Using reflective journals in a sustainable design studio

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Abstract

Purpose – The purpose of this paper is to introduce a pedagogical method used in a design studio as part of a curriculum-greening process to encourage reflection on the complexity of sustainability and sustainable design. Online reflective journals were used in two semesters of a sustainable design studio to develop students’ awareness and understanding of concepts relating to sustainability and sustainable design.

Design/methodology/approach – In the first seven weeks of a semester-long senior design studio, interior design students recorded their reflections on readings and in-class discussions on sustainable thinking, sustainable actions and sustainable design. The content analysis of the journal entries (n = 226) of two such groups of students (n = 30) from two different semesters are presented in this paper. In assessing the pedagogical effectiveness of the technique in the design studio, Hatton and Smith’s framework on the four operational aspects of reflection – descriptive, descriptive reflection, dialogic reflection, and critical reflection – is used to discuss the levels of reflection in the journal entries.

Findings – All four levels of reflection are represented in the journal entries analyzed for this paper. Results indicate that depth and complexity of thought are possible to achieve within a semester long course and can be used as a starting point for design development using complex concepts such as sustainability.

Originality/value – The pedagogical effectiveness of reflective journal writing in a sustainable design studio is assessed. By adding a reflective writing component to a design studio format that otherwise primarily engages students’ visual and verbal skills, the paper offers one approach to greening the design curriculum.

Keywords Sustainable design, Design and development

Paper type Case study

1. Introduction

The education of future designers must include opportunities for constructing knowledge through an iterative problem-solving process of reading, assimilating, reasoning, and reflection. The use of one such opportunity – reflective journal writing – is used as a “scaffolding” pedagogical technique in an interior design (ID) studio to help students explore the complexities of sustainable design.

In design studios, pedagogical techniques engage students in individual conversations, informal and formal presentations and critique, and design explorations. Oral communication is recognized as a significant ritual and a rite of passage in design studio education (Dannels, 2005). The need for structured pedagogical content within design studios to improve oral communication has been addressed (Anthony, 1991; Morton and O’Brien, 2005), but writing in general, and reflective writing in particular, has not been addressed or included comprehensively; the main focus is on how successfully the student can orally and graphically (through drawings and accompanying visuals)
convey the design process and product. Kosidowski (1996) used a directed design notebook in design studio classes as a writing-to-learn activity, finding it offered students a way of making their design process more explicit. If incorporated, writing can be an important complement to graphic and verbal techniques in exploring the essence, complexity and particulars of the design. This paper discusses the usefulness of a reflective journal writing assignment in promoting ID students’ understanding of sustainable design.

Similar to other professions that prepare students for applications of skills in the real world, (e.g. engineering, nursing, or teaching) knowledge in design includes both knowledge-in-waiting (theoretical and practical base) and knowledge-in-use (what is being applied to situation-at-hand) (Spouse, 1998). The body of knowledge acquired by a design student should not only represent factual information, but also a way of thinking and reasoning that can be applied to future problem-shaping and problem-solving processes – that is, a way of activating the knowledge-in-waiting and transforming it to knowledge-in-use. In a field characterized by change, design students must assimilate new paradigms, comprehend emerging concepts and integrate them in design endeavors. A reflective, critical thinking approach has been identified as a necessary and effective mechanism in constructing this knowledge, especially with respect to sustainable concepts (Welsh and Murray, 2003).

Sustainable design has many complex layers including the underlying philosophy, the process and materials used to design in a sustainable way, and evaluation/certification efforts. The complexity of sustainability as a learning concept requires a multidisciplinary (Meppem and Gill, 1998) and sometimes cross-cultural (Vann et al., 2006) approach to assimilating it within one’s knowledge base. It is recognized that a higher and deeper level of preparation is required so that new graduates (Crofton, 2000) and those who teach them (Stir, 2006) are better equipped to deal with this complexity. Sustainable design principles are being integrated in various ID courses in United States curricula, some infused throughout the curriculum at different stages, and others in separate courses. This paper reports the use of student reflective journals in the first seven weeks of a seventeen-week senior design studio to encourage awareness and a deeper understanding of sustainable concepts. First, it presents the significance of sustainability in design curricula and the role of reflective critical thinking in design education. Next, it describes the context of the reflective writing assignment, that is, the course within which this opportunity was offered. Finally, it reports the categories for analysis and the results.

2. Significance of sustainability in design curricula
Sustainability is an important challenge for designers and is fast becoming a core aspect of design endeavors in different domains, e.g. architectural, interior and industrial design, etc. While many definitions of sustainable design abound (Bonda and Sosnowchik, 2007) the central challenge for designers includes balancing a need to conserve non-renewable natural resources with a need to focus on the health and well-being of inhabitants of the designed spaces, or users of the designed products. Instead of linear thinking or a “cradle-to-grave” approach resulting in the design of products destined to waste long years in a landfill, designers now reconceptualize waste as part of a “cradle-to-cradle” cycle in which useful material is retrieved successfully at the end of a product’s lifecycle and reused effectively (McDonough and Braungart, 2002).
Emerging standards such as Leadership in Energy and Environmental Education (LEED) continue to develop voluntary consensus-based criteria for evaluating designs resulting from sustainable choices. Environmentally conscious designers and their clients induce manufacturers to present evidence-based information pertaining to sustainability in product labels and material data sheets. As a result, designers are faced with new types of information that demand relatively quick but critical perusal before deciding on what, where and how to implement a sustainable approach and/or a sustainable product. Simple knowledge of existing products and manufacturers or existing ways of designing sustainably is not sufficient. Within their knowledge base, design students also need to build critical thinking skills to evaluate the information they encounter.

The critical role of education for sustainability is discussed as a multidimensional and transdisciplinary endeavor, involving different levels of formal (e.g. university) and non-formal (e.g. private and public organizations) channels (Martins et al., 2006). In interior design, the top national and international ID organizations, Interior Designers Educators Council (IDEC), American Society of Interior Designers (ASID), and the International Interior Design Association (IIDA), have all adopted sustainable agendas to reinforce that sustainability begins with a way of thinking, and that awareness and understanding of sustainable approaches results in better application of sustainable principles to design. As a result, the discussion and implementation of sustainable approaches continues to develop as a significant and central component of ID curricula in the United States. Working with sustainable concerns requires a holistic, systemic way of thinking and a mindset that encourages integrated design using a new collaborative approach to design. Also, because of the integrative, multidisciplinary nature of sustainable thinking and concepts, there is also a need to inculcate lifelong learning skills. The Council for Interior Design Accreditation (CIDA) that sets the standards for ID education in the US proposes that there is less emphasis on the designer as an “expert” and more on the designer’s skills as a “co-learner” (CIDA accreditation manual, 2006).

Several pedagogical responses address the changing nature of education for sustainability. Some approaches use an introductory course with breadth and some depth (Vann et al., 2006). Others use different pedagogical techniques within existing or elective courses, e.g. tying in real-world experiential learning (e.g. Domask, 2007; Karol, 2006) or organizing design charrettes (e.g. as described in Crofton, 2000) to expose the students to different viewpoints of sustainability. Pedagogical approaches in other fields (e.g. education – Davis, 2006, nursing – Chirema, 2006) have used reflective writing assignments to enable learning via critical thinking and reflection and help new graduates develop an integrated view of their work rather than merely juxtaposing views.

3. Using reflective journals for critical thinking
Critical thinking is a complex construct with multiple definitions in the literature that render it a challenging concept to unravel and apply, especially to practical situations such as design endeavors (Edwards, 2007). Attempts to apply critical thinking within higher education include opportunities for reflection and analysis. Reflection – a catalyst for critical thinking – is multifaceted (Boud et al., 1985; Wong et al., 1995) and has evolved with its usefulness in practice (Dewey, 1933; Mezirow, 1991) and is particularly manifested as reflection-in-action and reflection on action (Schon, 1983).
With its main emphasis on iterative problem-shaping and problem-solving and the integration of multiple perspectives, reflection has also been distinguished into unproductive and productive reflection (Davis, 2006). Unproductive reflection is merely descriptive without much analysis whereas productive reflection promotes effective learning and demonstrates both integration and analysis. Indicators of productive reflection include uncovering and questioning hidden assumptions, providing a rationale for decisions, considering and integrating alternative perspectives, and evaluating one’s thoughts and actions; of much value when trying to understand the complexities of sustainable design.

Of the various typologies of reflection discussed in past literature, the one that most resonates with the intent of this study is proposed by Hatton and Smith (1995). This typology contains four levels of reflection – descriptive (non-reflective), descriptive reflection, dialogic reflection, and critical reflection. The four levels are relevant to this study because they convey a progression towards critical thinking rather than a hierarchy. As Table I indicates, the first level is descriptive – there is only a reporting of facts, summarizing without really analyzing. The second, third and fourth levels increase in complexity and depth, leading to a demonstration of critical thinking, and reaching productive reflection. This progression in levels suits the intent of the reflective journal assignment described here in this study and the capstone-like course within which it was offered.

Reflective journals can foster critical thinking and have been used successfully in education and nursing to engage learners in a dialogue with theoretical concepts and to assess the applicability of concepts to real-world situations. Often referred to as “paper mirrors” (Hubb and Brand, 2005) journals reflect students’ internal thinking processes, and assist them in constructing meaning and progressing from what Mezirow (2000) calls “assimilated learning” (unchallenged automatic imbibing of facts) to “transformative learning” (more thoughtful critical analysis). Reflective writing is especially useful when new content is being processed for understanding; it helps students contextualize the information in a meaningful and useful manner (Elbow, 1993) and has been linked with enhanced course performance (Cisero, 2006).

<table>
<thead>
<tr>
<th>Descriptive (non-reflective)</th>
<th>Descriptive reflection</th>
<th>Dialogic reflection</th>
<th>Critical reflection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rote reporting of facts</td>
<td>Limited justification</td>
<td>“Stepping back” from</td>
<td>Awareness of multiple</td>
</tr>
<tr>
<td>Simplistic descriptions of</td>
<td>Consideration of</td>
<td>events and actions</td>
<td>perspectives, historical,</td>
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<td>events and literature</td>
<td>alternative viewpoints</td>
<td>Different levels of</td>
<td>and socio-political</td>
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<tr>
<td>No discussions</td>
<td>Reflection based on</td>
<td>discourse with self,</td>
<td>contexts</td>
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<td>beyond descriptions</td>
<td>personal perspectives</td>
<td>events, and actions</td>
<td>Logical interpretation</td>
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<td>or rationales</td>
<td>Use of judgments and</td>
<td>of events and actions</td>
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<td></td>
<td>Recognition of multiple factors</td>
<td>possible alternatives for explaining and hypothesizing</td>
<td>based on theory and practice</td>
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</tbody>
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**Source:** Hatton and Smith (1995)

**Table I.** The four operational aspects of reflection
The pedagogical procedures of using the reflective journal activity vary – some use prompts or scaffolding techniques to direct and focus the reflections (Harris, 2007) and some do not (Kember et al., 1999). Generic prompts are more successful in students achieving deeper levels of reflection leading to transformative learning when compared with specific prompts. For the reflective journal writing assigned in the current study, generic prompts were used in the form of general questions pertaining to the topic of discussion. The following section explains the course within which this assignment was introduced, and its structure.

4. The context of the journal assignment

The reflective journal writing assignment was assigned in a final year design studio that is offered each fall semester. It was structured in three modules that introduced the idea of sustainability progressively as sustainable thinking, action, and design. At each stage, students were introduced to relevant readings, asked to reflect on concepts in those readings, and the issues were discussed in class, in online postings and reflective journals. Readings included the book, *Cradle to Cradle: Remaking the Way We Make Things*, by William McDonough & Michael Braungart (2002), *Sustainable Commercial Interiors*, by Penny Bonda and Katie Sosnowchik (2007), *Sustainable Architecture: White Papers*, by Brown et al. (2004), and other periodically assigned additional readings. Site visits, guest lectures and published design case studies also enabled students to see successful sustainable design examples, and hear from those who had successfully implemented sustainable initiatives. Ten journal entries were required during the first seven weeks of the semester. Students could use class readings as a basis for their reflections and integrate readings from other classes in their liberal arts background, readings/observations from popular media – current news, or from their own life experiences. For each journal entry, the students were asked to record their observations on at least one page (8 1/2” × 11” size) if not more, to give them an opportunity to present a main thought or idea, integrate it with other ideas, and reflect on the result. They were also encouraged to include photographs and other articles in their journal entries.

The design studio course was conducted in a studio space in which class instruction, projects and discussions took place and in a proximal computer lab equipped with networked computers with internet connectivity. Students posted their observations in one of three ways within an online learning management system (WebCT):

1. typing it directly online in an area set up for discussions, that is, where a student could see and post responses to other students’ entries;
2. typing their journal entries in an assigned space; or
3. uploading their entries as Microsoft Word documents.

They were free to do this during class or later, outside of class when convenient to them. The ten journal entries together constituted 10 per cent of the total grade for the class.

5. Students

This study used a convenience sample of students enrolled in a final design studio class in which the journal assignment was provided. Almost all of the thirty students (29 female, 1 male) attempted to balance school tasks with other (and sometimes multiple) part time jobs. They did not all own computers, but had regular access to computers in the department and the campus from which they could post their online
comments and journal entries. They were enrolled simultaneously in other liberal arts (general education) classes that introduced other perspectives outside those ideas discussed in the interior design classes.

6. Process
Student online postings and journal entries were analyzed with content analysis techniques. The unit of analysis was each posting or journal entry – no tracking was used to find out each student’s journey through the four types of reflection. Each entry was classified as demonstrating descriptive, descriptive reflection, dialogic reflection, or critical reflection based on the four operational aspects of reflection shown in Table I by two independent coders, who then met to discuss and reach a consensus. One coder was the author and the other a graduate assistant. The analysis focused on the presence of these four levels of reflection. Particular attention was directed to assess whether or not the dialogic and critical reflection (productive reflection) were evident in students’ reflections recorded using this journal activity. The format and the structure of the journal entries, and the associated prompts were assumed to enable more than a mere description of the issues discussed in class and that they would enable a deeper reflection integrating other concepts. Would reflection occur using this pedagogical method, and if it did, what levels of reflection would be reached? Did transformative learning occur, meaning, were there entries that demonstrated dialogic and critical reflection?

7. Results
A total of 226 journal entries were analyzed according to the four levels of reflection. Each entry was at least two or three paragraphs of text, ranging from a minimum of 200 to a maximum of 800 words. Although no quantitative analyses are presented here, the word count is considered an indication of the elaboration of thoughts in each entry (Davis, 2006). As such, most entries included in this study were fairly well-developed. Only three entries included photographs that illustrated the point under discussion. The following paragraphs illustrate how each of the levels of reflection was represented in the entries – the entries are reported here verbatim:

**Descriptive**: Five entries overall demonstrated pure description without any reflection, integration or analysis. In these entries, facts from class were repeated, or thoughts were presented superficially without elaboration or explanation.

**Journal excerpt: descriptive.**

Passive solar techniques allow one to utilize the sun’s natural heat in order to help heat or cool a space; thus saving on the heating bill. These techniques include passive solar heating, active solar heating, solar cooling, and photovoltaics. Passive solar heating uses the building itself to absorb and release the heat generated by the sun. By utilizing building orientation, shadings and overhangs, and window-to-wall ratios properly, one can reduce the dependence placed upon HVAC systems.

**Descriptive reflection**: Eighty-eight entries overall demonstrated descriptive reflection. In these examples, student entries reflected not only facts, but also one’s own thoughts contrasted with those in the readings and discussions. However, there was no
attempt to analyze why their thoughts contrasted with those in the readings. Some entries recognized the multiple factors influencing a sustainable thought or action.

Journal excerpt: descriptive reflection.
Sustainable thinking is a realization that the resources we have now are not going to last forever and that we need to change what we are doing so we will be able to continue living the way we are now. Sustainable thinking is having the constant awareness of trying not to live so wastefully. Sustainable thinking is being conscious of what we are taking from the environment and what we are putting back into it and whether our actions are harmful or not. This thinking has become more apparent as time goes on. More people are becoming aware of how harmful we are being to the environment and wanting to change something about it. People are educating themselves on new products and procedures that are less harmful to the environment. They are more interested in finding materials that you can reuse or have a longer life cycle. Using things in cycles gets the most use out of them. I also think sustainable thinking is a balancing act. It works like a give and take. You have to give up some of your comforts and maybe some of your financial resources in order to live a sustainable life. Many people aren’t willing to give up the comforts of everyday life but many are also realizing that things need to change.

Dialogic reflection: This category had the most number of entries overall – 118 entries demonstrated a level of analysis and integration that went beyond description. In many of the entries, multiple perspectives from different fields in design, science, and ecology were represented and analyzed. Particularly evident were perspectives and readings from some of the other liberal arts classes in which students were concurrently engaged.

Journal excerpt: dialogic reflection.
Reading Cradle to Cradle has been an eye opening experience for me. I have come to realize the vitality of our economy is not solely dependant on our spending habits and agricultural abilities. A strong economy is formed when people of all levels, from the government to the average citizen, work together as a solid force to create web of diversity and strength. For example, hurricane Katrina wrecked havoc on the southern coastline, if volunteers from all over the United States would not have offered assistance; the ecosystem of that community may have been destroyed forever. As the economy weakens, it becomes less stable and is unable to withstand natural disaster, and disease; only the strong will survive over time. If everyone works together to support each other, the weak will evolve and assist, creating a solid force. Cradle to Cradle illustrates this idea by describing the intricacy of a woven tapestry. Each thread is a unique and essential element to the interlocking layers and overall appearance of the tapestry. The combination of all the threads reinforces the weaker threads and the strong become stronger. If a thread breaks, such as what happened when Katrina took place, the entire tapestry is weakened. As more threads are removed the tapestry, or economy, become less stable. The assistance that America provided is symbolic of the stronger threads in the tapestry reinforcing the weak and broken threads. The interlocking threads are like an “environmental tapestry,” all the pieces, or levels of society, are dependant upon each other to create a solid and stable state of being.

Critical reflection: Fifteen entries represented this form of reflection. These entries demonstrated a keen awareness of personal assumptions, contrasting it with other contextual perspectives, and
presenting a rational evaluation of consequences of their actions. In these entries, there was a restatement of important sustainable principles, but in a way that linked them uniquely to the students’ experiences and to the students’ world.

Journal excerpt: critical reflection.

Before I read *Cradle-to-Cradle*, I had not heard much reasoning on why it is so important to live and build sustainably. Most people that talked about it were those that had strong feelings toward the topic, and they made it seem like a morally black and white area. However, William McDonough did not profess his ideas and feelings in that way; it was not a radical, “tree-hugger” presentation. Instead, it was simply the expression of the idea that people have the capability to take care of themselves and the world; therefore they should just do it. It is not an area to be treated with a nonchalant attitude, something to strive for if there is money and time to spare. If nothing else, we have our own brains and some resources (however limited) to start with.

Many of the buildings built long before our time were much safer and environmentally friendly than anything we build now. They realized the importance of what they had because they did not have a lot. On the other hand, we have all the technology and resources to spare, yet we are stuck in the rut of making things bigger just so they look better compared to some building built across the ocean somewhere.

It very much reminds me of the field of animation today. I am a big fan of Walt Disney and all the things he did for the world of art. I did a major research paper on his animation techniques in high school and was shocked at how many people and people and processes were needed to produce a full length animated movie. They used layer after layer after layer of drawings to create three dimensional effects. It is even more amazing to think that they did all of this without a computer. It disappoints me very much to compare Disney movies from the 1930s and 1940s to those of today. They are not even comparable to me. The old movies looked very realistic and had convincing aura about them: sometimes you could forget they were a cartoon. Today, there are no longer animated programs – they are cartoons in the cheap sense. I would have thought that the same or better quality would have come about from the use of computers to animate the films. However, the computer seems to have simply served the purpose of expediting and simplifying the final product. Today’s animation does not have the same depth, dimension, or realism as those made with much more primitive technology.

I feel this is happening in the world of design and architecture as well; the technologies that should be moving us forward are holding us back. The lower level of achievement seems to have become a standard simply because it means more production and more jobs. This is our problem: we need to focus on what we are doing in order to make sure it is done right. In turn, this would reduce the amount of buildings and things we think we need. I cannot help but what wonder if satisfaction plays into the larger problem of our unsustainable society; I think we are trying to make ourselves happier by building and doing more and more because what we are doing is not right in the first place. We need to figure out what we need before we can try to feel the need with more stuff. After all the reading and discussing we have done in class, I truly believe with all of my heart the solution to all of these problems is a return to nature and its simplicity.

8. Discussion

In this study, a reflective journal writing assignment was used in a sustainable design studio with the goals of achieving productive reflection and transformative learning. Reflection in students’ journal entries did occur based on the parameters of the Hatton and Smith (1995) framework. But, what levels of reflection occurred in journal entries? As student journal entries demonstrated, all four levels of reflection were represented to some extent, with a majority falling within the descriptive and dialogic reflection...
categories. The study only looked for the presence or absence of reflection, and the
degree to which reflection occurred. This was a useful first step in studio pedagogy,
and one that enriched students’ understanding of the complexity of the sustainable
design concepts. A typical design student on a college campus in the US often juggles
multiple roles and responsibilities along with learning, and has little time or incentive
to reflect on course content. Both groups of students were very comfortable with the
online format, and the ease of entering their reflective thoughts at a time that was
convenient to them. Working on the journal entries provided the students with space
and time to reflect deeper on discussions in class.

Each student’s progress through the stages of reflection was not tracked; neither
was it judged if entries within a category belonged to the same student. Future studies
can better code and track individual journeys of reflection and also assess whether
productive reflection is linked to aspects of learning, by exploring links between levels
of reflection and the depth, detail and complexity of the design solutions that the
students created at the end of class. This would allow fine-tuning this pedagogical
approach for inclusion in other design studio classes.

9. Conclusion
This study assessed the effectiveness of a reflective journal writing technique within a
sustainable design studio aimed at introducing sustainable principles and their
application to design. Reflective journals were used because of their value in
contextualizing complex information and inculcating critical analysis of concepts
students would encounter during their lifelong learning as future professionals. Other
studies have recognized the influence of reflection in connecting abstract concepts with
practical ethical consequences – (e.g. design games employed to increase ethical
decision-making in engineering – Lloyd and van de Poel, 2008) and that reflective
students who were active participants in their learning were successful in assimilating
theoretical and procedural knowledge (e.g. mandatory fourth year chemical
engineering course – von Blottnitz, 2006). The journal writing method discussed in
this paper adds to such efforts in other disciplines. Also, it offers a pedagogical tool
that may be used in other design classes as well, and by using other modalities to
record reflections such as annotations on drawings, preliminary sketches,
photographs, etc. In conclusion, the method was successful and yielded good results;
its usefulness in other studio formats remains to be seen.

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**Further reading**


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