Special Populations Studio: Transforming Informed Response into Design

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Design an apartment that extends independence for an elderly couple where one partner has Alzheimer's disease.

This was the challenge posed to us nearly twenty years ago by Joseph Dugan and Eric Clay, who were at that time the Principals of Shared Journeys, a foundation dedicated to improving care of people with dementia. From this challenge grew a collaborative studio that involves students in two independent courses—an interior design studio and an environment and behavior seminar—focused on design for special populations. In this Perspective essay, we tell the story of this learning experience, first by describing how it was structured and then by discussing the implications of this type of challenge and the design process for educating designers.

The Story

What intrigued both of us as educators about the challenge and the prospect of this collaboration was the complementary fit between our respective pedagogical aspirations.

DEA 3301, Design Studio V, Professor Paul Eshelman

> *Over years of teaching studio, I have arrived at the belief that design students gain valuable understanding about creativity when the challenges they address push them outside their realm of familiarity. Such challenges suspend their creative intuition and force them to reinform that intuition before they can generate relevant ideas. The act of reinforming their intuition offers the learning opportunity of thinking about the role information plays in the creative process. My hope is that students realize information does not limit creativity but, quite the opposite, opens avenues for creative thought and innovative forms they would not otherwise have explored. To realize this hope, I look to the challenge of design for special populations—people who for health, genetics, age, and even economic reasons live in the margins of society. The main problem with this type of challenge is the amount of time students must spend during the semester to acquire good, valid, and reliable information from which to formulate designs. The prospect of collaboration was appealing because allied students could share the time-consuming task of gathering and organizing the necessary information. The time gained for the design students could then be used to analyze precedents and explore conceptual approaches in preparation for the information that would be flowing into the process.*
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> *I also wanted the design students to experience a process that culminates not just in drawings and scale models but also in construction—the building of full-scale models to illustrate key portions of their designs. Collaboration would free time for the designers at the beginning of the semester to expand their understanding of design detailing through hands-on learning about materials, fabrication processes, and construction techniques.*

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DEA 2500, The Environment and Social Behavior, Professor Gary Evans

Through my years of teaching I have come to believe that students learn best when they have an opportunity to apply what they are learning. An important aspect of this equation is that the act of applying what is being learned elevates the intrinsic motivation of students to learn. The major problem is that the process of applying what students are learning can be all consuming of students' time in a given course. The opportunity to collaborate with design students who already are engaged in an application process allows my students to experience the application of their knowledge without having primary responsibility for the act of applying. The ownership of both the process and the product that can occur through collaboration effectively taps into my students' intrinsic motivation.

I wanted the environmental psychology students in my course to act as behavioral consultants to the design students. Working in teams would add value to the experience in the sense of simulating reality as a consultant in professional practice. My students would need at least four weeks at the start of the semester to learn and compile information they could organize into design guidelines. I felt it was important that part of the students' information-gathering process would include collecting tacit knowledge from the client and user. I valued the idea of full-scale construction of designs and wanted my students to be able to use those models to apply post-occupancy evaluation techniques. Additionally, in relation to the models, I wanted my students to participate in reasonable ways in the construction process to elevate familiarity with the tasks involved and ownership of the result.

Theoretical Framework

Although the two of us came together around the complementary nature of our respective pedagogical beliefs and goals, we shared the expectation that this collaborative experience ultimately must enable meaningful individual learning for each student. This point of alignment in our thinking as we formed the theoretical framework and structure for the collaboration led us to Russian psychologist Lev Semenovich Vygotsky (1896–1934) and his theory of the zone of proximal development (ZPD). Vygotsky defined ZPD as "the distance between the actual development as determined by independent problem solving and level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978, p. 86)

Vygotsky's ZPD theory, although withheld from public consideration during the Soviet domination of Russia, has been advanced and expanded in recent years. Developmental theorists led by Wood et al. (1976) have added to the definition structures and processes that enable learners to work at the outer limits of their current competencies. What has emerged is the concept of scaffolding as inclusive of processes that increase learner receptivity, procedures that are used by the expert to facilitate learner growth, and props that enable the learner to advance (Bruner, 1985). In excerpts from Berk and Winsler (1995), we see added specificity to Bruner's construct through the five aspects of effective scaffolding (see Figure 1).

Tenets of the design studio, modeled after the master/apprentice tradition in workplace training, align well with the five components of scaffolding: (1) learning occurs in a group context focused on challenging design problems; (2) the experience intends to move the learner toward the instructor's level of design competence; (3) project-based learning yields ongoing interaction between instructor and student; (4) desk critiques and

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Figure 1. **Berk and Winsler's (1995) five aspects of effective scaffolding.**

1 Joint Problem Solving	"People learn best when they are working with others while actively engaged in a problem . . . [that is] interesting and culturally meaningful" (p. 27).
2 Intersubjectivity	"The process whereby two participants who begin a task with a different understanding arrive at a shared understanding" (p. 27).
3 Warmth & Responsiveness	"[Learners'] engagement with a task and willingness to challenge themselves are maximized when collaboration [between the novice and the expert] is pleasant, warm and responsive and the [expert] gives verbal praise and attributes competence to the [novice]" (p. 29).
4 Keeping in the Zone of Proximal Development	"Structuring tasks and the surrounding environment so that the demands on the [novice] at any given time are at an appropriately challenging level, and constantly adjusting the amount of [expert] intervention to the [novice's] current needs and abilities" (p. 29).
5 Promoting Self–Regulation	"This requires the [expert] to relinquish control and assistance as soon as the [novice] can work independently. It also means that [experts] should permit [novices] to grapple with questions and problems and should intervene only when the [novice] is truly stuck" (p.30).

project reviews regularly provide students with feedback and direction; and (5) whether working individually or in a team, each student ultimately is critiqued based on evidence of individual initiative and creativity.

Beyond this alignment, we found ourselves asking how different our conception of a collaborative studio would be if we deliberately overlaid Vygotskian theory in the form of scaffolding? This led us to define the various aspects of our studio and examine each through the lens of Berk and Winsler's five aspects of effective scaffolding.

Joint Problem Solving

The best learning occurs when the student actively works not only with the instructor but also with "more competent others." The studio instructor can expand the definition of competence by acting as a facilitator to connect students with multiple sources of expertise: other students each of whom possesses unique understandings that can be modeled as they become relevant depending on the stage in a project; experts in the field accessed through direct face-to-face contact or by reading their work; and representative users in their sharing of the tacit knowledge they have acquired through life experiences. Although this expansion poses the risk that students will be confused by the inevitable disagreement among sources, exposure to contradiction is reality in the world of practice as well as in design research. The resulting struggle in the learner's mind when

an attitude of respect underlies consideration of differing opinions can elevate the problem to a valuable level of complexity and challenge (Leonard & Swap, 1999).

Intersubjectivity

If the goal of intersubjectivity is not to reach simply for threshold-level competency but rather encourage the student to stretch toward the expert's level of understanding, the studio instructors' task is to create an atmosphere of valuing the expert's knowledge. Creating the need for students to think outside their realm of familiarity motivates them to develop their knowledge base. Working with actual users, for example in designing for a special population, can increase students' appreciation of knowledge and give them insights about the value of collaborating with more knowledgeable others. Collaboration also draws out students, occasionally enabling individuals to emerge in the role of the more competent peer. These temporary role shifts can contribute to students' appreciation of their own expertise. Putting students on teams in which there is clear role differentiation—designers and behavioral consultants—as opposed to everyone being evaluated based on the same performance criteria, reinforces learning about respect for differences in contribution among team members. Again this introduces an important workplace skill.

Warmth and Responsiveness

To establish a nonthreatening atmosphere for learning, creating a constructive atmosphere for communication, is critical (i.e., pleasant and committed to the common good as opposed to confrontational or disengaged). Translated into a college-level team learning experience, the emphasis should be on the underlying concept of respect. In the case of the collaboration described in this essay, together we give a lecture on work-style differences (e.g., Warrior, Nurturer, Visionary, Critical Thinker) that emphasizes a "gifts-differing" approach to collaboration and then we engage the students in a team-building activity. With each student wearing a marker of his or her self-described work style, students work in their assigned teams in a competition among teams to construct the tallest tower using only paper and tape.

Equally important in maintaining an atmosphere of respect is responsiveness, whereby the expert becomes a vigilant monitor of each learner's progress and makes ongoing adjustments in his or her guidance. To accomplish these ends during collaborative projects, the instructor's task is to model the desired communication between learner and expert, irrespective of who is in either role at any moment. The foundation of this model should be a steady communication flow with the best and most relevant information available during each design decision. The model should also demonstrate that it is possible to respect and live with the tensions—creative abrasions (Leonard & Swap, 1999) associated with contradiction—and yet still arrive at relevant solutions to the design problem.

Keeping in the ZPD

This dimension accentuates the importance of monitoring each student's developmental zone, not as a fixed state, but as an evolving condition. Beyond determining each student's design strengths, the studio instructor's task is to actively monitor how each student perceives and responds to aspects of the problem and process. The instructor then can adjust the learning environment per student by orchestrating Bruner's three parts of

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the scaffolding—access to experts, definition of tasks, and configuration of spatial layout and props—to keep each student within her or his ZPD, at the outer edge of her or his current competencies.

Promoting Self-regulation

Scaffolding by definition is temporary. As the learner develops competence, the expert must progressively relinquish control through distancing (Berk & Winsler, 1995, p. 30). An example of distancing in a studio context is the strategy of chunking—breaking the problem into manageable pieces. Transition chunking enables the learner to acquire independence by working iteratively (Zeisel, 1981)—cycling through the design multiple times at different scales so as to learn from successes and failures with each iteration.

Implied in the notion of self-regulation is the necessity for self-motivation. To facilitate the studio instructor in defining a scaffold that fosters self-motivation, Vallerand et al. (1992) offer a useful, three-part taxonomy. Intrinsic motivation involves: (1) curiosity—the urge to learn, explore, and try to understand something new; (2) mastery—feelings of competence and satisfaction with creating something; and (3) inspiration—having the intellect or emotions moved by the experience. To promote self–regulation, scaffolding should bolster all three—the learner's curiosity, feeling of mastery, and sense of inspiration.

Scaffolding Components

For our collaborative studio/seminar focused on design for special populations, we engaged in intensive planning and reflection to define the components of the scaffolding we would employ. Our scaffolding has grown to include eleven structural components.

1. *Work with real client and multiple users*. Seek the opportunity for students to interact regularly and repeatedly throughout the project with representative users who have a real need for improving the design of the settings in which they live. Sometimes the client is not a user of a facility and often, she or he is not the only user or even a representative user. Design students and behavioral consultants spend time watching and listening to clients and the full range of users in the kinds of space in which we are working. This also sensitizes student to new forms of knowledge and presents real-world tensions that occur (e.g., the teachers wanted to reconfigure tables easily for their preschoolers; the maintenance staff wanted permanent installations; the manager wanted to be able to see all of the residents, the clients wanted visual and acoustic privacy; the ADA regulation stipulated *x*, the differently abled student said, "no way"). Clients and users provide feedback on iterative stages of design programming, concepts, and preliminary sketches.
2. *Examine a pressing social issue*. Direct design effort toward a complex social need of interest to students that has challenging building and interior design ramifications. Tap into students' desire to help others as motivation.
3. *Work with unfamiliar content*. Seek a real client and social issue that are outside the typical students' realm of familiarity. Acknowledging that design creativity often involves intuitive leaps of thought, posing unfamiliar challenges may enable students to more readily recognize the limits of intuition as a tool for achieving innovation. Similarly, students may gain appreciation of the role of information in elevating thinking to the point that relevant intuitive leaps again can be made.
4. *Build ideas upon a well-developed knowledge base*. Work with the most current and accurate information about the social issue. There are three purposes here: (1) to ensure relevance of the students'

Figure 2. **Planning, designing and construction process with completed Head Start installation.**

design ideas; (2) to help students appreciate the value of information as a means for inspiring design innovation; and (3) to empower and educate students to make decisions and act on the basis of whatever evidence they have, but to simultaneously be critically aware of the validity of that evidence. Personal experiences are treated as legitimate sources of information as are scholarly analyses of empirical data. We stress that students recognize the strengths and weaknesses of multiple types of information. We emphasize self-awareness of what kind(s) of information are informing a particular guideline or design decision. We require students to communicate to all stakeholders (i.e., client, users, designers, researchers) the evidence in play for design guidelines and design solutions.

5. *Employ iterative design cycle.* Use Zeisel's iterative process model—imaging, presenting, testing, reimaging, representing, retesting (1981)—to give students the opportunity to learn from their successes as well as failures. The intent is to avert the learning problem of constantly moving on to something

Figure 3. **Designing for meditation.**

new and, consequently, never having the opportunity to try again, perhaps in the process learning to redefine a "mistake" as an opportunity for learning.

6. *Communicate via card game*. Create a dynamic flow of information and ideas that enables a conceptually appropriate design to emerge. The underlying intent is to avoid prematurely formed concepts that inappropriately drive design decisions. The technique involves 3x5-inch cards on which the behavioral consultants record and transmit design guidelines to the designers. These cards can be grouped around themes and linked with sketches of design alternatives. Christopher Jones' morphological charts design method (1970, pp. 292–296) provides a framework for the card game. By encouraging students to delay concept formation until after they are thoroughly immersed in project information and have generated preliminary design ideas, the card game offers valuable lessons about control, or the perceived lack thereof, in design (see Figure 2). In the spirit of iterative design and interdisciplinary problem solving, interim products (e.g., preliminary design guidelines, design concepts, sketches, and study models) are circulated among designers, behavioral consultants, client, users, and instructors. Written feedback is shared and then discussed in person and followed up with electronic depository available to all parties. We hold design and behavioral students accountable to articulate how their revised products reflect feedback or, if not incorporated, explanation as to why. We clearly and consistently send the message that all students must engage with multiple and, at times, even conflicting input received. Students do not have to follow the advice of every source of information confronted, but excellent work often relies on close engagement with myriad sources of information.
7. *Engage in design play—lateral thinking (de Bono, 1970)*. Allow time-out periods for design play. Dedicated periods of unencumbered exploration can counterbalance the pressure of the project schedule to force decision making. Design play can suspend judgment long enough to allow divergent but potentially useful ideas to be considered. Examples of design play are creating an abstract collage to study material relationships or a sketch model of an isolated design feature to study issues of form and function. To encourage design play is to acknowledge that the true nature of thought is rarely a clear straightforward journey. Rather, many false starts, detours, and even dead-end paths, are taken before excursions into new territory occur.

Our intention is that by the end of each studio, students will have grown in their understanding of the social and behavioral value of design and gained insights about the nature of design process for achieving socially relevant innovation.

8. *Work in interdisciplinary teams*. Teamwork, an increasingly common learning format in post-secondary education that is reflective of real-world problem solving, tends to see teams comprised within the same class. Consequently, there is little differentiation among team members' roles. In this example, two roles are distinguished—designer and consultant—through collaboration between students in a design studio and students in an environmental psychology seminar.[1]
9. *Model in full scale*. Every choice of media and scale used in imaging designs offers advantages and limitations. Beyond allowing for enjoyment of discovery through hands-on manipulation of materials and tools with various fabrication techniques, the opportunity to examine ideas at full scale reveals problematic design issues that might not otherwise be seen. This benefit is realized not only during construction of full-scale models, but also during post-occupancy evaluation (POE) when representative users manipulate and test the design. Full-scale modeling provides an additional arena for teamwork across the two classes: it allows multiple opportunities for students to learn competencies in another "skill" arena (i.e., construction technology).
10. *POE*. Invite representative users to test the full-scale models. The presence of actual users at the conclusion of the project enables live and video recorded observations and interviews that not only provide a rich array of kudos, but also generates useful criticisms and questions for continued reflection.
11. *Final presentation to client and users: Celebration!* When the long and at times arduous work is finished (as least for now), we all need a celebration. Design students and behavioral consultant students jointly plan and deliver a final presentation of their work to the client and various user groups who have been involved throughout the semester studio/seminar collaboration. Local print and media news services attend and, where possible, student family members. We hold the presentation on site with the full-scale models present.

Conclusion

Challenging students in studio to design for a special population can be dismissed merely as an exercise in problem solving, an activity that thwarts application of the full creative power of design. Our experience has been that such a challenge does reduce the process in the early stages to informed problem solving. But as discrete and appropriate design responses accumulate, conceptual unity among responses is discovered and design emerges. For nearly two decades, among the special populations we have designed for are preschool children in Head Start, people with Alzheimer's disease and their families, college students with physical disabilities residing in residence halls, at-risk youth members of Boys and Girls Clubs of America, frail and independent elderly, and college students in stress (see Figures 2 and 3).

Our intention is that by the end of each studio, students will have grown in their understanding of the social and behavioral value of design and gained insights about the nature of design process for achieving socially relevant innovation. We believe and the clients confirm that the scaffolding components we have assembled—working with real clients, examining a pressing social issue, working with unfamiliar content, building ideas upon a well-developed knowledge base, employing an iterative design cycle, communicating in our case via what we termed "a card game," engaging in lateral thinking through design play, working in interdisciplinary teams, modeling design ideas in full-scale, conducting POEs, and delivering a final presentation to the client and users—provide the kind of learning experience that scaffolds the development of skilled and reflective design professionals.

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What do the students say?

The following comments reflect common themes expressed year after year by interior design and environmental psychology students who participated in the scaffolding learning studio/seminar:

It was an exhausting but a much better way to learn.

At first all of the different points of view were overwhelming. But I got better at listening and calibrating responses.

Best day ever! [Final presentation day when everything comes together]

OK, as long as only one course like this at a time.

Seeing that professors and other experts didn't know the answer was unnerving. But the more I read, watched, drew, and listened, the better I came to grips with real-world problem solving. If we knew the answers, people wouldn't be asking for professional assistance.

It is motivating to think about things and work on something that people really need answers to. It wasn't just an exercise.

At first I thought others telling me about things I needed to consider would confine my creativity and kind of get in the way. However when I saw that I was keeping threads of my own ideas throughout the whole process, but in much more sophisticated and useful ways, I wanted more input, not less.

Paul and Gary rock.

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Note

[1] Instructors, in consultation with the students, typically organize the larger challenge into overarching categories. For example, in the case of the Boys and Girls Clubs of America the four categories involved: active play, creative and dramatic play, homework and technology, and designated space for girls. Each student privately communicates her or his category preference by submitting a priority list. Instructors compare priority lists and make team assignments based on top student preferences. We feel this approach is representative of what happens in professional practice and avoids team formation based solely on friendships.

References

Berk, L., & Winsler, A. (1995). *Scaffolding Children's Learning: Vygotsky and Early Childhood Education*. Washington, DC: National Association for the Education of Young Children.

Bruner, J. (1985). Vygotsky: A historical and conceptual perspective. In J. Wertsch (Ed.), *Culture, Communication and Cognition: Vygotskian Perspectives*. Cambridge: Cambridge University Press.

de Bono, E. (1970). *Lateral Thinking: A Textbook of Creativity*. New York: Harper & Row.

Jones, C. (1970). *Design Methods: Seeds of Human Futures*. New York: John Wiley & Sons.

Leonard, D., & Swap, W. (1999). *When Sparks Fly: Igniting Creativity in Groups*. Boston: Harvard Business School Press.

Vallerand, R., Pelletier, L., Blais, M., Briere, N., Senecal, C., & Vallieres, E. (1992). The academic motivation scale: A measure of intrinsic, extrinsic, and amotivation in education. Educational and Psychological Measurement, *52*(4), 1003–1017.

Vygotsky, L. (1978). *Mind in Society: The Development of Higher Psychological Processes*. Cambridge: Harvard University Press.

Wood, D., Bruner, J., & Ross, G. (1976). The role of tutoring in problem solving. *Journal of Child Psychology and Psychiatry*, *17*, 89–100.

Zeisel, J. (1981). *Inquiry by Design*. New York: Cambridge University Press.

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