger world' (Boyer 1990, p.7). In this vision an important aspect of student learning at university was helping students to make connections between different forms of knowledge and to construct a more inclusive understanding of knowledge. For this reason he argued in his later 1998 report, *Reinventing Undergraduate Education: A Blueprint for American Universities* that research universities should remove barriers to and create mechanisms for much more interdisciplinary undergraduate education. In his view, the principal barrier to interdisciplinary research and study was the traditional organisational pattern of universities to create vested interests in traditionally defined departments (Boyer 1998).

Across the Atlantic, the publication of Boyer's 1990 report coincided with investigations being carried out within the science disciplines by Michael Gibbons and his colleagues (1994) in the United Kingdom. Gibbons et al. extended Boyer's thesis in their analysis of contemporary modes of knowledge production in an increasingly complex global context. They categorised atomistic knowledge production and dissemination in the academic context – (Boyer's

Scholarship of Discovery) - Mode 1 knowledge production. Gibbons proposed that this form of knowledge is being displaced by Mode 2 knowledge - Boyer's Scholarship of Integration. Subotzky comments,

'The main attribute of Mode 2 knowledge production is its transdisciplinarity, its heterogeneity and organisational diversity, the heightened social accountability and reflexivity which accompanies it, and new forms of quality control which emanate from it' (Subotzky 1999, p. 416).

'Gibbons argues that new forms of quality control extend beyond the closed confines of conventional peer review and incorporate a more diverse range of intellectual, social, political and economic interest' (Subotzky 1999, p. 421)

Although a domain considered by Boyer and Gibbons et al. to be the vanguard for future knowledge production, it is apparent that the Scholarship of Integration is not only underdeveloped as an intellectual practice it is also underdeveloped as a management practice in the organisational structure of universities. Mindful of Boyer's alert to barriers in implementing interdisciplinarity in research universities Johnston (1998) draws attention to the 'administrative' dimension of operationalising integration. She reminds us that in the UK (as in Australia) the unification of the higher education system has introduced a suite of administrative efficiencies and controls designed to encourage transfer between courses and institutions. She hints at the depth of these institutional barriers in noting that there has not been a corresponding shift in the 'academic paradigm towards the dominance Scholarship of Integration' (p.265).

### **Interdisciplinarity**

Ideals of a university as an energetic community focussed on shared robust, active inquiry and learning in all Scholarship domains is central to both Boyer's and Gibbons et al'. proposition for a revitalised research university. Scholarly reflection further reveals that vibrant intellectual inquiry and citizenship is most active and creative in interdisciplinary endeavours (Barnett 2000, Lattuca 2002, Frost and Jean 2003). In this domain, the community – academics, students and external groups - accept the challenge of uncertainty in constituting new knowledge and shared understanding for social action by moving beyond disciplinary boundaries to interact with other disciplines and their practices in context. Ronald Barnett most potently captures the importance of uncertainty as an incubator of life-long intellectual excitement in social contexts in his comment,

The university is a site of organised inquiry for generating and for managing uncertainty. The task of generating uncertainty: that is the university's research function. The task of managing uncertainty, of enabling individuals to live with uncertainty: that is the university's teaching – or rather, it's educational – function. (2000, p.143)

In describing both the space and various attributes of interdisciplinarity as an academic enterprise Lattuca proposes that the following definition used by the US Centre for Educational Research and Innovation best captures the 'continuum' of interdisciplinarity,

Interdisciplinarity –an adjective describing the interaction among two or more different disciplines. This interaction may range from simply communication of

ideas to the mutual integration of organising concepts, methodology, procedures, epistemology, terminology, data and organisation of research and education in a fairly large field. An interdisciplinary group consists of people trained in different fields of knowledge (disciplines) with different concepts, methods, data and terms organised into a common effort on a common problem with continuous intercommunication among the participants from the different disciplines (Lattuca 2002, p. 712)

Drawing upon the work of a range of educational scholars, Ivanitskaya, Clark, Montgomery and Primeau (2002) investigation of the processes and outcomes of interdisciplinary learning reveal valuable characteristics necessary to developing a robust aptitude for intellectual excitement and resilient attributes for managing uncertainty. These include a disposition to engage in deep and meaningful learning with its attendant higher order thinking skills such as the ability to analyse, synthesize, be agile and creative, solve problems and think meta-cognitively, reflectively and emphatically. Engaging with deep learning means the learner uses these abilities to construct understanding and to know when and how this understanding can be best deployed in context. In contrast to disciplinary knowledge that is often content focussed, Ivanitskaya et al. (2002) propose that interdisciplinarity assists learners to construct understanding, the key to deep and meaningful learning, by symbiotically framing structural, declarative and procedural knowledge as a holistic enterprise. They affirm further core characteristics of interdisciplinary learning and teaching, as an 'emphasis on coping with difficult tasks and the search for multiple solutions, focus on the evolving connections among ideas and interpretation and application of knowledge across several contexts' (2002, p. 98). In this way interdisciplinarity sets the framework for the next section of the paper, which discusses the Scholarship of Application.

### **Scholarship of Application**

In their 2002 report Braxton et al. remind all involved in the academy of the triangulation of their three core responsibilities – teaching, research and service. The Scholarship domain of Application is concerned with Service. For Boyer (1990), this domain involved the activity of engagement and practice with others external to the institution. He was mindful of delineating the difference between this form of Scholarship and that of the educated person [gentleman] involved in 'citizen' service (Johnson 1998, Braxton et al. 2002). For Boyer, application was the specific direction of disciplinary knowledge, individual academic expertise and institutional organisation to solve social problems and assist communities in need (Boyer 1990). He cautioned that these activities 'were not just for the benefit of the recipient alone, but in turn, would advance the academics understanding and interpretation of her or his discipline through its practical application' (Johnson, 1998 p. 260). However, despite these goals, acceptance of these activities as Scholarship in the traditional peer review and methodological framework of the academy has been limited (Shapiro and Coleman 2000). Noted scholar on reflective practice Donald Schon proposes epistemological reasons for this:

...that the Scholarships of application, integration and teaching rest on a different epistemological basis than does the Scholarship of discovery. Schon (1995) contends that epistemology useful to practice stems from the type of knowledge that practitioners exhibit in situations characterised as unique, uncertain and complex. This form of knowledge springs from a process entailing first the

delineation of a problematic situation and then the development of strategies for possible solutions to the problem (Braxton et al. 2002, pp. 22-23).

In his conceiving the 1990 Scholarship domains Boyer visualised a symbiotic relationship where application was in service to social issues but also where these issues generated research agendas for the Scholarships of discovery and integration. In this way service was a Scholarship of mutuality in maintaining confident relationships with those external to the institution. As summarised by Braxton et al. by 1996 Boyer saw a need to revisit this domain concept.

The tendency to promote work within a discipline and to condemn research that had become popularised or useful to non academics (Jacoby, 1987) had led to a disengagement of academic research from the lives of the public and to a decrease in the public's confidence in the higher education system as a whole. Boyer made the interesting point...although apathy for service may be an internal [university] problem, an outcome is that external constituents no longer see a need to call on those most immersed in research for something as simple as gathering information (p. 29).

Johnston (1998) and Subotzky (1999) extend this contention. They point out that increasingly, universities, in resisting change, are losing their status as knowledge authorities. As Gibbons et al. prophetically reminds us: 'In the future universities will comprise only a part of the knowledge producing sector and they are no longer in a strong enough position to determine what shall count as excellent' (1994, p.72). Another aspect of the changing modern university is that its intellectual ethos is increasingly driven by vocational disciplines. Unlike traditional disciplines these applied disciplines, with their emphasis on concrete, active and reflective ways of knowing and constructing knowledge (Rice in Braxton et al. 2002, pp. 21-22) maintain a vital link between the academy and their fields of social practice in service to society. In this way, 'knowledge is dynamic, constantly made fresh, and given new shape by its interaction with reality' (Lynton in Braxton et al. 2002, p. 30). In affirming the unique opportunity of this contemporary ethos of higher education to contribute in the current climate Subotzky draws upon Braskamp and Wergins' perspective:

Higher education will enhance its usefulness to society by becoming a forum for critical community dialogues, by advancing practice-based knowledge and policies as well as upholding the creation of theory based knowledge, and by utilizing faculty expertise in new ways – in short by forming new relationships (1999, p. 423).

Professional disciplines, such as those of UNSW's Faculty of the Built Environment (FBE) with their focus on engagement, practice and service are uniquely placed in universities to advance and enhance the Scholarship of Application. Their strong links with professional practice, industry and business not only provide a vital connection to community contexts but have the potential to act as a catalyst in reconfiguring the relationship between knowledge production, student learning, social consciousness and action for the public good. At the centre of this connection between the utilitarian and social value of professional practice is the student, the life long learner, the emerging professional, the person who will be engaged in practices of value that will be of benefit to society. While student engagement with practicum settings enhances their professional capabilities and introduces them to the practice settings of their

future careers it does not necessarily develop their empathy for others, a capacity to act in disciplinary service or even prepare them for active intellectual citizenship in a complex modern world.

In meeting this aspiration Service Learning is increasingly seen as an educational framework to affirm the civic consciousness of research university education as institutions reconstitute their contemporary roles as 'forums for critical community dialogues' (Subotzky 1999, p. 423) and as active partners in advancing knowledge, scholarship and community citizenship.

### **Service Learning**

Well recognised in the United States under the umbrella of community based learning (CBL) service learning is framed by critical educational theory. This theory emphasises student-centred learning where students, through curriculum-based projects that challenge their values and attitudes, become active agents for social change (Freire 1985, Hironimus-Wendt and Lovell-Troy 1999). It informs aspects of problem-based learning in medicine; project-based learning in engineering, architecture and landscape architecture, case study learning in business; community outreach programs in sociology; and practice in vocational disciplines such as law and optometry. Its pedagogical foundations are informed by John Dewey's philosophy of experience perspective, linking theory to practice, where student learning is an active engaged process of coming to understanding and active citizenship through interaction and reflection with actual problems in everyday community life. In drawing upon the American literature Mooney and Edwards (2001) provide a useful working understanding of service learning,

'The 1990 [USA] Community Service Act defines service learning as a method of learning in which students render needed services in their community for academic credit, using and enhancing existing skills with time to... "reflect on the service activity in such a way as to gain further understanding of the course content, a broader appreciation of the discipline and an enhanced sense of civic responsibility" Bringle and Hatcher 1995, p112' (Mooney and Edwards 2001, p. 186)

At the core of service learning in this view are the following key components. Firstly, consistent with Boyer's proposition in the Scholarship of Application, it is the community that identifies and defines the need, issue or agenda that they wish to have addressed through service learning. Secondly, community members are active participants, partners in the activities that the students, academic staff and institution engage with. Thirdly, service learning is intentionally integrated into the academic curriculum of the students degree program as a structured learning activity. In this way the rigor and relevance of disciplinary knowledge is understood, enhanced and revitalized through its application and practice in the community. Students, in collaboration with their teachers engage with 'discovery-based learning experiences' (Subotzky 1999) which actualise Boyer's Scholarship of Integration and Gibbons et al'. Mode 2 knowledge production, thus empowering the link between research, learning and teaching. In addition to enhancing expected academic competencies such as problem solving, critical and abstract thinking, complex reading and writing skills (Mooney and Edwards 2001) students and staff develop and extend important affective capabilities through working with and helping community groups in need. These include leadership, conflict resolution, self-confidence, group and teamwork, goal setting and achievement, social and cultural empathy (Ballantine and Phelps 2002).

The final key component of service learning is that it involves experiential learning (problem or project-based learning). Building upon Kolb's (1984) four staged model: *Concrete experience- Reflective observation - Abstract conceptualizing- Active experimentation*, this approach is premised on students being active (not passive) learners as they gain understanding of their disciplinary knowledge through reflecting on the experience of putting this knowledge into practical action. It recognises that every situation, context or problem is different or unusual and has the potential to be an opportunity for learning when reflected upon. Reflecting on the experience of the activity is a vital aspect of service learning, actively linking theory to community practice, research to learning, teaching to learning and the university to communities. As noted earlier, reflection is an integral and purposeful aspect of creative professional practice, a critical capability in dealing with 'uncertainty' in the age of *supercomplexity* (Barnett 2000) and implementing *inquiry-based learning* in research universities (Boyer 1998). Therefore service learning has the potential not only to be implemented at the discrete disciplinary or Faculty level but also to be framed as the ethos or mission of an institution as an organisation.

Of interest to following discussions in this paper is the intersection of the Scholarship of integration articulated as interdisciplinarity and the Scholarship of application, articulated as Service learning, demonstrated in three case studies, for projecting a revitalized intellectual citizenship in an Australian research university community.

### **Context for Case Studies**

In common with many Australian universities, during the period 1995 to 2001 UNSW engaged in an organisational and institutional restructuring process in response to the fiscal and policy climate of higher education. At that time the Faculty of the Built Environment was composed of five independent Schools<sup>i</sup>, each focussed on their traditional individualistic knowledge, professional practices with little interaction between staff and students of the various Schools. The then newly appointed Dean, Professor Tong Wu, guided a restructuring process, which resulted in the dissolution of the internalized-schools structure and the implementation of a single School and Faculty organisation. An overarching goal of this restructuring process was to energize the synergy between different staff, students, knowledge perspectives and practices in their contributions to the community and practice fields of the Built Environment.

Currently, the UNSW Faculty of the Built Environment (FBE) is one of the most diverse and largest of its kind in the world, encompassing a unique array of disciplines and professions. While research and Scholarship activities, doctoral and postgraduate coursework education are major responsibilities, the core of the Faculty enterprise is student learning in the undergraduate degree programs (approximately 1800 students)<sup>ii</sup> In keeping with the professionally-oriented experientially-based education model, the four design programs – Architecture, Landscape Architecture, Interior Architecture and Industrial Design have the design studio setting at the core of their academic programs.

Informed by UNSW academic goals directed to transdisciplinary combined degrees the intentions of the 1998 Faculty restructure were further enhanced by restructuring undergraduate degree programs to include elective courses firstly, from Built Environment disciplines and secondly from other UNSW disciplines. In this way students were encouraged to complement and challenge their own disciplinary learning by engaging in understanding and ways of working in built environment disciplines. This approach has led to creative curriculum-based

interdisciplinary courses and projects. It has also given risen to research and scholarly activities that provide opportunities for students and academics, separately and collectively to collaborate, share disciplinary knowledge and energise approaches to knowledge generation and its application in the public domain. This approach is a vital aspect of Boyer's 1998 model of *Reinventing Undergraduate Education in Research Universities*.

That the majority of the Faculty community has been able to energetically and productively move forward after a restructuring process, illuminates a number of positive factors that resonate with our discussions to date on revitalizing educational change in research universities.

Firstly, the Faculty is primarily composed of creative disciplines that have design thinking and practice at their core. Design differs from traditional academic disciplines that have entrenched methodologies or knowledge practices. For some it is considered to have limited *discovery* research focus; for others with its *marriage of applied science and artistry* (Schon 1988, p. 4.) it is interdisciplinary and integrative and perhaps most importantly, it is a discipline that embodies praxis through its mutuality of theory and practice. In this way it is a social discipline involving connections with people, contexts, issues and solutions beyond the institution. Involving student-centred learning, it is taught in the small-group tutorial setting of Design Studio. Therefore as a disciplinary practice it is focussed on student centred learning. As Quinlan et al. have noted:

The design studio demands traditional academic activities such as research, analysis and problem solving. It also involves craft and representational skills such as drawing, rendering and model-making. These activities and skills are mediated by social understandings, cultural backgrounds, lived experiences, and, finally, metacognitive or higher order thinking processes such as creativity, interpretation, improvisation, synthesis and reflection. (Quinlan, Corkery, Marshall 2003, pp. 1 -13)

Secondly, because of the accreditation of its programs by relevant professional institutions it is a Faculty that maintains strong links with its professional practice settings, particularly through its large group of sessional staff who practice in the fields of the built environment. Thirdly, because of these links it has a well-established tradition of service relationships and engagement partnerships with communities, thus building and revitalising disciplinary knowledge and practice.

Lastly, and somewhat ironically, considering the Faculty was one of the first at UNSW, it has a very flat academic staff structure; that is, there are very few professorial staff. A majority of staff have well-established practice backgrounds and life experiences that extend beyond the limitation of narrowly-focussed academic careers. Thus their disposition is to collaborate, be inventive and take risks in their academic work, to facilitate scholarship projection and educational change, as demonstrated in the following case studies.

## Faculty of the Built Environment (FBE) Case Studies

### 1.FBE Science Square Installation Project

#### *Interdisciplinary Design Learning as Service to a Research University community*



At UNSW a key strategic goal is to improve the quality and outcomes of the first year educational experience. To activate this goal Pro Vice Chancellor (Education), Professor Adrian Lee implemented in 2002 a yearlong multi-faceted strategy that was directed by Michele Scoufis of Learning and Teaching @ UNSW. It involved contestable grants to support innovative first year Faculty projects. As part of the grant, awardees participated in regular university-wide workshops involving students, academics and support services to share perspectives, resources and inform the projects. This culminated in a university symposium on first year learning and teaching at which the projects were presented and, finally, a monograph of the university endeavour was published, containing, Faculty projects, processes and outcomes (Wilson, Scoufis and Weiss 2003).

The experience of constructing design projects in social contexts external to UNSW in the company of fellow students and staff is a traditional and distinctive characteristic of FBE first year architectural education. In the current climate of a research university, providing opportunities for very large first year student communities to engage with experientially-based design and construction projects are very limited and operationally challenging. Success in gaining one of the UNSW First Year Innovative Learning and Teaching 2002 award grants meant that the Science Square Installation Project could continue this tradition and extend opportunity for practical experiential learning to all Year One students in their first session of university. As part of a strategic institutional focus this award project benefited from sharing resources and ideas with another two UNSW projects that explored the symbiotic relationship between theory and practical learning. However, the project was unique among the funded projects because it was the only one that set out to engage with all disciplines of a Faculty grouping.

The Science Square Installation project involved over 350 first year students from five Faculty programs, working in 44 discipline-specific teams. Twenty-seven academic and part-time staff, supported by FBE and UNSW facilities service staff and a major sponsor, *visyboard* guided the students, over several weeks in the design and construction of creative installations that were exhibited in the last sessional week in the UNSW public plaza known as Science Square.

The award project was informed by disciplinary knowledge specific to the separate design course curricula in Architecture, Landscape Architecture, Interior Architecture and Industrial Design and the Communication and Construction courses of the Building and Construction Management program. Staff in each program met regularly to discuss and coordinate the differing design and construction projects and in turn met with staff of UNSW support services. In all projects, students in each program worked together in installation teams, responded to a

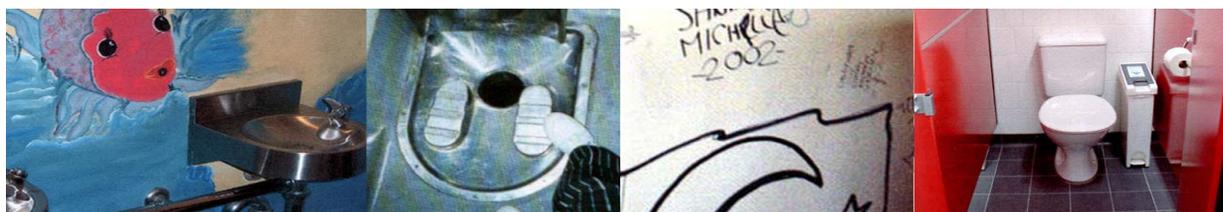
student-selected location in a shared site context. Projects were constructed of recyclable and sustainable materials and they were all installed and exhibited at the same time. An interactive Faculty website outlined all projects, provided information on materials, resources and the site context, as well as documenting through images and text the various development phases of the differing projects.

At the institutional level, an important goal of this project was to make visible and public to the UNSW community the processes and outcomes of active engaged student learning – to celebrate the veracity and realism of inquiry-based first year learning in a research university. In demonstrating aspects of synergy between differing staff and students as well as between FBE knowledge and practice perspectives, this project enhanced FBE community building and contributed to enhancing discussion and debate between FBE discipline communities about resonances and differences that could be explored in interdisciplinary research and curriculum projects. Embedding the project in the five FBE curricula affirmed the importance of experiential learning in making disciplinary knowledge meaningful, challenging and relevant through practical and active realization of ideas. The exhibition of the installations provided opportunities to learn about other FBE disciplines and their practices and this was reflected upon in student process journals. It also affirmed to all students that their future career contributions will occur as professionals in the public domain. The project valued student peer learning and working in culturally and socially diverse teams. It encouraged and facilitated, self confidence, leadership, mediation and persistence as well as risk taking, creativity, innovation, persistence and experimentation in the exploration of ideas, sustainable materials and assembly systems.

This case study describes a project that productively implemented at the institutional level, Boyer's Scholarship of Teaching. At this level it also demonstrates an approach to implementing key actions for educational change in Boyers' 1998 proposal for *Reinventing undergraduate education in Research Universities*. In particular, the actions of *Constructing an Inquiry based Freshman Year*, *Removing Barriers to Interdisciplinary Education* and *Cultivating a Sense of Community*. In demonstrating an approach to the Scholarship of Integration it illustrates how different modes of interdisciplinarity can be operationalised and acted upon, even in first year learning settings and despite administrative limitations such as timetabling. In implementing an approach to the Scholarship of Application it affirmed publicly the interaction and outcomes of theory and practical learning. As service learning the project responded to an issue identified by the institution and worked with the institutional community to explore avenues for benefiting the constituents of that community. In the process, knowledge about enhancing first year educational experiences is shared and enacted upon so it can be revitalized in response to the specificity of the UNSW community.

## 2. Children: Toilets: Schools

### *Interdisciplinary Design Learning as Service to Social Agency*



With knowledge of the interdisciplinary educational framework of the FBE, UNSW Chancellor Dr John Yu, in his capacity as inaugural chair of the expert advisory panel for the NSW Commission for Children and Young People (CCYP), approached the Faculty with a research need identified in consultation with schoolchildren of NSW. The authors saw this need as an opportunity to establish a research course, Children, Toilets & Schools, in the undergraduate Faculty elective curriculum, connecting student design learning with community needs. It built upon their own expertise as design practitioners working in an academic context and the authors recognised the potential in generating understanding of children's perceptions of design qualities that could enhance an important aspect of their lived-experiences of schooling.

Formulated as a credit point bearing interdisciplinary research elective course in 2002, the project was offered to years 2, 3 and 4 undergraduate students in the four design-based programs – Architecture, Landscape Architecture, Interior Architecture and Industrial Design. Fifty-five expressions of interest were received from across the FBE student design community. This was a substantial response rate considering the number of electives offered each session by the seven Faculty programs. Subsequent briefing meetings with students revealed that for many they had deliberately selected this course so they could interact with other disciplines and contribute to a community need. Interestingly all eight students who continued and completed the course were women enrolled in Years 2, 3 and 4 of the Architecture, Landscape Architecture and Interior Architecture programs. Structural issues such as timetabling, credit load and core program courses prevented many students from acting on their expressed interest but they indicated a strong desire to be involved in future project developments. For the authors, this student feedback illustrates Boyer's 1998 contention that *barriers to interdisciplinarity* are often caused by a research university's operational organisation. It also suggests that students, particularly women, are predisposed to interdisciplinary learning that enables them to make social contributions as part of their degree program.

In preparing for the course a preliminary literature review revealed surprisingly limited Australian and international knowledge relevant to the subject of school toilets. The review revealed a research need, informed by differing disciplines such as medicine, biology, ergonomics and facilities management but not necessarily a focus. This allowed the 'problem' of school toilets to be informed by the undergraduate students' own disciplinary knowledge contribution and experiences. In defining stakeholders who could answer questions the scope quickly broadened from school children to a stakeholder 'network', including parents, teachers, cleaners, health professionals and government. Engagement with these groups revealed not just acquiescence, but a genuine willingness to be involved. The inference was that all groups in the 'network' were aware of a real and urgent need for action in an area that apparently fell just 'outside' the borders of anybody's responsibility.

In this curriculum course, six research projects evolved with strategies and methodologies suited to the students' educational experiences and areas of study<sup>iii</sup>. An expert researcher from another university validated the reliability of the student research and in keeping with the principle of community partnership students presented the outcomes of their research projects and invited community response to their projects published on the FBE website<sup>iv</sup>. As an issue of community importance it generated significant Australian media interest simultaneous to the release of a report in the UK, which generated British and European media interest. Dr John Yu and Gillian Calvert, the NSW Commissioner for Children and Young People (CCYP) recognised

the potential in the student research. The CCYP formed a steering committee to explore opportunities for national collaborative funding partnerships between universities, government agencies and community to serve the needs of all NSW schoolchildren by improving the condition of toilets in schools. In this ongoing collaboration the UNSW Research office has assisted the CCYP in developing a strategy to advance this goal, thus extending the partnership between differing universities, academics and operational units with community groups, statutory agencies and state government departments.

This case study describes a project that demonstrates how Gibbons et al'. (1994) Type 2 Knowledge production can be activated in research universities when solutions to an identified community need are generated through inquiry-based interdisciplinary research projects embedded in the curriculum. It implements Boyer's 1990 vision of the Scholarship of Application as a symbiotic inquiry relationship between universities and communities, where communities and students are active partners in the creation of social knowledge of public benefit. There is great potential for this research project to evolve into a genuine service learning opportunity with the identification of individual schools and education administrators to undertake site-specific work. Additionally, there have been expressions of interest from industry to engage with the authors in investigations that could lead to more formally recognised and nationally funded research through an ARC Linkage grant.

### **3. Green Square: evolving square**

#### ***Interdisciplinary Design Learning as Service to Community and Disciplines***



Through public and community interest generated by the previous case study, and the authors' relationship with industry and practice, ideas for the Green Square Project were conceived and implemented in the 2003 academic year. The authors were approached by two organisations: one a New South Wales Government statutory body and the other, a private foundation. The first, the South Sydney Development Corporation (SSDC) was established to oversee the development of the Green Square precinct. The other group, the Hornery Institute, is a private philanthropic organisation of the property development corporation Lend Lease, committed to building "social capital" in urban areas that are undergoing major social transformations as the physical structure also changes. Both groups recognised a unique opportunity to involve FBE design students in a project that would contribute to the evolving sense of community in this gentrifying area of the city. The authors recognised an opportunity for a unique service learning experience that extended opportunities for interdisciplinary learning.

Green Square is a redeveloping precinct of South Sydney. Characterised by historic industrial land uses and associated worker housing, the area has now been largely rezoned to accommodate large-scale redevelopment for medium to high-density residential uses. While some of this redevelopment activity has been implemented, the precinct will continue to evolve

over the next 20 years. The Town Centre Plaza, which was the focus of the design studio project, will in three to five years be the “heart” of this new precinct.

The project involved a collaboration of two Year Three core design studio courses – one comprising architecture students, the other landscape architecture students. Their studio leaders ran parallel 14-week programs that had several points of exchange and interaction, giving the students an experience of each other’s design practices, processes and outcomes. For the landscape architecture disciplines, this third-year design studio is when the students begin to understand the connection between design conceptualisation and the documentation of their ideas for construction. The first seven weeks of the studio are for design ideation, and the second half is for detailed design development and documentation of the creation. In the second half of their third year, architecture students have an option to choose a studio that addresses a project in the public domain and takes into account social factors, such as neighbourhood change and placemaking. The design brief for the architecture studio states: ‘The studio reviews the principles of urban design and guides students through urban design methodology through an appreciation of strategic planning, and exploration of implementation through specific design intervention’ (Toohill 2003, p.2). The studio convenors aimed for a balanced number of architecture and landscape architecture students, so there were about 30 students involved in each of the two studio groups, working with four design studio leaders and design tutors.

Consistent with the principle of service learning, the two “client” organisations, SSDC and the Hornery Institute, worked as partners with the studio convenors in planning the studio program. They attended the initial class meetings, providing background briefings on the development process and an overview of the master planning. These sessions modelled professional project briefing sessions. The multi-disciplinary design team that won the Green Square design competition also presented their concepts to the students, providing insights into the way design disciplines interact in practice, and also how their work interfaces with planning and development processes. SSDC personnel attended mid-session and final reviews of the students’ work.

To facilitate the interdisciplinary structure of the program, the students were assigned to working pairs, i.e. two architects working with two landscape architects, to share resources and perspectives on the early analytical aspects of the project. The disciplinary groups worked on the project in parallel according to their own timetable but coming together at key points in the session to present to each other, e.g. following site analysis, at the conceptual design stage, and with their final design propositions. These points of interaction were critical for students to witness each other’s design process, and for each group to reflect on how differently, or similarly, they approached the task at hand, as well as to review each other’s assessment procedures. Client representatives were also in attendance at these reviews as guest critics.

On the ‘continuum’ of interdisciplinarity, this project represents a slightly different aspect. The students (and staff) bring to the studio foundational knowledge and expertise in their individual discipline and practice consistent with two and a half years of study. Additionally, they display fairly well formed attitudes and values about their own and other disciplines. Through the joint studio structure, the students are engaged in a common endeavour with students from another discipline, but approach it with their own frames of reference. At points of interaction throughout the semester, they are challenged to consider the differences and similarities in the design methodologies exhibited by their colleagues and to reflect on how this may influence their own disciplinary thinking and practice.

Like the First Year Science Square project in the first case study, the project context is the generator for the interdisciplinary interaction and focus. Importantly, the Green Square project links directly to the Feb.'s strategic goal of encouraging more structured, curriculum-based interaction between its programs. This project trialed an innovative arrangement for the design studio setting that was not without its difficulties. Again, Boyer's caveat about the institution's operational barriers comes to mind when issues relating to timetabling studio space for combined groups of students, from different academic programs are being determined.

A similar parallel studio structure was re-run in 2004, but with a different site, project and client. Feedback from the students and staff who participated in this second studio will become part of the cumulative data that will be used to analyse the effectiveness of this interdisciplinary learning and teaching experience and track the effectiveness of the studio outcomes. The authors imagine that this material will be central to documenting the value of the endeavour and making an argument for the continued, and hopefully increased, resourcing of interdisciplinary studio projects that contribute to the public domain of the built environment.

## Conclusions

In presenting the three preceding case studies, this paper has sought to demonstrate the potential synergies between universities and communities for providing unique teaching and learning opportunities and generating innovative solutions that benefit the public good. Boyer's scholarship domains of integration and application have been particularly appropriate in the conceptual framing of the projects themselves with the Scholarship of Integration addressing interdisciplinarity and the Scholarship of Application focusing on service. Additionally, the authors draw on Schön's notion of reflective practice to evaluate the outcomes of the learning and teaching experiences and our roles in those results. In all three case studies, we have assumed the action-research stance of co-learners and co-researchers with our students, and our community and industry participants.

These projects have focused on design learning and interactions with students from four design disciplines: architecture, landscape architecture, interior architecture and industrial design. As experienced designers and design educators, we are familiar with anticipating and managing the risk and *uncertainty* inherent in interdisciplinary endeavours, as Barnett describes, and in fact are exhilarated by the shared inquiry that is a hallmark of such undertakings. Again, this viewpoint allows us to be receptive to new forms of knowledge generated as a result of these projects, and to guide students toward a realization of their individual capabilities as future practising collaborators in the fields of the built environment.

Importantly, these case studies illustrate that productive social knowledge can be generated through collaborative interactions between the university, students in educational settings, government and its agencies, industry and community. In that process, new possibilities for teaching and learning have evolved, along with opportunities for raising awareness of social issues, and implementing educational change to advance the role of universities in contributing to the public good.

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<sup>i</sup> These Schools were Architecture, Building and Construction Management, Landscape Architecture, Industrial Design and Town and Country Planning.

<sup>ii</sup> Architecture, Landscape Architecture, Interior Architecture, Industrial Design, Building and Construction Management, Geography and Planning.

<sup>3</sup> The student research projects were 1. Hygiene, security and privacy in primary school toilets, 2. Kindergarten children and stand-alone toilet blocks, 3. Cultural understanding of toilets, 4. Vandalism and graffiti in school toilets, 5. Ergonomics of children's toilet design, 6. Comparing elements of primary school toilets. Research techniques ranged from questionnaires and surveys to observations based on drawings and photos of existing conditions. For a more detailed review of the projects see <http://www.fbe.unsw.edu.au/exhibits/ChildrenToiletSchools/> and <http://kids.nsw.gov.au/exchange/12/schooltoi.html>