Pedagogical Insight from Complementary Fields:

Engaging Sustainability through Environmental Education and Curriculum Theory

Traci Rose Rider, North Carolina State University

Abstract

With the emphasis on sustainability and green building continuously growing in both practice and academia, it is important to explore complementary fields that could provide insight and guidance on the inclusion of these themes within formal architectural education. In the absence of a multitude of published works focusing on sustainability in design education, it is beneficial to look to other fields for commonalities. The purpose of this article is to explore the fields of Environmental Education (EE) and Curriculum Theory in search of potential influences to help assist in the much needed shift toward environmental integration in formal architectural education. A number of themes exist within EE literature that can be applicable to architectural education such as systems thinking (Kohak); program and course management (Kim; Moody et al.; Yeung); affective components, such as the use of feelings within courses and designs (Moody et al.); and applied knowledge versus foundational knowledge (White and Mayo). Curriculum theory literature illustrates how connectors between courses and recurring themes in courses and overall curriculum outline a framework and touchstone to establish learning priorities. Though the educational tradition within architecture is important and revered, this is a time for reflection and adaptation. Long-standing traditions do not need to be dismissed, but can be shifted with insight from other fields that have developed research where translations are appropriate. The Environmental Education and Curriculum Theory fields are ripe with insight applicable to the integration of sustainability themes in architectural education.

Introduction

Acknowledging an attention on sustainability that is permeating modern culture, it is increasingly necessary to reflect on the methods being used to teach sustainability themes within architectural education. Traditionally vague and foreign to other disciplines, the pedagogies and structures within architectural education are built solidly on both tradition and repetition. The scaffolding structure of the curriculum is rigorous and uniform; a focus on the integration of new themes is rare. While architectural education rarely looks beyond the boundaries of its own world through the history and culture that has developed over time, a daunting task such as the integration of sustainability makes it essential to move beyond the traditional scope and considerations. Though sustainability is being addressed more frequently in higher education literature, the number of published works focusing on sustainability in design education is small; we must look to other fields for insight. Two fields that have much to share are Environmental Education and Curriculum Theory. The goal of this paper is to highlight similarities with the field of Environmental Education and Curriculum Theory, and underscore possibilities for insight into the integration of sustainability themes in architectural education.

Environmental Education

The field of Environmental Education (EE) has its formal roots in the early 1970s, and is a field that is constantly evolving. While the scope of EE started out focusing on topics such as nature study, outdoor education and conservation education, overtime additional topics began to be incorporated into EE's reach, including solid waste management, land-use management and energy use (Hungerford). With the expansion of issues and the inclusion of additional complexity, the Tbilisi Declaration was crafted at a United Nations Educational, Scientific and Cultural Organization (UNESCO) conference in 1977 held in Tbilisi,

Georgia (USSR). In an article published in *Connect*, the UNESCO/United Nations Environment Programme's (UNEP) joint Environmental Education Newsletter in 1978, the Tbilisi Declaration charged the EE field to focus on environmental problem solving, suggesting a focus for the educators in the field (UNESCO/UNEP).

EE now not only examines K-12 education through its root focus on outdoor education and nature study, as is most popular and identifiable to other fields, but has also developed extensive literature on the integration of environmental themes into courses at the university level. A number of these methods and suggestions can be easily applied to and are important in the development of architectural curriculum, and can lend valuable insights to architectural educators interested in the integration of sustainability.

Many of the considerations, goals and challenges for EE are exceptionally similar to those of sustainability and green design in architectural education, as evidenced by the following excerpt from the Tbilisi Declaration:

> …environmental education should provide the necessary knowledge for interpretation of the complex phenomena that shape the environment, encourage those ethical, economic and esthetic values which, constituting the basis of self-discipline, will further the development of conduct compatible with the preservation and improvement of the environment; it should also provide a wide range of practical skills required in the devising and application of effective solutions to environmental problems. (UNESCO/UNEP)

The foundational issues of EE as noted here, such as addressing "complex phenomena shaping the environment," balancing "ethical, economic and aesthetic values," "self-discipline," and "the devising and application of effective solutions to environmental problems," all speak directly to training the future leaders of and practitioners in the green design movement. Given the similarities in goals, though notably with different contexts, EE advocates and suggests a number of different implementations that can also be seen in, or applied to, architectural education. These include the creation of context, issues with management and assessment, and the importance of affective components within the education process.

Creating Context

One of the common concerns found between the two fields of EE and green design education revolves around the intertwined issues of scope, complexity, and context. Specifically, the interconnectedness of issues within each field continues to grow, and with that expansion comes the challenge of incorporating additional issues into courses and curriculum. The questions become:

1. What concerns are realistically within the scope for a certain course (or semester or year or program)?
2. How are the selected issues managed without overwhelming the students, but still ensuring that they are aware and equipped to address an array of environmental concerns as they arise in the profession?
3. How is scope and complexity addressed within courses and curriculum to create context for the issues, enabling comprehension and problem solving skills to develop appropriately?

In EE, these issues are often addressed through systems thinking, incorporating ecological and societal systems beyond the traditional scope of a more narrow course or topic (Cortese; Zoller; Gough; Martin; Stephens et al.; Kohak; Sobel). By broadening traditional topics and connecting them more readily to related issues, concerns and possibilities, EE breaks apart the linear and encapsulated "subjects" and exposes students to a more accurate understanding of linkages, problem solving, and cause and effect. This creates a networked context enabling more informed decision-making.

Many faculty and practitioners in the green building design and sustainability movement support the design integration of systems within projects at all levels, from the educational level to real-world construction projects. These methods are often termed *integrated design* or *interdisciplinary design* (7group and Reed; Yudelson; Keeler). The basic notion behind this effort is that a building designed in a cyclical and integrated process, receiving input from all parties on a regular basis (owner, architect, engineers, ecologists, etc.) is able to better address potential barriers to sustainability, as well as capitalize on further opportunities, more readily than the traditional linear design and construction process. In this way, through repeated

conversations with other team members, each contributor is able to better understand and appreciate the larger systems and connections within a design from different viewpoints, enabling the team to capitalize on potential opportunities for efficiencies while eliminating would-be roadblocks at the same time.

Bringing this whole-systems perspective into the architectural curriculum, however, poses some difficulties. Similar to green building themes in architectural education, EE often finds that it is competing for exposure in an overcrowded curriculum, seen as yet another topic to address equally in curriculum structure (Barry). Architectural curriculum typically covers a vast amount of subjects in an already-expanded five- or six-year degree, and the thought of adding "supplementary" information to this crowded curriculum can make any educator's head spin. However, by integrating these themes uniformly throughout the existing curriculum, the larger subject of sustainability is broken down into manageable parts and applied to existing courses as appropriate, intertwining with existing subjects and courses without the added pressure of introducing another "strand" of topics to address. In other words, instead of incorporating a string of courses on sustainability and green building, highlight green building themes that already exist in history, design theory, materials, structures courses, etc.

As mentioned in the previous EE overview and shown in recent research on the topic of integrating sustainability into design education (Rider), enabling students to understand and address complex and multiplying environmental issues is an important consideration when looking at integration methods. Specifically, by providing architecture students with various frameworks that can help them comprehend issues, strategies and considerations throughout the design process, the overwhelming goal of living lightly on the land becomes more manageable. Some examples of constructs include the use of various green building rating systems and guidelines (including LEED, Green Globes and The Natural Step); emphasizing specific strategies at various levels of education; and using technologies such as energy modeling or the heliodon. In sum, it is important to provide students context and a framework that they can build upon to not only assist them in organizing their thoughts around an incredibly complex and ever-changing issue, but also provide a structure that can be modified as their knowledge, experience levels, and concerns grow over time.

Management and Assessment

Major barriers to integration of environmental literacy in higher education at the foundational level have been identified as program coordination, clarity of course or program criteria, and quality verification for courses offered (Moody et al.; Calhoun and Cortese). This suggests that sustainability integration is frequently felt to be important in the higher education realm, but there are often significant issues of management within departments and institutions. Issues are also cited within program and course management, such as how are environmental themes included at different levels and how they are assessed for quality and consistency (Kim; Moody et al.; Yeung).

Similarly, ecological literacy itself has been generally agreed to be an important inclusion to design programs (Gould and Hosey; Kim; Moody et al.; Yeung). However, the inclusion of these themes remains inconsistent both in individual programs and nationally. While there are often solid supporters at many accredited programs, they may serve as the only supporter, expert and lone advocate in the faculty body. There are also no guidelines with which to measure environmental and ecological themes within architecture programs, nor are there agreed upon goals or assessments for this type of integration. Unlike skills that can be measured through tests and licensing, such as structural integrity and occupant comfort, the introduction of many environmental themes is still so new to the field that no assessment criteria has been agreed upon.

Affective Components

Highlighting the work of the Tbilisi Declaration, the article *An Inventory for Assessing Environmental Education Curricula* notes an emphasis of awareness and attitudes in EE, supporting the importance of integrating of an affective component within education (Kim). In line with Moody et al.'s (2005) position that crafting elements within courses to specifically create and impact the feelings of the students, directors of EE programs cite emotions when describing their involvement and investment in the environmental fields (Reis and Roth). One participant in Reis and Roth's study (2010) says, "My general approach is having [students] fall in love with the world…" Then, referencing her own journey, continues, "…the heart of the matter is in the wetlands and I am totally in love with it…. Include all the parts, include the body, include the heart, include the soul, include the mind…." Another participant in the study "articulates the intertwined nature of emotions and the objectives of her program, which also suggests that students develop an emotional tie with nature after coming into contact with the environment. According to her,

emotions bring meaning to what students learn in the program." These examples of EE implementation suggest that affective and emotional components are integral to the effective inclusion of environmental themes in education.

This affective quality - relating to moods, feelings and attitudes - is frequently overlooked in formal education, especially in science-based fields such as architecture and engineering, but may be more easily accounted for in these types of programs' foundational tracks (Moody et al.). This affective, foundational level has been where most success is seen in higher education regarding environmental education, and where the most information is retained by students (Moody et al.). Within the pedagogy of inquiry-based learning at the foundations level, students are forming their own opinions, values and foundations for knowledge that comes later. However, it has been shown that educators place more emphasis on the integration of sustainability into the courses addressing applied knowledge instead of those concentrating on foundational knowledge (White and Mayo). This also produces a conflict between the most effective way to implement environmental education and the perception of educators as to the most valuable way to educate regarding the environment.

Though not regularly addressing any affective elements regarding the students themselves in architectural curriculum, there is frequent reference to the intangible qualities of design that any design students should consider, specifically focused on the occupants. Much time is dedicated within the studio setting to creating beautiful, resonant buildings that elicit certain feelings from the users and public. It would be difficult to argue that the instruction of design in any of the accredited architecture programs in the United States does not speak to emotion and feelings. Given this, the translation of these affective methods could be translated into the instruction of the material instead of rather than just as a product of the designs.

Environmental Education Summary

It may be that architectural educators interested in sustainable and green building themes begin to more readily refer to themselves as environmental educators in the formal sense, specifically identifying with the field that has been running on a parallel path since the early 1970s. As described by one EE supporter,

> Environmental educators attempt to provide the knowledge and skills people need to make wise decisions on environmental issues. Environmental educators help people examine the range of positions associated with environmental issues and encourage them to make their own decisions. They do not simply advocate one set of positions or values. Environmental educators provide people with critical thinking and citizen participation skills. They do not advocate particular actions but provide the skills necessary for people to be responsible citizens who can effectively make informed decisions. (Wilke)

These are goals and intentions seen frequently in formal architectural education, especially in reference to sustainability themes. By identifying with EE on issues such as the creation of context, logistic issues regarding management and assessment methods, and the importance of affective components within the education process, architectural educators can continue to move forward in understanding possibilities for and insights to the integration of environmental themes in their curriculum.

Curriculum Theory

Architectural faculty often have not initially focused on how to teach; they teach as they have been taught, or tweak their own personal experiences as students through an overlay of their own developed values and perspectives, which often result in a similar education method with maybe a slight shift in emphasis. While this has worked for centuries, the profession and concerns to be addressed in the profession are changing. Curriculum Theory can provide insight into the integration of sustainability themes into architectural courses and curriculum. One possible example is the notion of a "big idea," which uses larger constructs (themes) as connectors between ideas and strategies (Wiggins and McTighe). These types of connectors are already used in some architectural education programs, bridging the different topics to cover within a curriculum, depending on the school's particular focus. These connectors, and the recurring themes, in turn establish learning priorities. This type of educational strategy based in supporting common values within a program helps to find ways to integrate foundational themes into one course, a series of courses, or a whole curriculum as a touchstone to which each faculty and student can return. The

development of these types of theoretical constructs at any level - either across the field, in a specific program, or in an individual course - could greatly impact the retention and frame of reference around sustainability as students move into practice.

It is necessary that as society evolves, higher education curriculum evolves as well. This necessitates continued evaluation and updating of curriculum on all fronts, in all subjects. One of the primary topics covered within the education literature concerning curriculum evaluation is the question of *what* exact qualities are being evaluated and assessed during reviews. It has been proposed within the humanities that emphasis is placed on the actual content of courses, rather than the application of skills once an individual leaves the program (Helm). Helm also notes that it may be important to understand the true goals of the curriculum, rather than in terms of contents, such as how many of what types of courses are offered. This approach favors core values and foundational training instead of strictly catering to applied skills without a solid theoretical foundation, and combats the regurgitation of facts and skills on demand without the student critically questioning what or why.

More specifically, the issue of quality management within curricula is an important aspect of evaluation and is well-covered in education journals. Curriculum is frequently broken down into three specific aspects including *Quality of Design* (QD), *Quality of Conformance* (QC) and *Quality of Performance* (QP) (Widrick, Mergen and Grant; Mergen, Grant and Widrick). The *Quality of Design* category pertains to how well the curriculum addresses the consumer's requirements, which, in the scope of design curriculum, would be the greater field of architecture and possible employers; the *Quality of Conformance* criteria addresses satisfying the design requirements and traditional standards, such as the service being provided and the ultimate gratification of position and pay achieved by a graduate; and the *Quality of Performance* addresses the satisfaction of the end user, in this case the student's satisfaction with their experience. Widrick et al. (2002) propose measures to evaluate each of these three categories – quality of design, quality of conformance, and quality of performance - within a program's curriculum.

Similarly, Gilbert (2000) notes that there are three levels through which some research programs, such as doctorate programs, can be evaluated: quality of individual projects as noted by both the professors and the individuals themselves; the quality of the field of study itself and additional contributions to that field; and the completion of specific stated goals as well as the intrinsic worth of those goals from the beginning. Both frameworks reviewed thus far identify three major – and similar - criteria applicable to all educational disciplines. Though architecture and design are typically viewed as non-traditional in the overall scope of higher education due to the use of studios and the resulting culture, it can still be viewed through this established three-part framework of product, process, and experience.

The three-tiered framework broken out into additional categories of evaluation. Evaluative measures can also be addressed as *intrinsic* and *extrinsic* (Gilbert). *Extrinsic* issues deal with the ultimate "pay-off" of a program, such as achieving program objectives and goals; *intrinsic* issues address "questions about the worth or value of the stated objectives themselves" and question other outcomes that may not be addressed in published or stated objectives (Gilbert). Encompassed in the *intrinsic* values that Gilbert mentions are the curriculum values of *awareness* and *attitudes*, noted repeatedly in literature on environmental education evaluation (Kim).

Methodologically, a number of specific elements can be looked at in standard curriculum evaluation: courses offered and sequence, including course content and coverage of topics; appropriate faculty expertise; admission requirements; employer satisfaction of the new employees; type of employers recruiting; licensing board results; and starting salaries (Widrick, Mergen and Grant). Additionally, in research based programs such as doctorates, elements such as graduate satisfaction and research quality would be reviewed (Gilbert). While some of these elements such as salary, admission requirements, and recruiting employers can be quantified, other aspects are left to qualitative methods such as expert reviewers, especially in the case of the doctoral and research programs.

Another framework to reference when speaking about course development is 'Backward Design' as described by Wiggins and McTighe (2005). This design outlines the course development process by identifying the goal of the course first, and then identifying what elements in class may work toward reaching that goal with the students, enhancing the level of true understanding of a topic (Wiggins and McTighe). The notion of understanding is central to the course development process by highlighting 'big ideas' to prioritize learning, similar to the intrinsic issues noted earlier (Gilbert). This also mirrors the *Quality of Design* category reviewed by Mergen et.al (2000).

Wiggins and McTighe (2005) identify a 'big idea' as a theme that "connect(s) the dots for the learner by establishing learning priorities." They also use the term 'linchpin' as a descriptor for those big ideas; the key to designing courses that work toward true understanding is to identify these 'big ideas' and deliberately design tasks around them, instead of touching on every

topic that might be of importance in each applicable subject. The subject matter addressed in courses can be categorized into three tiers. There are elements that are *worth encountering*, which would provide scope and context; things that are *important to know*, such as tasks and overarching theories comprise the middle level; and *core concepts* and 'big ideas' should be found at the heart of the course. In line with this idea of enduring understanding in course development, six elements are outlined to support the development of understanding: the ability of the students to explain, interpret, apply, have perspective, empathize, and have self- knowledge (Wiggins and McTighe). These six facets of understanding ensure that the core topic – or big idea - is wholly comprehended and the knowledge has transferability to other applicable realms. This can only truly happen when a deep understanding is achieved.

Understanding that skill-focused courses, as often found in fields such as engineering and architecture, are also frequent and important, Wiggins and McTighe (2005) outline tips for how to implement the 'big ideas' in this type of coursework. Specifically, they propose that 'big ideas' can be found in the following skill-based elements: the value of the skill and why it is desirable; underlying concepts that support the use and defense of the skill; issues of strategy and effective tactics about when the skill is applicable; and the underlying theory of the skill and why the skill is successful.

To summarize, according to the literature reviewed on curriculum evaluation, three primary perspectives must be assessed when evaluating curriculum: the final product, the process of getting to that final stage, and the individual's experience through the journey. Additionally, these can each be viewed through an *intrinsic* or *extrinsic* lens. Wiggins and McTighe's framework (2005) is similar in its emphasis on core values, as mentioned repeatedly in other curriculum theory literature (Helm; Mergen, Grant and Widrick; Widrick, Mergen and Grant; Gilbert).

In contrast, the evaluation of architecture programs generally consists of topics such as: program overview; providing support and opportunities to students; training students for participation in the profession; diversity within the student population; review of the self-assessment process; review of promotional media; sufficient human resources and support staff; physical and reference resources, including studio space, classrooms and library inventory; financial resources within the greater educational institution; and student performance (NAAB). In relation to the three-tiered framework of product, process and experience referenced previously and common in curriculum theory literature, the emphasis is primarily on the product and the experience, not the process. Regarding the *intrinsic* and *extrinsic* qualities, architecture programs are primarily reviewed with respect to extrinsic considerations, relating to graduates employed, literacy in skills taught, pay scale, etc. Reviewing the *intrinsic* element of programs is not as emphasized, looking at "questions about the worth or value of the stated objectives themselves" (Gilbert).

Conclusion

Shifting demands on the architectural profession, and therefore on architectural education, require that the standard educational methods seen in formal architectural education are frequently revisited. EE and curriculum theory literatures each have identified elements within their fields that can inform and help to develop sustainability themes in architectural education. EE relies heavily on systems thinking while battling logistical issues with assessment, standardizations and integration methods; similar trends and troubles are seen in architectural education. Additional awareness can be found in EE literature regarding the benefit of incorporating affective components into coursework to emphasize environmental themes.

Most importantly, EE and curriculum theory share similar perspectives on the integration of themes into courses and curriculum. EE emphasizes the creation of a framework to help orient students to the issues and concerns of the field, while the use of a core concept across curriculum is identified in curriculum theory literature as an important key to developing a touchstone and reference point for both faculty and students. Each field addresses barriers to the integration of a common theme throughout programs, recognizing potential methods for extended success. This paper illustrates the value of reflecting on the fields of curriculum theory and environmental education as a vehicle to establish relevant educational opportunities in light of the changing face of the architectural profession.

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