

Using frameworks to cross interdisciplinary boundaries: Addressing wellness

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Abstract

Increasing interest is seen at the intersection of architecture and health. The built environment has become associated with a number of negative health outcomes including obesity, cancers, and diabetes. Engaging design students in these inquiries surrounding health is integral in preparing them for future practice. This paper reviews the conceptual development and tested implementation of an interdisciplinary course focusing on the wellbeing and overall health of the occupant, using primary and secondary framework structures in the vein of Groat and Wang's logical argumentation. The reviewed course engages interdisciplinary teams composed of students from the School of Architecture, the College of Engineering, and the College of Natural Resources, with private practice. The course puts forth an effort to break out of the conventional pedagogical structure found in architectural education, primarily the studio and large lecture spaces. The course has been specifically designed to: (1) establish a framework for common content relating to health in the built environment across disciplinary boundaries; (2) build meaningful partnerships between interdisciplinary student groups; and (3) establish a common vocabulary between architectural education and aligned disciplines regarding health and the built environment. The course structure, activities, and assessments are reviewed, proposing a solid framework for including integrated design and themes of health in architectural education.

Keywords: design pedagogy, health, interdisciplinary, logical argumentation, scaffolding

As concerns over health and sustainability in the designed environments become ever- more complex, it is increasingly difficult - and irresponsible - for designers to cling to their claims of the singular creative genius. The occurrence of designing in a vacuum is certainly less prevalent than it has been in the past, and professional architecture firms are increasingly looking to new perspectives, increased engagement with end users, and insight from other expert fields, such as epidemiology or psychology. However, conversations can be stilted and cumbersome until the point at which team members are familiar enough with each other to have more easy, meaningful conversations and collaborations. In academia, familiarity is difficult, particularly outside of a faculty's or researcher's home expertise. This paper addresses the notion that established frameworks can be used to lighten the burden of the initial conversations, paving the way for more meaningful collaborations in research and teaching.

Literature Review

One of the biggest challenges in design education is the creation of opportunities for design students to participate meaningfully in interdisciplinary groups. Several design

fields and professions, and any number of other disciplines in higher education's ivory towers, have traditionally been separated, each clinging to their own areas of expertise for required and even elective coursework. This relegates most possibilities for interdisciplinary partnerships to other similar fields under the same design umbrella. For instance, architecture and landscape architecture might work together in a partnership which would, technically, be interdisciplinary by definition. Collaborations such as these, partnering architecture students with landscape architecture, planning, or interior design students, are more common in both case studies and in design practice (Rider, 2016).

Large lecture courses have difficulties in facilitating meaningful interdisciplinary experiences, and these are most likely the types of courses in which design students actually see other disciplines. In other words, these larger courses are likely their only class-based opportunities to engage in meaningful inter-collegiate and interdisciplinary partnerships. With the growing awareness of the complexity of issues that need to be addressed in the built environment, which require interdisciplinary teams and integrated processes, both practicing and future designers are realizing the need to improve collaborations and dialogue with other disciplines (Keeler, 2009; Yudelson, 2009; Deutsch, 2011; Reed, 2009). Literature illustrates that courses using interdisciplinary teamwork engages students at higher levels, simulating actual dynamics of communications and projects that they will likely come across in the working world (Smit & Tremethick, 2013; Fixson, 2009; Rhee, 2010). Because no built environment projects can be completed without interdisciplinary collaborations, these types of educational experiences can have lasting implications for students after graduation.

Unfortunately, the lynchpin of architectural education - the studio - is also what causes the most difficulty with interdisciplinary collaborations. Potential collaborators in disciplines outside the design fields, such as engineering, do not have the history, credit structure, or cultural understanding to easily, meaningfully participate in a studio course. The sheer amount of time allocated to the studio course, both in and outside of official class time, is difficult for other disciplines to comprehend. While studio is the preferred setting for interdisciplinary collaborations, where most meaningful connections are established between design concept and implementation during education (Kurt, 2009; Schon, 1984), interdisciplinary engagement is not easily accomplished in this venue due to logistics.

While some architecture programs have been making strides in establishing successful and repeatable methods for true interdisciplinary learning in a studio setting, other opportunities do exist for architecture students to engage meaningfully with other disciplines on campus in a classroom setting. This profiled course is one such opportunity.

Research Methods

This research methodology is primarily theoretical, in the vein of logical argumentation, with the goal of framing a broad explanatory theory (Groat & Wang, 2013). The development of this new theory was then implemented and preliminarily tested in an

interdisciplinary class setting. The development of the theory and argument is built upon *first principles*, outlined in the literature reviewed above. The goal being, as such, to take one further step in organizing wide and varying realities into a comprehensible framework so that others are free to work within the newly established framework without having to redefine and constantly reconsider the parameters in which they are working (Groat & Wang, 2013).

Groat and Wang (2013) identify four strategic principles of logical argumentation, which this study aims to address: (1) *Paradigmatic Innovation*, (2) *A Priori Argumentation*, (3) *Interdisciplinarity*, and (4) *Primary and Secondary Frameworks*. Each of these elements was strategically identified in the developing theory, working to create a broad theory that was strong and appropriate for implementation and testing.

This methodology makes use of abduction, involving *educated guesses*. In this case, a correlation was identified between the process and outline of teaching an architecture course focused on health and well-being, and the pedagogy for teaching a course on healthy places through the lens of public health. The potential crossover in pedagogy was noticed after a discussion of how collaborators from different fields, specifically architecture and public health, might begin to structure a co-taught course. After preliminary discussions, a paper proposing the parallels between the two practiced approaches was crafted and submitted to a conference, continuing the discussion and further supporting the need to develop an overarching theory. This parallel between the two pedagogies was perceived, without any hard evidence, to be a potentially illustrative case for a larger rule, though no focused exploration had happened to give support to the relationship.

Discussion: Review of Theory Development

The intent of creating a logical framework “comes with practice in a particular way of seeing connections between disparate elements in a field of information, with a desire to frame them into large but succinct explanatory networks.” (Groat & Wang, 2013) The following discussion refers back to the four strategic traits identified above by Groat & Wang (2013): (1) *Paradigmatic Innovation*, (2) *A Priori Argumentation*, (3) *Interdisciplinarity*, and (4) *Primary and Secondary Frameworks*. These pieces were each addressed individually as the concept for the theory grew in strength and clarity. The theory generated by the process of developing a logical argument was then applied and tested in the classroom.

Paradigmatic Innovation

The established theory looked at the more common structures for design courses, primarily major-only studios and lecture courses, and attempted to establish a course structure that neither fit into the two popular course descriptions or was restricted to only design students. The course’s emphasis on a team approach to both conceptual and evidence-based assessments strategies was unquestionably valuable for the students. One graduate student noted that, “Rather than being taught at us, which is usually the case, the students played an integral part in providing data and analysis. Having spent nearly half a

decade in school, I have grown tired of teachers leading us down a winding road. One in which our skills are not tested and we are not challenged to excel and progress. This progression is not so for this course. We had the opportunity to learn from professionals outside of our fields. This challenged me to be comfortable communicating with my peers as well as the university faculty.” (Rider & Bowen, 2016)

The common frameworks to be used in the analysis of the project buildings were established and reviewed in the first five weeks of the semester. This foundational work up front supported the student teams in establishing effective means of communication by having a common understanding of concepts, goals, and terms. This clarification allowed the groups to be able to work more efficiently toward a meaningful final assessment. Given this, the WELL framework presented to students to establish a level of common knowledge successfully addressed the difficult issues of challenging communication in interdisciplinary teams (Hall et al., 2004; Dayton & Henriksen, 2007; Rider & Bowen, 2016).

A Priori Argumentation

One of the fundamental “known” truths, as established in the literature, is that complex issues of society and the built environment, embodied in many issues that need to be tackled in practices surrounding the built environment, need to be addressed through interdisciplinary teams. As noted, increased understandings of the issues that need to be addressed necessitate both interdisciplinary teams and integrated processes (Keeler, 2009; Deutsch, 2011; Reed, 2009).

Similarly, extensive literature focuses on benefits of interdisciplinary collaboration in higher education (Rider & Bowen, 2016), speaking to increasing student production and nurturing professional proficiencies (Blackburn & Chapin, 1994; Hackett & Rhoten, 2009; Robinson, Sherwood & Depaolo, 2010); accurate overarching teamwork issues such as communication difficulties and expertise (Spelt, Van Boekel & Mulder, 2016); and necessary interdisciplinary efforts to work within the growing emphasis on sustainability and complexity (O’Rafferty, Curtis & O’Connor, 2014). The theoretical framework for this course addressed many of these issues through both frequent class exercises and group deliverables (Rider, 2016). As such, the logical framework developed for testing in the class was built in part on these a priori truths.

Interdisciplinarity

One of the fundamental components of the developed theory on course structure surrounded interdisciplinary work, and worked closely with the trait of A Priori Argumentation. A course only opened to architecture students would not support this theory, nor would a course with a ratio or 5:1 design to non-design majors. A post-course survey hosted through a secured, online university server indicated that students had not participated in such an interdisciplinary, collaborative, project based academic setting before, and valued the opportunity (Rider & Bowen, 2016). One student noted, “I also liked that there were other students from different majors in the class. I think having the variety of different majors in the class helped us learn from different perspectives.” (Rider & Bowen, 2016)

The structured interdisciplinary groups, which were a fundamental aspect of the course, ensured that students practiced engaging in conversations around complex issues. The frameworks used helped the students understand complex issues in areas of health and the built environment, across disciplines. These interdisciplinary perspectives exposed students to emerging issues in the realm of the built environment, which in turn will hopefully impact the design processes for the design students in the future. Addressing these complex issues through multidisciplinary perspectives, class participants will be better prepared for their future professions, and began to understand the importance of addressing complexity (Johnson et al., 2010; Rapoport & Kantor, 1967; Rider & Bowen, 2016).

Primary and Secondary Frameworks

The proposed theoretical structure for such a course was developed using primary and secondary frameworks to help structure the theoretical argument, and subsequently the proposed structure for a course. Because the primary challenge is to make sense for students from different disciplines on such an enormous topic, the WELL Building System was used as a previously existing, evidence-based structure for organizing the complex issues that the student teams would need to address. No students had previous experience with the WELL Building System. However, many had heard of or engaged with the LEED Rating System family in some capacity, which helped to orient them on the more specific focus of the WELL Building Standard. Using this familiarity with the LEED systems, this proposed course used the clear and familiar LEED structure to establish a larger, primary framework for students. This enabled the students from the different disciplines to understand a larger framework, and where their expertise fit into that framework, before delving into a newer, more detailed, or more expansive scope - a secondary framework of the WELL Building Standard.

This scaffolding allowed the students from various backgrounds to understand not only the variety of issues that they were going to tackle in detail, but how these issues fit into the larger primary LEED framework that they were already familiar with. This helped to establish a structure for the incredible amount of information being communicated and used as building blocks over the course of the semester (Rider & Bowen, 2016). The structure also helped students across disciplines identify key terms used in their teams, possibly in different ways by different fields, which helped to facilitate conversation, debates, and collaborations. This structured system of primary and secondary frameworks was used to streamline communications and make teamwork more efficient, productive, and meaningful, which is acknowledged as a repetitive concern in the literature (Hall, et al., 2004; Minssen, 2006; Dayton & Henriksen, 2007).

Testing the Theory

Literature covering issues of health and the built environment typically focus on relationships between the built environment and health outcomes, mostly at the planning scale (Frank & Engelke, 2001; Frumkin, Frank & Jackson, 2004; Koohsari, Karakiewicz & Kaczynski, 2013; Besenyi, et al., 2014). Little literature addresses how to begin to incorporate these themes into architectural education (Rider, 2017). The resulting theory established the framework for an interdisciplinary course that could address the complexity of health and sustainability issues outside of the two primary delivery

structures of design classes, the studio and the large lecture course.

The test course was divided into three modules across the semester. In the first section, common and foundational content is provided to establish a foundation about how green building is currently, viewed, structured, and implemented in professions surrounding the built environment. While many students from the different disciplines arrived familiar with at least the concept of the LEED Rating System, few had actually participated in a LEED project. Because the course did not focus on LEED either as a strategy or as a final deliverable, the system review included in the beginning phase of the class was rudimentary. However, as noted previously, it served as a primary framework so was included as a fundamental foundation of how the students would begin to understand the topics and context that would be assessed during the semester. A guest speaker, a member of USGBC leadership, was engaged in class via an online platform to review the original goals and subsequent evolution of the LEED Rating System. His talk also included views on how different systems, such as WELL and the Living Building Challenge, might compare, contrast, support, or compete with the LEED system. At the end of this third of the course, students are able to begin to assess the roles and scopes of different systems, using case studies of notable green buildings for conceptual, basic assessments. This first module of the course addresses the establishment of primary and secondary frameworks from which the students can move forward.

The second third of the semester concentrates on understanding the details, intentions, and strategies that are included in different categories of the two secondary systems. This exploration is completed in strategically defined interdisciplinary groups, forcing students to communicate and assess strategies from different perspectives. The process encourages participating students to understand particular strategies from the point of view from their team members by examining and presenting systems categories, or petals depending on the secondary framework being addressed, and their requirements. The interdisciplinary teams were able to provide more holistic assessments of and approaches to issues to help deepen each student's understanding of opportunities and challenges within this complex topic. This second module of the course addresses the fundamental trait of interdisciplinary within the proposed theoretical course framework.

The final third of the semester focused on the conceptual application of the secondary systems to real-world projects, in partnership with professional firms. Students remain in interdisciplinary groups from the previous module where categories, credits, intents, and strategies were explored. During the final six weeks of the semester, the interdisciplinary teams met with the firms twice, to receive a brief of the project and for a follow up to discuss questions that may have developed during their research and strategy development. The final deliverable for the interdisciplinary teams entailed a public presentation about the findings from their explorations and the possibility of their firms' projects to attain certification in the secondary systems (Rider, 2017). The presentations each had to be representative of the range of student expertise within the groups, and propose interdisciplinary strategies to conceptually meet the required thresholds.

This proposed theoretical framework for a phased course structure was created to meet

three goals (Rider, 2017). First, to establish primary and secondary frameworks on which to build common knowledge that students from differing disciplines could understand, translate, and conceptualize in the built environment. Second, to engage interdisciplinary perspective and partnerships to actively and collaboratively build upon the knowledge established from the frameworks. And third, to be able to apply these frameworks, and the subsequently new knowledge, from a mixture of perspectives to a real-world project.

Effectiveness and Assessment

The structure of the course and the course goals were assessed through self-reported pre-test and post-test data on hard copies during class, without gathering any identifiable marks from the students. The preliminary goal of both the pre-test and post-test was to begin to understand the perceived level of knowledge gained over the semester (Rider, 2017). The pre-test was distributed on the first day of class, immediately after reviewing the syllabus, all expectations, and the timeline for the course. The post-test was distributed on the very last day of class, but before the final presentations. Statements to be addressed were associated with a Likert scale, asking about different knowledge regarding health and the environment, covering perceived understanding of strategies, thresholds and resources. Directions were, *Please rate your perceived current level of knowledge in each of the following on a scale from 1 to 10.* Statements included *How buildings impact human health* and *Rating systems available beyond LEED to measure the impacts of the built environment.* (Rider, 2017) As illustrated below in Figure 1, pre-test and post-tests from the introductory class indicate that the students believed there to be a significant increase in levels of understanding over the course of the semester, as well as in the acknowledgement and appreciation of interdisciplinary team members and perspectives.

Spring 2016 Pre-Test										
Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11
4.10	3.45	5.07	5.55	4.00	4.17	5.03	4.62	5.97	3.97	5.86
Spring 2016 Post-Test										
Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11
8.00	8.59	7.86	8.45	8.05	7.36	8.36	7.00	8.32	7.59	8.86

Figure 1: Pre-test and post-test results from introductory class

Conclusion

This proposed structure, bridging the distance between design education and public health, is a realistic model for meaningful, collaborative relationships between students studying the built environment and non-design students using established frameworks. The initial two offerings of the Beyond Sustainability course held at North Carolina State University resulted in a number of beneficial results, one of the most important of which was establishing comfort in collaboration between previously considered distant student disciplines (Rider & Bowen, 2016). To address complex issues in the built environment, the use of an established, evidence-based framework could be a key strategy for increasing collaboration between design and aligned, or not-so-aligned, disciplines in other Colleges.

The primary goal of using an established framework in an interdisciplinary graduate architecture course was to enable student participants to acquire a well-rounded

understanding of complex considerations needed for future designs in the built environment. The successful implementation of the proposed framework in this repeated course indicates that interdisciplinary projects can be meaningful in a design-based seminar setting, demonstrating that students from different disciplines and home Colleges can form significant, productive partnerships over the course of a semester (Rider & Bowen, 2016).

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Author Biography

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