UNSTAKED TERRITORY:
Frontiers of Beginning Design

Proceedings of the 19th National Conference on the Beginning Design Student, Oklahoma State University, Stillwater, Oklahoma
April 3-5, 2003

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Challenging The Boundaries I
Challenging The Boundaries II
Integrating The Boundaries
Obscuring The Boundaries
Various Terrains
Initial Terrain

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Design and Critical Thinking: Applying Perry's Theory of Intellectual Development to Foundational Design Instruction

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Several beginning architecture students recently had a discussion among themselves about an assignment given in their introductory architecture course. The assignment began with a rectangle and involved performing a series of formal operations and repetitions to create a design for a hotel on a cliff overlooking the ocean. Each rectangle represented a guest room and each resulting room was to have a view of the ocean. One student seemed to have a good grasp of the assignment and was giving a very capable explanation to four or five other students. Despite the good explanation, several students remained bewildered. The student giving the instructions changed his tactic from trying to explain the procedures for performing formal operations on the rectangle to suggesting that they might just cut the rectangle out of a piece of paper, change the shape with one cut, then trace the resulting shape repeatedly along the line representing the cliff face. I asked the student later why he thought it was so much easier for him to grasp the concept of formal operations, and he attributed it to having more life experience that enabled him to handle ambiguous situations. "Even though I don't understand completely, I can just take what I do know and make a decision." The purpose of this paper is to explore why it is easy for certain students to handle the ambiguity inherent to the beginning design process, and difficult for others and to propose some strategies to develop design projects that support students at their current level of intellectual development and challenge them to become reflective, critical and creative thinkers.

Harvard Professor William Perry has developed a theory of intellectual and ethical development of college students. By interviewing the same students every year during their college careers, Perry created a scheme to show the progression many students make in their intellectual development during college (Perry, 1970). This theory has been supported by subsequent research (Moore, 1982), and encompasses dimensions of dualistic and absolutist thinking, issues of personal agency and critical thinking (Moore, 1994). Perry's scheme consists of nine positions with four major categories: Dualism (Positions 1-2), Multiplicity (3-4), Contextual relativism (5-6), and Commitment within relativism (7-9) (Moore, 1994). The early stages of Perry's scheme describe students who think in dualistic terms. Ideas are labeled as right or wrong and the student's task is to learn the right solutions. In later stages of the scheme students are more able to deal with ambiguity and learn to evaluate possible solutions, not in terms of right or wrong, but in terms of better or worse. Eventually most students are able to integrate knowledge they have learned from others with their own experiences and make a commitment to a solution. In the commitment stage students realize that learning is an ongoing, evolving activity. This development is a "reorganization of intellectual structures stimulated by cognitive disequalibrium resulting in increasing awareness, comprehension and ability to deal with the complexities, uncertainties and ambiguities of one's intellectual and social life" (Hofer & Pintrich, 1997). The following chart presents a summary of Perry's positions.

Table 1 - Summary of William Perry's Positions of Intellectual Development

Position	Type of Knowledge	Assumptions	Agency	Student's Task	Learning Methods
Dualism 1 & 2	Received Knowledge	There are right/wrong answers known to Authorities	External	Learn the right solutions	Repeating, Memorizing Defining Summarizing Reporting Translating
Multiplicity 3 & 4	Subjective Knowledge	There are conflicting answers	External	Learn how to find the right solution	Examining Investigating Simulating Operating
Relativism 5 & 6	Procedural Knowledge	All proposed solutions are supported by reasons (viewed in context and relative to support)	Internal	Learn to evaluate solutions	Interpreting Differentiating Planning Predicting
Commitment 7,8, & 9	Constructed Knowledge	Integrate knowledge learned from others with personal experience and reflection	Internal	Student makes a commitment, realizes commitment is an ongoing, unfolding, evolving activity	Incorporating Revising Judging Assessing Criticizing

Freshmen at a typical university spend their year in large auditoriums with hundreds of other students, listening to lectures. Between lectures they read textbooks and study handouts. It is the students' responsibility to remember what they have read and heard and to be able to recall and repeat assigned information. Often the assessment of what they have learned is made in the form of a multiple-choice test. Occasionally they will be asked to retell or summarize what they have learned. This form of education is geared toward those at the earlier positions of Perry's scheme. It is the cognitive realm with which most freshmen are familiar and in which most are comfortable. In contrast, consider the freshmen and sophomore architecture students who, in addition to four classes in the format just described, are also taking a beginning design course. In this design class students are expected to apply certain principles to solve abstract problems. They must communicate to others how they have arrived at their solution and they are often expected to participate in an assessment of how other students have solved the problem. These tasks require relatively advanced intellectual functioning.

As a new teacher in beginning design classes, I looked for a theoretical framework to provide direction in developing a pedagogy. As I listened to many students discuss their

assignments and their professors I noticed that some students were very comfortable with the ambiguity inherent in the design process and with the subjective nature of the assessment of their designs. Other students expressed frustration about not being able to figure out what the professor wanted. Perry's theory, especially in its application to critical thinking and agency, clearly explains the disparity in students' ability to deal with ambiguity. Intervention using Perry's scheme has been used in classroom settings for writing assignments, mathematic programs (Copes, 1980), and teacher training (Hill, 1999), but there is no literature to support its use in design courses. It has the potential to provide guidance in pedagogy for design courses(1).

Students' levels of intellectual development along the Perry scheme can be measured using the Measure of Intellectual Development (MID), which asks the students to describe a course of study they have enjoyed in the past. Trained evaluators read the responses and rate the students' stage of development. The complexity of the assessment and the need to use trained evaluators is likely one reason this theory has not been studied more. I used the general format of the MID to get an idea of where architecture students in my 100 level class would fall along Perry's scheme. Students were asked to write about their experience in the Introduction to Architecture course. I suggested they might write about the aspects of the course they found beneficial and those that were not beneficial. Even though I am not a trained evaluator I was easily able to identify many students' position in the Perry scheme by their responses to the question.

Dualism

Responses from students at Position 1 or 2 revealed their dualistic epistemology. They expect the professor to enlighten them with the right answers and express frustration that the right answer is not always obvious. Diversity and complexity are so alien to the students at these positions that a quiz in which the right and wrong answers are clear provides some comfort. Implicit in the responses of students at this level is the underlying belief that architecture is something that can be fully understood. Following are excerpts from students' responses:

> "I think the biggest problem is that Professor X forgets this is a first year class and that we haven't had any experience. He goes over everything so briefly that I can never fully understand the topic."
>
> "The instructions are never very clearly presented and this leaves me with a feeling that what I am doing or think I should be doing is never correct."
>
> "The quizzes are about the only things that are clear since we are given exactly what we must read about and we are only quizzed over that"
>
> "How can everyone come up with different solutions to a problem and everyone be correct?"

Multiplicity

Several students recognized there are conflicting answers to problems and believe their job is to find the right solution. They expressed suspicions that the professor knows the answer, but is holding back some important information hoping the students will figure it out for

themselves. It is at this stage that students really struggle to discover the grounds on which their opinions are graded (Perry, 1970). Some students expressed hopelessness about figuring out what the professor wants.

> About the professor, one student said:
> "He is good at 'playing dumb' when kids are explaining stuff to him so they can arrive at a correct or at least some kind of answer themselves."
>
> "The assignments could be explained more thoroughly sometimes. He seems to have a try-for-yourself approach to the assignments, which is good because you can make mistakes and later understand why it was wrong."
>
> "Sometimes it is hard to understand what all is required on the assignment. Then, when you ask other students they have another perception on how we are supposed to complete it. I understand that most of this uncertainty is to somehow benefit us, but missing points on assignments and quizzes because of this is not helpful."

Contextual Relativism

Students who were at a position of relativism were obviously much more comfortable with the abstract nature of the presentation of design concepts and with the assignments in the introductory course. At the earlier positions students accommodate where answers are not certain by thinking of them as unusual cases. At this stage, students realize areas that can be categorized as right or wrong are the special cases. This is the position at which the world starts to make a lot more sense (Perry, 1970).

> "So far I think 102 is better (than 101) because we begin to discuss the fundamentals of design rather than regurgitating basic terms, ideas and concepts."
>
> "Assignments can be quite vague, but I like that because it allows for my own creative input."
>
> "I haven't found any assignment to be un-useful. I found they all have a reason why they were assigned."
>
> "The class gives you a better understanding about designing and why something is the way it is."

Commitment in Relativism

The comments of one student indicated a position of Commitment in Perry's scheme. This student was able to integrate knowledge he had learned from others with his personal experience.

> "This adds to my previous experience of actually working in a firm. I have been able to see how the business aspect works but unable to see how the architect develops a design in his/her mind before setting it on paper."

Some may argue that the students' response was to the professor of the introductory architecture course rather than to the content, but the range of responses from confusion to delight indicates a difference in the way different students were thinking about the course. A cursory survey of objectives for beginning design courses indicates there are many schools that expect high levels of cognitive performance in beginning design courses. Course descriptions of beginning design courses were gathered from 10 schools of architecture across the country (2). Objectives from several schools included introduction to basic principles and elements of design and skills development in drafting, rendering, modeling and lettering, but most descriptions involved tasks that require a high level of critical thinking. Following are some excerpts from the beginning design course descriptions:

….practical and abstract applications
….instruction through presentation and critique
….creative problem solving
….synthesis of basic social, functional, technical and aesthetic factors
….exploration of architectural experiences through tectonics and individual experimentation
….exploration of aesthetic and poetic abilities
….use fundamental issues of form and space in creative problem solving
….creative assimilation of programmatic, technical and contextual requirements
….experimentally develop design methods for structuring of concepts and forms that respond to identified need

When this list of beginning design objective is compared to the capabilities of students at different position in Perry's scheme it is easy to see that may objectives are geared toward students at higher levels of development. Students are expected to be involved in assimilating and synthesizing information to creatively solve problems. There are many students who are capable of tackling these complex tasks, but there are also many students who do not have the intellectual skills to understand them. It is not my contention that schools of architecture should change their objectives. I do contend, however, that faculty can structure courses in such a way that will acknowledge the cognitive limitations of some students and challenge them to higher positions of development.

The instructor's task becomes even more complex when trying to accommodate students at several different positions. One of the problems we face is that not all freshmen are dualists. In fact, many freshmen have a multiplistic epistemology and a few are comfortable in contextual relativism (Perry, 1970). There is a risk of boring more advanced students through less complex tasks, or confusing less advanced students through complexity. By directing a program toward one end of the schema or the other we run the risk of alienating those at the other end.

I would like to suggest four strategies beginning design instructors might use over the course of a semester to support students at their current level of development while challenging them to higher levels of critical and reflective thinking, increasing their tolerance of ambiguity and enabling them to synthesize information.

The first strategy is to plan the semester as a progression through the positions of Perry's scheme. For example, at the beginning of the semester assign a design project that has a right or wrong answer. Instructions can be given that are so specific all students will reach the same solution. This might be an effective method of introducing basic design principles. As the semester progresses, gradually introduce more ambiguity into the projects. Projects used in past

years can be reassigned, but the manner in which they are presented might change. The learning methods column of the chart that summarizes Perry's theory can be used as a guide to the progression. An early project might require students to report, define, and summarize. A mid term project might involve some investigation and experimentation. A final project will require interpretation and planning.

The second strategy is to be conscious of students' level of development when presenting information and explaining principles. Many students want to know if something they have done is right. An instructor's response may make a difference in whether they remain in a dualist position or if they progress to multiplicity. A simple "yes" or "no" may leave them content dualists. Discussing all the contextual situations that would make their solution either right or wrong might challenge someone in a multiplicity stage to move toward a position of relativism, but it would likely just leave a dualist in the dark. Throwing the question back at a dualist (What do *you* think?) might help them move toward multiplicity.

The third strategy is to gear assessment of students' work to their level of development. It is an age-old complaint of architecture students that grading is subjective. The more an instructor can make the grading criteria appear to be objective, the more supported a student will feel. Begin the semester with very explicit criteria. Projects can be broken into measurable components that are clearly communicated to the students. Points are assigned for each criterion. A grade sheet, listing the criteria is given to each student so they can see where they lost points. As the semester progresses, the instructor can be less specific about criteria. There are several things that contribute to this: Students will have a better idea what is expected of them; they will be functioning at higher levels than at which they began; and they will have developed the skills to do personal assessment of their work.

The final strategy is to be willing to individualize work. Develop different strategies for those students who are dualists and just do not seem to "get it." Be willing, for a while, to give them a right or wrong answer. For those students who are already thinking at Perry's higher stages, be willing to challenge them to even greater critical thinking. They need to know they are trusted, not to always make the best decisions, but to always think through their problems systematically and to make judgments based on their assessment of the problem.

Many architecture programs set objectives for beginning design courses that require a high level of critical thinking and a high degree of personal agency from a student to perform effectively. However, students' levels of intellectual development make a difference in their ability to perform the complex tasks that are a part of the design process. When assigned problems for which they are not cognitively prepared, many students respond in frustration. They perceive the instructor is withholding important information and struggle to discover the "right" answer. William Perry's scheme is useful to help explain the cognitive development process of may college students. His recommendations to support students at their current level of development and challenge them to higher positions can be applied to the pedagogy used in beginning design courses. Instructors can structure courses to support students in dualist positions at the beginning of the semester and progressively add challenges that will move students to learn to evaluate their solutions in contextual relativism and to acknowledge personal agency for their solutions.

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Notes

1. An exhaustive bibliography of research using William Perry’s Theory of Intellectual Development may be found at the website for the Center for the Study of Intellectual Development (CSID): www.perrynetwork.com

2. In addition to the program at Southern Illinois University, nine undergraduate programs from Schools of Architecture were randomly selected and beginning design course descriptions were accessed through online course catalogs. The following schools were surveyed: University of Illinois, University of Missouri at Kansas City, University of Kentucky, Georgia Tech, Virginia Tech, Columbia University, New York Institute of Technology, University of California at Berkeley, University of Wisconsin-Milwaukee