CHAPTER 1 - INTRODUCTION

Research Focus

This research documents how instructional design could be taught based on a particular view of teaching, one that regards teacher and student as mutual learners (co-participatory) and supports critical, self-appraisal (reflexivity) by all participants. In addition to how one views teaching, how one understands and views instructional design is another critical influence on how instructional design is taught. This co-participatory and reflexive model emerged out of collaborative design, teaching, and research with Dr. Susan Magliaro of a master’s level instructional design (ID) course from 1994-1998. We view instructional design as a human activity, one that is pragmatic, meaning that learners experience the ID process by actually designing.

Although cast as mutual learners, this approach acknowledges the interdependent roles of teacher and student. The teacher’s role models the content to be taught, the ID process, as well as the traditional expectations of design, implementation, and evaluation. The student’s role in this model is to engage in learning activities and perform learning tasks. The distinctive feature is the support of all participants by an ongoing self-examination of their learning—the instructor’s continual appraisal of his or her teaching and the students' experiences with developing reflective habits. The development of the model stems from our belief that reflection is an essential aspect of teacher development. Reflective teaching, according to Hitchcock and Hughes (1989), is teaching which is capable of moving beyond the logic of commonsense, often expressed in anecdotal terms, and practical reasoning, to action which stems from critical, professional thinking based upon ‘a looking again’, ‘around and about’ phenomenon and, maybe, applying the ‘researcher’s eye’, making the familiar strange, not taking for granted what is characteristically taken for granted” (p. 11).

In addition to reflectivity, teacher inquiry is another aspect of teacher development. While skills and habits of reflectivity allow teachers to become self-aware of their thinking and how these thoughts influence actions, inquiry skills enable them to critically assess evidence about educational processes, in effect, to research their teaching practice (Hitchcock & Hughes, 1989). Adopting an image of teachers as reflective practitioners (Schön, 1987), the reflexive teaching model represents a reflective artifact in our conscious efforts to make explicit to ourselves and students our stance on learning, communicate and constantly evaluate our teaching approach to students and the teacher and educational research communities, and model the ID process for students by using the evolution of the course and supporting materials as examples of design-in-action.

Background of Problem

Inquiry into the teaching of instructional design began in the Fall semester, 1992, when I was in the role of a student in EDCI 5164: Principles of Instructional Design. During this time I began thinking about the challenges students faced in the course taught by Dr. Magliaro. As a
result of this thinking, I wrote a student guide to help future students manage the course’s learning tasks. Systematic and collaborative activity with Dr. Magliaro began as she and I worked as co-instructors in the ID course over six deliveries from 1994-1998.

During the analysis component of this dissertation, an ongoing question presented itself: What story was I telling? Was this research the evaluation of a teaching model? Was I describing the instructor’s story of the ID course over six deliveries, or was I documenting teacher thinking of Dr. Magliaro? I found it difficult to discard any two in favor of the third, as all three questions were interrelated. Characterizing this instructional approach as a model was the result, first, of critically examining the features of our teaching and outcomes based on actual teaching over time, rather than limiting the research to an analysis of a single delivery. Secondly, we needed a means to represent and communicate our teaching efforts as well as place up for scrutiny our inquiry at research conferences (e.g., Shambaugh & Magliaro, 1996-April, 1995-April). Thirdly, since this research was a collaborative activity, it brought forward Dr. Magliaro’s previous work, as well as a record of my learning of what it meant to teach ID.

Because we viewed modeling of the instructional design process as an important strategy of teaching an ID course, I adopted the design and development cycle (Richey & Nelson, 1996) as a research framework to study the instructional approach as it developed over six cases. Thus, each instance of the ID course would be examined in terms of our prior experience and a needs assessment (analysis) and subsequent design decisions; implementation of these decisions during an academic term; and evaluation of what students and instructors learned, student perceptions of their learning and the course, and my perceptions of how we were responsive to learner needs.

Research Objectives

In development research, objectives characterize the overall purpose of the study, which is to describe how the teaching model or instructional approach was developed over time. These research objectives, as they apply to six instances, or case studies (Cases 1-6) of the instructional design course from 1994-1998, include the following:

- **Design objective:** Summarize the design decisions based on a teaching model.
- **Development objective:** Summarize the implementation of the design decisions.
- **Evaluation objective:** Summarize student learning on ID projects, student perceptions of learning, and instructor responsivity to learning needs.

Description of Chapters

In Chapter 2, I describe the theoretical framework that informs our view of teaching, summarize the instructional design process and research on the teaching of instructional design. Also discussed in Chapter 2 are the use of models to represent teaching approaches and how development research can be used to study these models. In Chapter 3, I describe the methodology used to analyze development of the instructional approach, including a brief description of the instructional approach under study, data sources and collection, analysis methods for each of the six cases, and the limitations of methodology and method.

In Chapter 4, I report the findings of how the ID course developed as a student in the course and as a co-instructor over six deliveries of the course. Each delivery was treated as a case
study, the unit of analysis for the study. For each case, data were analyzed in terms of (1) design decisions; (2) implementation of instruction, student responses and performance on learning tasks, and instructor responses; and (3) evaluation of the model in terms of student performance on an ID project, student perceptions of their learning, and instructor responsivity to learner needs. The six cases are then connected by summarizing the changes in design decisions, implementation, and evaluation over time.

In Chapter 5, I discuss the features of the reflexive model that emerged from the findings of the six iterations using the conceptual framework of Joyce and Weil (1996). This framework describes the basis for the model, its goals, theoretical assumptions and underlying principles. The model is described in terms of its social system, syntax, student and teacher reactions, and support system. Finally, the instructional and nurturant effects of the model are described. Chapter 6 discusses four categories of conclusions, including improvements to the instructional approach, conditions that promote successful use of the model, the impact of the model on student and teacher learning, and the conditions conductive to efficient model development. Chapter 6 also discusses the limitations of the research, suggestions for subsequent research, and the significance of the research for ID instruction, the ID process, and teacher inquiry.
CHAPTER 2 – CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

Two critical issues influence the teaching of instructional design: (1) how one views learning and teaching and (2) how one understands and depicts instructional design. In this chapter I describe the theoretical framework informing our stance on learning and teaching, summarize the ID process, which is the content for instruction, and summarize research on teaching instructional design. Then I describe four features underlying one way to teach instructional design based on our view of teaching. I discuss the use of models to represent an instructional approach and the use of developmental research to study the development of the model.

Theoretical Assumptions of Learning

The ultimate aim of the model is the construction of shared understandings through authentic, meaningful activity. This aim is informed by the following theoretical assumptions: that (1) learning is constructed by the learner, that (2) learning occurs within context, and that (3) teaching supports learning construction. Each of these assumptions will be discussed.

Learning is Constructed by the Individual

Learning is a natural aspect of human lives and is constructed by individuals over time in an attempt to make sense out of their world (Bruner, 1990; Jonassen, 1991; Piaget, 1971). In this perspective, a learner constructs new meanings based on personal experiences within the world. From a Piagetian point of view, knowledge, skills, and dispositions are developed through the assimilation and accommodation of existing knowledge structures through new experiences (Piaget, 1971). Learners are constantly trying to make sense of the world and achieve equilibrium between their personal constructions and these new experiences. Individuals are constantly challenged to build, link, clarify, and transform their thinking and actions (Bruner, 1990).

Implied in the above is that all individuals’ constructions are valid and there lacks an objective reality in which to judge the merits of these constructions. Knowledge, according to Rorty (1991), is a consensus of beliefs, open for negotiation. Duffy and Cunningham (1996) suggest that “someone’s knowledge, understanding, explanation, or other action” is judged by “testing the extent to which it provides a viable, workable, acceptable action relative to potential alternatives” (p. 171), and that such pragmatic perspectival questions “may lead to an unpacking of suppositions, the better to explore one’s commitments” (Bruner, 1990, p.27). The constructed world, according to Duffy and Cunningham, is “largely invisible,” that we begin to assume that others see the world as we do and that “the participants in any community simultaneously transform and is transformed by such participation” (p. 178). As Bruner (1986) notes, “meaning and reality are created and not discovered, that negotiation is the art of constructing new meanings by which individuals can regulate their relations with each other” (p. 149).

Learning Occurs Within and is Influenced by Context

Fosnot (1996) says the important question is not whether the individual or the social should be given priority, but “what the interplay between them is” (p. 23). Piaget (1970) recognized the developmental interplay between the intellect and the social system. Individual construction of meaning does not occur in isolation but is influenced by one’s social world, a mix of one’s history, culture, institutions, and individual characteristics (Brown, Collins &
Duguid, 1989; Lave & Wenger, 1991). Emphasis is placed on the word “mix,” as any setting cannot be a purely cultural one or historical, or institutional, but rather a blend of these aspects (Wertsch, 1991). Rather than the focus being on processing information, learning is regarded as an active process in context. “The situation as a whole must be examined and understood to understand the learning” (Duffy & Cunningham, 1996, p. 171).

A constructivist view of reflectivity can be viewed in terms of reflective abstractions (Glasersfeld, 1995), which result in the construction of concepts that can themselves be mentally acted on and revised and reorganized over time. These conceptual organizations occur through one’s participation in the cultural practices. As Wenger (1998) states, it is not the kind of activity, whether alone or in groups, but that “learning – whatever form it takes – changes who we are by changing our ability to participate, to belong, to negotiate meaning” (Wenger, p. 226). This view of the contextual construction of new meanings acknowledges one’s perceived realities of the world and the nature of our participation in the world. Intellectual activity is influenced by the participation of people within a community of learners in which one resides (Wenger, 1998; Rogoff, 1994; Moll, 1990); in particular, the interactions of individuals within families, cultures, and communities (Bruner, 1983; Wertsch, 1979).

Furthermore, learning is influenced by what are sometimes referred to as mediational means, such as language (Vygotsky) and other tools (e.g., visual means, John-Steiner, 1997) that shape purposeful, goal-directed human action. Reflexivity, a "looking-back" on oneself, can be regarded as another mediational means, or tool, to help humans ultimately shape and redirect action through purposeful self-examination.

Teaching as Assisted Performance

Vygotsky (1978) provides us the means to connect these theoretical ideas to how the teacher can support the learner. Through extended interaction with more capable others an individual’s everyday constructions are nurtured, informed, and shaped and reconstructed internally. Vygotsky used the phrase “zone of proximal development” to identify the course of development for each individual learner (Vygotsky, 1978). Understanding where the learner is in terms of his/her actual developmental level is determined by problem solving on a task independently, and the level of potential development when assisted by a capable adult or peers provides us with the information we can use for further questioning, feedback, or to structure learning tasks that are appropriate and challenging.

Within this theoretical framework, as learning is viewed as an active process of individual construction within social settings, then teaching is a process of supporting this construction rather than communicating knowledge (Duffy & Cunningham, 1996). This assistance in the development of cognitive and performance capacities (Tharp & Gallimore, 1988) can take multiple forms, including modeling, contingency management, feeding back, instructing, questioning, cognitive structuring, and reflecting (Shambaugh & Magliaro, 1995; Tharp & Gallimore). Tharp and Gallimore considered these multiple means of assisting performance in order to link different theories and disciplines (i.e., behaviorist, cognitive, neo-Vygotskian theory of development) together to form a general theory of teaching. Our role as teachers is to provide assistance for the learner, co-participate in the learning process, and through this collaborative venture, co-construct new understandings. Tharp and Gallimore remind us that teachers, too, require assistance, both in formal lines of responsibility and in informal support from administrators, parents, and other teachers.
The Instructional Design Process

This section discusses the purposes of design, the systems and learning theory roots of instructional design, and research on ways to teach instructional design.

Design

Simon (1981) depicts design as a means to improve upon existing situations, and the task is to select the best alternatives from choices of action based on available knowledge (i.e., satisficing, Simon). Glaser (1976) cites design as what guides and improves practice. According to Simon, design is what distinguishes the professions of architecture, business, education, engineering, law, and medicine from the sciences. Simon also acknowledges the re-casting of professional schools as schools of science for reasons of academic respectability, including “subject matter that is intellectually tough, analytic, formalizable, and teachable” (p. 130). The problem, as Simon sees it, is an organizational design problem: how to design a professional school that achieves education in design (or as Simon labels design, an artificial science) and natural science “at a high intellectual level.” Simon’s goal of an artificial science focuses on the adaptation of means to environments, a central concern of design. He advocates “a science of design, a body of intellectually tough, analytic, partly formalizable, partly empirical, teachable doctrine about the design process” (p. 132).

Analytic thinking, one aspect of Simon’s belief that a science of design is possible, is central to the Cartesian framework, in which the behavior of a complex system can be understood from the properties of its parts. However, this mechanistic view with its focus on function (e.g., Rudolph Virchow’s cell theory, Louis Pasteur’s germ theory of disease, and expressed in Jacques Loeb’s (1912) The Mechanistic Conception of Life) was opposed by organismic biologists in the early twentieth century favoring instead the concept of organization and the underlying concept of pattern, or a configuration of ordered relationships (Capra, 1996). The thinking that developed from this opposition to the mechanistic view came to be known as “systems thinking.”

Systems Thinking

Biochemist Lawrence Henderson (Lilienfeld, 1978) used the term “system” to label both living organisms and social systems and came to mean “an integrated whole whose essential properties arise from the relationships between its parts” (Capra, 1996, p. 27). These properties disappear when the system is divided into isolated elements. With systems thinking the relationship of the parts and the whole has been inverted (Capra). Systems thinking concerns itself with connectedness, relationships, and context, while analytic thinking (i.e., analysis) means examining the parts to understand the whole. The idea that the nature of the whole is always different from the sum of the parts found itself in the writing of many fields, including Gestalt psychology from Wertheimer’s and Köhler’s work on perception (Koffka, 1963), and biology (Haraway, 1976). The biography of one of the founders of quantum physics, Walter Heisenberg (Physics and Beyond, 1971), was originally titled by him as The Part and the Whole. In ecology, the idea of “biosphere” was first mentioned by Vladimir Vernadsky (1926), and the idea of biological communities has expanded to ecological networks (Patten, 1991).

Another characteristic that distinguishes systems thinking from analytic thinking is the idea of processes (Capra, 1996). In the mechanistic view, structures interact with forces to give rise to processes, while in the systems view each structure is a product of processes. The idea of
process and the organization of systems were explored by biologists (Bertalanffy, 1950) as living systems, cyberneticists (e.g., Norbert Wiener, John von Neumann, Claude Shannon, Warren McCulloch) incorporating feedback loops, and ecologists’ representations of cyclical flows of matter and energy through ecosystems (Odum, 1953). It was Bertalanffy’s work (1968, 1950) that established systems thinking and theory as a major movement in systems engineering (Checkland, 1981), systems analysis (Dickson, 1971), systems dynamics (Forrester, 1969), operations research (Churchman, West, Ackoff & Arnoff, 1957), and management (Ulrich, 1984).

The systems approach is the basis for a number of terms that can generally be used synonymously. The term “instructional systems development” (ISD) was first used by Barson and Jones (1965), while the term instructional design (ID) has been more increasingly used (Kennedy, 1994). The ISD process is defined by Briggs (1977) as “the entire process of analysis of learning needs and goals and the development of a delivery system to meet the needs” (p. xx), while Romiszowski (1981) stipulates that ISD includes precise goals and objectives, careful preplanning, and testing out. Another terms, “instructional development,” refers to a broad process beginning with needs assessment and ending with implementation (Molenda, 1997), and is used by Shrock (1991) in her history of instructional development and Gustafson (1991) in his survey of instructional development models. The ID process has been described as a multifaceted, multi-phased, and recursive (e.g., Kemp, Morrison & Ross, 1996; Smith & Ragan, 1993; Banathy, 1991) process based on learner needs (e.g., Gagné, Briggs & Wager, 1992). Designer decisions are based on contextual details rather than following a plan (Rowland, 1992; Streibel, 1991; Suchman, 1987) and that designers are “constant reflecting on their own processes and considering relationships between means and ends” (Rowland, 1992, p. 37).

However, Banathy (1996) believes that instructional design is not systems design at all. Design in his view should support transcending education over improvement, a revisioning over revising education, and transforming education rather than reforming education. Banathy views instructional design as a closed system, as a means to design an instructional or training system, which includes defined instructional objectives that are derived from a larger instructional or training program and takes into account the characteristics of the user (i.e., learner). Banathy contrasts instructional systems with educational systems, which are open systems, consisting of societal expectations and values from which can be formulated “the core definition, the mission, and purposes of the system.” The design activity in educational systems involves those “who are serving the system, those who are served by it, and those who are affected by it” (p. 89-90).

Roots of Instructional Design

Systems roots. Instructional design has two roots, a systems view and a behavioral view of learning. Molenda (1997) argues that the systems engineering view was more influential than behaviorism, because the assumptions of how learning occurred were not being examined at the time. General Systems Theory (Bertalanffy, 1968), which, according to Bertalanffy is a “general science of wholeness” (1968, p. 37), has as two of its aims the integration of the natural and social sciences and the development of unifying principles within the sciences. These principles, as they relate to helping plan instruction, constitute a problem solving process – if “instruction is necessary, the problem how to design it has to be solved” (Dijkstra, 1997, p. 20). The generalized solution is summarized by Dijkstra as the following phases: (a) needs assessment, (b) description of goals and program requirements, (c) design of the object, (d) development of a prototype, (e) production, (f) use, maintenance, and (g) do away with and recycle. Evaluations
may take place during these phases. A simplified representation of this process is from Reiser and Dick (1996) and includes the following phases: (1) identification of learning objectives for students to attain, (2) selection and/or development of activities to help students attain those objectives, (3) development and administration of assessment instruments that measure student attainment of those objectives, and (4) revision of instruction and remediation of students based on the degree to which students attain each objective.

Molenda (1997) claims that the “inherent nature of the ID process was determined by its very ancestry,” from systems engineering concepts and behaviorist psychology. Instructional design emerged during the postwar period when the behaviorist perspective was dominant in American psychology and each branch of the military had developed its own model of training development, all of which were based on the systems approach. The systems approach can be described as the “idea of viewing a problem or situation in its entirety with all its ramifications, with all its interior interactions, with all its exterior connections and with full cognizance of its place in its context” (Mood, 1964, p. 1). Instructional design was initially viewed as guidelines and “as insurance against overlooking an important factor” (Mood, 1964, p. 14). Burns (1964) also warned that one cannot separate means and ends, that one cannot specify outcomes without choosing criteria for those outcomes. The systems approach as it has evolved required clearly defined ends and objective assessment of those ends; however, these criteria in public education, claimed Burns, have usually been too vague.

This cycle of analysis, design, development, and implementation/evaluation is not necessarily a step-by-step process, but are recurring stages. The systems process is frequently mistaken as an algorithmic set of procedures. For educational systems, ID proponents acknowledge that heuristic problem solving techniques are often better than algorithmic ones (Romiszowski, 1981). The heuristic process is a creative use of general principles rather than specifying specific rules. The systems approach does not aim for a solution at all times, but to increase the possibility of arriving at a working solution (Romiszowski, 1988; Simon, 1981). Other characteristics of the systems approach involve system components related to each other through inputs and outputs; thus, a change in one component may affect one or more components. Feedback loops between components serve as a means to review and revise components. Each component may consist of sub-components which have their own processes. A system is also influenced by numerous environmental factors, but the representation of the system may or may not identify these.

Behaviorist roots. The systems approach and the analysis, synthesis, and evaluation cycle can be seen in the early instructional development projects by Barson (1967) and Faris (1968). A discussion of the influence of behaviorism on instructional design can be found in Burton, Moore and Magliaro (1996). The behaviorist philosophy was pervasive in the military, and the training programs developed by Gagné (e.g., 1965) and Briggs (1947) were applied to their later work in academic settings, such as the use of behavioral objectives, behavioral change in students, criterion-referenced testing, task analysis, and environmental influences (Gagné, 1962; Reigeluth, 1983). Furthermore, the programmed instruction used to meet the U. S. Department of Defense’s standard of 90% of users responding correctly to questions 90% of the time meant that writers had to make sure test items were well matched with objectives. Subsequent tests of written materials, in order to meet the standards, became formalized over time using the cycle of analysis, design, testing, and revision (Heinich, 1970; Molenda, 1997). The overriding principle of behaviorism was the association of a stimulus with a response in student behaviors (Gropper,
These have resulted in the use of other behaviorist principles, including reinforcement, repetition, and contiguity (Burton, Moore & Magliaro). Tools that support these principles include goals and objectives with measurable outcomes, task analysis of learner characteristics and behaviors, contextual analysis of the learning environment, and feedback methods.

From a survey conducted by Hoban (1974), members of the Division of Instructional Development (Association for Educational Communications and Technology), identified Skinner (71%) and Bruner (59%) as the theorists most applicable in their work, reflecting a mix of behaviorist and cognitivist views. Practical guides identified included Robert Gagné, Robert Mager, and Benjamin Bloom, who were primarily behaviorist-influenced.

Cognitive influences. The idea that the right set of stimuli result in particular behavioral responses suggests that learning is predictable (Winn & Snyder, 1996) and forms the basis for implementing procedures (i.e., task analysis, selection of stimuli) for designing instruction (Gagné, Briggs & Wager, 1988). A cognitive perspective introduces ideas such as mental processes and internal representations to provide a clear account of what influences the behavior. However, as Winn and Snyder have stated, “the change from behavioral to cognitive theories of learning and instruction has not been accompanied by a parallel change in the procedures of instructional design through which the theory is implemented” (p. 133), due to what Winn and Snyder claim is an invalidation by cognitive theory of the basic assumption of behavioral theory, that behavior is predictable. Their first claim is that instructional theory is incomplete, that prescriptions cannot cover all learning outcomes. A second claim is that cognitive characteristics vary from individual to individual making it difficult to predict student response. In both of these claims, no complete set of rules could cover all contingencies. A third claim is that learners make their own decisions as to what strategies they use and may dismiss the strategies selected for them. The fourth claim is that people are not always rational in their decisions and actions and thus their behavior cannot be altogether predicted.

Cognitive equivalents for instructional design, however, have been implemented, such as cognitive task analysis (Resnick, 1976), cognitive objectives (Mager, 1962), and learner analysis through the use of mental models (Bonner, 1988), but Winn and Snyder state that these assumptions still assume that behavior is predictable. Winn and Snyder (1996) differentiate the purposes of instructional design as a means to incorporate cognitive principles. Instructional design, when viewed as a means to design instructional programs, is untenable based on what Winn (1993) and others (e.g., Clark, 1983) have claimed is the impossibility of designing, independent of the implementation (i.e., context-free), instruction that can reliably ensure student outcomes. However, instructional design, when viewed as a means to design learning environments, is not a prescriptive product, but is viewed as probabilistic outcomes for problem solving (Newell & Simon, 1972) and as learning contexts to help students think (Kozma, 1991; 1994), “tools for thought” (Norman, 1993; Salomon, 1979) allowing them freedom to learn in their own way. The environment must be “responsive to the student’s intelligence in such a way that the best ways for the student to learn are determined…” (Winn & Snyder, p. 135) by the student.

Student-directed environments are key to the development of learning communities and the importance of the social context in the development of cognitive processes (Brown, Collins & Duguid, 1989). Examples of this cognitive-social approach in learning communities can be found in the Cognitive and Technology Group at Vanderbilt University (1994) and the Schools
for Thought Collaborative (Lamon, 1994). These communities provide students with opportunities to engage in their own research and problem solving, work together, learn from topics of their own choosing, use technologies as needed and make students’ thinking visible (Lin, Bransford, Hmelo, Kantor, Hickey, Secules, Petrosino, Goldman, & The Cognition and Technology Group at Vanderbilt, 1996).

Tennyson and Breuer (1997) also see the goal of instructional design to improve learning by the development of learning environments and have proposed an interactive cognitive complexity model as a psychological foundation. This model focuses on active cognitive processing (sensory, knowledge storage and retrieval, executive control) of strategies and knowledge base, plus affects (motivation, feelings, attitudes, emotions, anxiety, values) interacting with the external environment. The intent of the model is to include the varied and complex variables of instructional design, particularly the importance of the affective component in the development of learning environments (Tennyson & Park, 1987).

**Constructivist influences.** Molenda (1997) identifies the 1990’s when the underlying philosophical issues behind instructional design were re-examined. Hlynka and Belland (1991) questioned the assumptions of the scientific framework on which research and practice for educational technology were based. These and other postmodernists urged designers to be more reflective in their work and to “examine their motives and heighten their ethical antenna” (Molenda, 1997, p. 46). Meanwhile constructivists challenged the positivist assumptions in both behaviorist and cognitivist approaches underlying instructional design practice (Bednar, Cunningham, Duffy & Perry, 1991; Jonassen, 1991). The constructivist can take a range of positions, moderate and radical, in defense of the constructivist position. The pivotal issue for the radical constructivist, according to Molenda (1997), is whether knowledge exists apart from individuals or is constructed by individuals. Moderate constructivists (e.g., Cognition and Technology Group at Vanderbilt University, 1992; Perkins, 1992; Spiro, Feltovitch, Jacobson, & Coulson, 1992); identify with Piaget and Bruner’s advocacy of constructive views of learning and focus their efforts at developing instructional strategies for complex learning tasks (Molenda, 1997). Cobb (1996) sees a coordination of perspectives that learning is both a process of individual's self-organization of one's thinking and a process of “enculturation” that occurs while individually or socially participating in activity.

**Teaching Instructional Design**

**What to teach.** What has been written about the teaching of instructional design has been in the context of teacher education (e.g., Earle & Sheffield, 1995; Higgins & Sullivan, 1982), what ID skills teachers should have (e.g., Snellbecker, 1987), views towards ID and practices of ID by teachers (e.g., Branch, 1994; Driscoll, Klein & Sherman, 1994). Studies have been conducted on whether or not formal instruction in systematic principles transfers to actual use in teacher planning (Naff Cain, 1989; Martin, 1990; Neale, Pace & Case, 1983; Reiser, 1994). Reiser’s “impressions” from his studies were that given sufficient training, [preservice] teachers will use the systems approach in their planning. However, he believed that additional instruction beyond the twelve hours these students were exposed to would be necessary to use systematic planning in their actual teaching. Frequently, it is the case that administratively required plans may be in a different format than the one teachers were exposed to in the course.

What ID skills to teach depends on one's view of teaching. If one views teaching as implementing curricular directions, then ID skills are unnecessary as teachers have little involvement in the creation of curricular materials. If one views teaching as thinking about
teaching before, during, and after teaching (Clark & Peterson, 1986), then teachers need skills in curriculum implementation -- the planning or designing of how curriculum is implemented. Nunan (1983) claims that ID skills are necessary to help a teacher gain control over classroom instruction.

Snelbecker (1987) identified 60 ID skills within seven categories: assessing student needs, planning instruction, implementing instructing, conducting administrative duties, communicating with others, having personal/professional skills (pedagogical, pedagogical content, interpersonal, self-improvement), and supporting students’ personal qualities, such as learning-to-learn skills, social interaction, and attitudes. Most of these skills, according to Snelbecker, were addressed in some way by the introductory educational psychology textbooks of the time. In regards to the planning instruction set of skills, 19 skills were identified. Snelbecker also made some observations about teacher's view of instructional design based on his experiences with teachers.

1. Teachers do not always see difference between instructional design and planning.
2. ID is sometimes seen as not relevant to what they do as teachers.
3. Teachers are unaware of differences between curriculum and instruction.
4. Teachers sometimes overestimate their knowledge about instructional design theory and technique.
5. Teachers are resistant to change what "works for them" in light of their responsibilities.
6. Teachers sometimes have difficulties moving ideas from one context to their own.
7. Teachers express reluctance to invest the time and effort into using ID.
8. ID is viewed by some teachers as appropriate only with media and computers.

This list represents possible additions to address in the "content" of an ID course, particularly in-service experiences with experienced teachers.

How one views the process is echoed by Martin and Clemente (1990) who have studied why teachers resist ID. “The particular decisions we make as we teach ISD and the amount of time or emphasis we give to aspects of ISD ...affect how these aspects will ultimately be used in the classrooms” (Martin & Clemente, 1990, p. 83). The conceptual image of instructional design via ID models characterizes the world as ordered and rational. For students who are teachers, some aspects of teaching may not be viewed by them as ordered or rational, such as the unpredictability of events and student responses during classroom teaching. The emphasis of ID on rational and ordered means is demonstrated through formulating behavioral learning objectives, choosing activities to support these objectives, and selecting assessments that measure the extent to whether these objectives have been attained (Reiser, 1994). Such a behavioral focus may be at odds with the beliefs of these teachers that learning outcomes cannot be fully specified in behavioral terms (Martin & Clemente, 1990; Tosti & Ball, 1969). Martin and Clemente summarize impediments for teachers’ use of ID based on teachers’ perceptions of ID practices and perceptions of their teaching. They include:

(1) Teachers believe that they, not instructional materials, are instrumental in student learning (Smylie, 1988). Teachers prefer teaching approaches that maintain their high influence on student achievement and relationships with students and do not favor low influence materials,
processes, or programs that reduce their instructional decision-making (Clark & Peterson, 1986; Olson, 1981).

(2) Teachers use mental rather than written planning approaches (Morine-Dershimer, 1978-79). Planning may include, but not always, objectives, activities related to objectives, sequencing, and evaluation (McLeod, 1981; Peterson, Marx & Clark, 1978; Reiser, 1994; Taylor, 1970; Zahorik, 1975).

(3) Teachers use an informal “formative” evaluation process that is neither arbitrary nor random” (Martin & Clemente, 1990).

(4) Some instructional planning derived from ID, such as attention to efficiency, may more closely fit administrative rather than teaching goals (McCutcheon, 1980; Yinger, 1980).

(5) ID planning is time consuming and not worth the investment, particularly if some goals valued by the teacher (e.g., group activities) are not addressed (Kennedy, 1994; Martin & Clemente, 1990).

(6) Assumptions underlying ID, such as systems theory, behavioral theory, information-processing views of cognition, use of technology, may not match teacher’s theories and beliefs (Martin & Clemente, 1990).

If the image of a teacher has evolved from that of a skilled behavior manager to a professional thinking and reflective practitioner (Clark & Yinger, 1987; Moallem, 1996; Schön, 1983), then teaching of ID would need to consider in its processes some of the above issues. Moallem (1996) suggests that ID should consider the social context of any design activity, the decision-making processes of practitioners in a particular field (e.g., teaching), and the complexities of the learning context. In addition, participants’ beliefs and professional experiences and design experiences would need to be considered. Moallem also believes that teachers and designers need to carefully examine what it means to “understand” content (McDiarmid, Ball & Anderson, 1989), the interactive nature of the design activity, the particular ID procedures (e.g., needs assessment, task analysis, program evaluation), and the recursive nature of design efforts over time.

Bratton (1984) reports on efforts to propose competencies for instructional designers. The International Society for Performance and Instruction (then the National Society for Performance and Instruction) and the Division of Instructional Development of the Association for Educational Communications and Technology (AECT) proposed a list of 16 competencies for possible certification of instructional designers.

1. Determine appropriate projects
2. Conduct needs assessment
3. Assess learner characteristics
4. Analyze jobs, tasks, and content
5. Determine learner outcomes
6. Analyze setting
7. Sequence outcomes
8. Specify learner activities
9. Sequence learner activities
10. Determine instructional resources
11. Evaluation instruction/training
12. Produce materials
13. Monitor projects’ implementation
14. Communicate
15. Demonstrate interpersonal, group process, and consulting behaviors
16. Promote diffusion and adoption

To this list Shambaugh and Magliaro (1996-April) added “Exhibit design thinking” and “Scrutinize learning beliefs.” Design thinking (Shambaugh & Magliaro, 1997) included higher level thinking skills and problem solving skills for ill-structured problems, the ability to use design tools (e.g., interviewing, task analysis, learning taxonomies) to facilitate data gathering and decision-making; and ability to break a project into smaller pieces, yet retain the overall picture of the overall problem; understand relationship of design components for revisions; consideration of contextual factors, and drawing upon one's knowledge, personal heuristics and prior experiences. Design thinking was also seen to include creativity and flexibility to address the complexity of instructional problems (e.g., Nelson et al, 1988; Rowland, 1993; Sachs, 1981). “Scrutinize learning beliefs” was deemed necessary because one's beliefs about teaching and learning will come to influence how one designs and how one teaches. These beliefs need to be examined and grounded in learning principles to apply them appropriately and also to give a teacher a research base to call upon (Smith & Ragan, 1993).

Sherman (1978) also calls upon design thinking to be included in ID instruction. He differentiates between the form and substance of instructional design as two aspects of "content" for the teaching of the systems approach to educators. The form of ID is the use of ID tools, while the substance of ID is "systems thinking," a holistic approach concerned with solving problems in their total context. The whole provides a "frame of reference" while the system's components can be studied. For ID instruction Sherman specified the capabilities to be learned (based on Hayman's, 1974, list of ID components) and the learning type for each capability. The capability for systems thinking was identified as the holistic approach and the learning type identified as a cognitive strategy. The "favorable conditions" (Gagné & Briggs, 1974) for learning this cognitive strategy, the holistic approach, was specified as providing opportunities to practice and use the cognitive strategy and using the ID process to address novel problems. Evaluation of problem solving would be concentrate on the overall process used rather than in the solution.

How to teach instructional design. One researcher who has written about the education of instructional designers is Gilbert Rowland, who states “How we view what we teach has a strong influence on how we teach it” (1995, p. 223). Rowland’s view of the ID process is as a creative endeavor, rather than as a rational, technical process consisting of a set of activities carried out in a step-by-step manner. Design, according to Rowland, is “an imaginative, iterative process whose defining element is an imaginative leap to a new possibility” (Rowland, 1993, p. 80). Rowland (1993) examined the literature from a variety of design fields and portrayed these fields along a continuum from those taking a more rational view, such as engineering; to a mid-way
view including media design and interior design; to a more creative view, that of architecture. In the rational view of design Rowland described the design process as systematic, deterministic, linear, technical, with well-defined problems. The creative view was described as being iterative, cyclical, ad hoc, guided by intuition, with unique and ill-defined problems. In terms of educational outcomes, a rational view of design included conceptual knowledge, rule-applying skills, and technical skills. The educational outcomes in a creative view were the ability to generate new ideas suitable for unique situations and tool use. Rowland summarized the teaching methods in the rational view as including large lectures, problem-solving exercises, and projects. The creative view’s teaching methods included studio work, peer critiques and competitions, and the study of artifacts.

Rowland and colleagues (1995) suggested a number of instructional options for the teaching of ID based on this “creative” view of ID. These include presentations, expert projects, competitions, study of artifacts, case studies, design studio, and the internship/apprenticeship. Presentations could include individual or student work on different projects and present their work to their classmates or a panel of experts. A variation would be students assessing each other’s work with minimal interference from the instructor. The use of visiting experts and their projects would provide a modeling of design expertise (Rowland, Fixl & Yung, 1992, December) perhaps over the semester while the project is underway. This type of activity would be more suitable in advanced courses in which the students would be familiar with design knowledge and skills.

Competitions between individuals and/or groups of students could provide a capstone experience for students in the design of an instructional problem over a length of time, after which their presentation to the class or multiple classes would reveal different design approaches to the same problem. Examining artifacts of designing, such as instructional materials, websites, or other projects would help students to learn from other’s work and promote constructive criticism from students. These artifacts could also, according to Rowland, be stored for future use. Case studies of scenarios or completed projects would give students an exposure to a range of instructional problems and provide the basis for classroom discussion. The design studio would involve hands-on design activities and might include simplified design tasks as well as use of conceptual or technical tools. Finally, the internship/apprenticeship option increases the authenticity for ID practice by tackling instructional problems outside the classroom.

Romiszowski, Mulder, and Peters (1990) and Romiszowski (1990) also suggest the use of the case method for teaching instructional design. In the case method of teaching, students analyze situations, recommend action, and discuss their decisions with other students. The instructor is a facilitator in this method. Cases can be of three types (Matejka & Cosse, 1981): true (real events, real names), disguised (real events, fictitious names), and fictitious (imaginary events, imaginary names). Citing a lack of ID cases for use, Graf (1991) provides suggestions on constructing fictitious case studies for ID instruction. Graf recommends the fictitious type which focus on specific objectives, so students can complete them in a short time frame and allow case authors to create a scenario to more completely support these objectives. Objectives could focus on needs assessment, analysis of learning tasks, instructional strategies, assessment, media selection, program evaluation). Three types of case materials were suggested (Knirk & Hudspeth, 1988): the 1-2 page case report, a briefing on a critical incident; a 7-8 page case problem, a more complete summary of an event; and the more comprehensive case study, including a detailed discussion of relationships, issues, and analysis of problem resolution. The
case write-up was recommended to include overview, objectives, background, supporting data, discussion, solutions and debriefing suggestions, including the use of questions, alternate solutions, and areas for further study.

Citing curriculum demands of teacher education programs and the tendency to eliminate dedicated ID courses, (e.g., Higgins & Sullivan, 1982), Savenye, Davidson, and Smith (1991) integrated ID principles into a one-semester computer literacy course to prepare preservice teachers to teach using computers. The four-unit course included computer basics, software skills, ID principles within computer-aided instruction, and developing computer-based concept lesson based on a prototype lesson. The assessment criteria for the computer-based lesson included how well students applied ID principles in terms of completeness and adequacy of objectives, lesson, instructional strategies, practice activities, feedback, and test items. Other criterions included instructional quality, technical quality of programming and execution, and congruence among objectives, presentation, practice, and assessment items. The researchers recommended that ID principles be woven throughout a course, that teachers provide students with course objectives, model the process to be taught, provide an instructional mix of methods, and provide learning activities that use the ID principles. What constituted completeness, adequacy, quality, and congruence were based on a list of questions, but these were subject to professional judgment.

Relating Theoretical Assumptions to ID Learning and Teaching

The nature of what is to be taught, the instructional design (ID) process, is viewed by us as a complex, intellectual process to address instructional problems (Nelson, Magliaro & Sherman, 1988). These ill-structured problems (Simon, 1973), in which learners and their contexts are dynamic and individualistic in nature, require a process sophisticated to address their complexity. Furthermore, if individuals construct their own meaning from experiences in a particular context (e.g., Rogoff, 1990), then teaching should be based on teaching concepts and principles in their context of application (Rowland, 1992).

To learn this complex process requires that newcomers practice many of the same cognitive activities required of experts in authentic contexts to facilitate transfer (Norman, 1978), including reflection (Schön, 1987). Real design contexts are messy and ambiguous, and demand the application of a more heuristic approach (Shambaugh & Magliaro, 1996-February). While the prior knowledge and experience enables novice designers to enter the design arena, it is through the assistance of more capable others that they can actively build on what they already know about design and grapple with the messiness (Brown, Collins & Duguid, 1989).

As novices, an instructional approach is necessary which supports their development as “intelligent novices” (Bruer, 1993), those who can control and monitor their thought processes and make use of general strategies when necessary. Rowland and colleagues (Rowland, Fixl & Yung, 1992, December) have suggested three elements for ID instruction: authentic ID tasks, modeling of design expertise, and reflective activities. We have added dialogue between participants as a fourth element as possible ways to support ID learning (Magliaro & Shambaugh, 1997). Each of these four elements will be described.
Participating in Authentic ID Tasks

An important belief that supports this instructional approach is that learners must be engaged in meaningful tasks in genuine contexts in order to master complex intellectual processes (Brown, Collins & Duguid, 1989). Learners develop within a social world within all of the cognitive and communicative functions inherent in that world (Lave & Wenger, 1991). We regard instructional design as a pragmatic endeavor, that its implementation is a human activity, and that design as purposeful action emerges out of transactions (Joas, 1985) with the design constituents: learners, teachers, parents, administrators, experts, designers, evaluators, even societal and cultural norms. Using a more authentic setting has helped us situate the learning within its real complexity and engage learners as true participants in the process (Lave & Wenger, 1991). Within real contexts, such as actually designing a response to an instructional problem, we attempt to provide the social interaction that helps to develop the intellectual problem solving inherent in instructional design (Nelson, Magliaro & Sherman, 1988). Teachers are also included, as they are learners with their own and unique developmental zones of proximal development (Tharp & Gallimore, 1988); in this case, an understanding about instructional design and teaching.

Research has begun to reveal the complexity of tasks in school, including mathematics, science, reading, and writing (e.g., Bruer, 1994; McGilly, 1994; Schauble & Glaser, 1996). Broadly speaking, instructional design is a complex, problem-solving task embracing mostly ill-defined problems. As instructional design has been characterized as an intellectual activity requiring flexibility and creativity (Nelson, Magliaro & Sherman, 1988; Rowland, 1995), instruction at these higher level processes emphasizes the need for students to directly experience the content (i.e., the ID process) and develop their own generalizations and heuristics. However, as Doyle (1993) says, “Gaps are left which students themselves must fill….the instructional program does only part of the work for students to open up opportunities for choice, decision-making, and discovery” (p. 177).

Authentic ID tasks are achieved through the selection of rich tasks, such as an ID project, in which the motivation initially stems from the students’ freedom to negotiate the choice of an instructional problem. In addition, tackling a genuine instructional problem provides many possibilities and challenges for ongoing and final assessment as students perform the task over time. When the instructional problem is cast also as an academic task, the problem’s complexity is changed (Doyle, 1983). Task selection and structuring are key decisions to help students to process new information and reflect on decision-making on other tasks. Structured tasks help us as instructors to signal accountability for in-class tasks, such as participating in discussion and reporting back to the whole class the results of small group activities. Consistency and stability of task structure also helps students to identify task-relevant information and make time-management decisions. However, the complexity of the learning tasks can be difficult for both teachers and students to accomplish during classroom time. Structured group work provides opportunities for students to learn from each other and provide mutual support for different degrees of social skills by group participants. The complexity of group work is also affected by many factors: available time, resources, and participant make-up, which influences who talks and who does not, as well as overall group performance.

Ambiguity and risk also are inherent in academic tasks as they include evaluation. Task structure helps to reduce the ambiguity, although the range and differences of ambiguity towards these cannot be predicted and are the subject of continual revision. Participation or engagement
in these tasks is also critical. “Teachers of authentic concerns, purpose, identification, emotion regard participation as critical and that their role of teachers is that of active practitioners concerned with authentic participation by both their students and themselves” (Wenger, 1998, p. 276). This suggests that teachers and students are co-participants in the learning process.

Modeling of ID Expertise

Since the context of instructional design is the social world, it is also our belief that ID expertise consists of both skill competencies and human sensibilities. Modeling is one of the means for a teacher to assist learner performance and originates from learners observing what experts actually do (Rowland, Fixl, & Yung, 1992). ID instructors also afford themselves as experts and can use their own experiences as examples of expert reflection and decision-making. This stance requires that instructors of ID model the content they are teaching. However, instructor-modeling in this fashion is one way of making experts’ knowledge and processes explicit. Thus, the design and evolution of the ID course itself becomes a source of explicit expertise for students.

If teaching is viewed as a reflective professional practice, one characterized by the uncertainty of the classroom, as well as under many influences, then technical and conceptual competence is inadequate. Teaching also requires practical knowledge and other competencies (i.e., creativity) to deal with situations that cannot be addressed by technical expertise alone. Practical knowledge involves more than how-to-do things, but also flexibility and adaptability that can only be learned through practice (Brown, Collins, & Duguid, 1989; Elbaz, 1983). To gain knowledge of this professional practice, Winn (1989) suggests a reflective practicum, in which Schön’s (1987) reflection-about-action and reflection-in-action can be supported. If instructional design is viewed as a tool for teachers, such an approach may be useful. This approach is consistent with that used by other professions, including engineering (Koen, 1984), social work (Siegel, 1984), and teaching (Clark & Peterson, 1986). From a practicum, in which graduate students served as instructional designers within a corporate environment, a comment from one of the teams summarized their experience: “We quickly discovered that the knowledge of the design process in general and ID models in particular are necessary but not sufficient preparation for design and development in the real world” (Quinn, 1994, p. 81).

Rowland, Parra, and Basnet (1994) introduce a creative supplement to technical competencies. Because most instructional problems are less than well defined, a recursive design process is necessary. Guided by systematic tools as well as intuition based on experience to the realities of the problem, flexibility is called for (Nelson, Magliaro, & Sherman, 1988). The manner in which such a creative view is taught and assessed can be accomplished through multiple means, including authentic projects, peer critiques, public presentations, study of other’s projects, visits from experts, and internships (Rowland, Fixl, & Yung, 1992).

Another view of the design process, apart from a technical view or a creative view, is that it is a dialogue (Tripp, 1991, as cited in Rowland, 1993). What is designed, according to Rowland is a function of the designer’s knowledge, skill, and expertise; the design task, working conditions; and methods and management. The perspective of the designer, how one perceives a situation, is an important influence on what is designed (Thomas & Carroll, 1979). How the design will proceed depends on the purpose of the task, whether or not it has been done before, and the identified goals. This is a dialogue with oneself, a mental or written appraisal or sizing up of the design challenge, taking into account resources and constraints, and making judgments...
about actions to take. Such a dialogue is very similar to the mental sizing up that teachers do when planning. However, for both teachers and instructional designers, reflecting one’s abilities, experiences, and foundational beliefs is essential as these influence one’s thinking and decisions. Having a dialogue with others is another aspect of the design process, although many teachers report that their planning is a private affair, due partly to the time limitations in which they operate in. For instructional designers this dialogue can involve those who are gathering data from the field or developing instructional materials. Since the design of instruction, whether by an instructional designer, a design team, or a teacher, involves developing a response to an instructional need, dialogue with intended users is often forgotten. In any case, such a dialogue, whether with oneself or with others, represents a whole set of skills that a technical-rational approach by itself cannot completely address.

Reflecting on Learning Activities

Reflectivity is useful to deepen one’s understanding of the complexities of the instructional problem and the contextual realities and includes conversations with others and with themselves (Rowland, 1992). Reflecting is yet another means to assist student performance and must be supported by teachers who value and model this activity. Schön (1983, 1987), who has written about the importance of reflection on learning in the medical, musical, architecture, and management professions, characterizes an ability to reflect on one’s thinking while acting as “reflection-in-action,” which Schön (1983) cites as distinguishing the truly outstanding professionals. Reflective action, first described by Dewey (1933), as it relates to teaching, includes the following key characteristics (Pollard & Tann, 1993, p. 9):

1. An active concern with aims and consequences of teaching, as well as means and technical efficiency.
2. An ongoing cyclical or spiraling process, in which teachers monitor, evaluate, and revise their teaching.
3. The development of competence in classroom inquiry to support development of teaching competence.
4. An attitude of open-mindedness, responsibility, and whole-heartedness.
5. An awareness that one’s professional judgment is informed partly by self-reflection and partly by insights from educational disciplines.
6. A belief that teaching is enhanced through collaboration and dialogue with colleagues.

In education the teacher as a reflective professional represents an evolution of the conceptual image of the teacher by researchers. The initial view of a teacher as a skilled manager of behavior was based on a behavioral psychology, as well as theories from organizational development, systems science, and administrative science (Clark & Yinger, 1987). The essence of teaching success was seen as a master of technique, and in this technical rational view teaching was evaluated by having particular skills or competencies. Research on teacher effectiveness studied what teachers did in the classroom and their actions on student outcomes, which was considered primarily by standardized achievement measures (Good & Brophy, 1986).

Jackson’s (1968) Life in Classrooms examined the complexity of teaching and the thinking of teachers that influenced their behavior. This conceptual study framed its discussion in
language teachers could relate to, such as the use of preactive and interactive terminology, to describe phases of teaching. The significance of this portrayal, according to Clark (1983), “called attention of the educational research community to the importance of describing the thinking and planning of teachers as a means to fuller understanding of classroom processes” (p. 6).

The image of the teacher as a behavioral manager came be complemented by a view of the teacher as a skilled decision-maker. Teachers’ planning processes have been studied within the teacher thinking research program, which is based on the conceptualization of the teacher as a human who acts and thinks. Its aims are to: (1) describe the mental lives of teachers, (2) understand how the behavior of teachers takes on numerous forms and functions, (3) and understand how humans manage the complexity of classroom teaching. The goal of teacher thinking research is to develop a cognitive portrayal of teaching (Clark, 1983).

Teachers’ thinking and behavior, within this view of teacher as decision-maker, is visually represented within Clark and Peterson’s (1986) model of teacher thought and action (see Figure 1). The model depicts a two-way relationship between thinking and behavior, the conceptual components of each, and a visual reminder of the complementary understanding of teaching provided from behavioral and cognitive perspectives. Jackson (1965) implied in a paper, “The Way Teaching Is,” that teacher-effectiveness research and teacher thinking research are both important to provide an understanding of teaching.

![Figure 1. Model of teacher thought and action (Clark & Peterson, 1986).](image)

Within the Clark and Peterson (1986) model, teacher thinking research is conceptualized as having three components: (a) teacher planning, before and after instruction (preactive, postactive), (b) thinking during instruction (interactive), and (c) teachers’ theories and beliefs. Note in the visual that the relationships between these components are reciprocal. If teachers’ thinking is conceptualized as including these components with reciprocal relationships, a better understanding of one requires consideration of the other two. Teachers’ actions in this model
include their own classroom behavior as well as acknowledging students’ classroom behavior and student achievement. Each of these components is also represented to have reciprocal effects. For example, student achievement is seen here as influencing teachers’ behavior and students’ behavior. Another important feature of this model is the inclusion of constraints and opportunities, such as the physical setting and institutional support, among others. The decision-making model of Clark and Peterson includes the general knowledge concerns of teaching in complex situations, rather than cognitive processes alone (Moallem, 1996). A new view of teaching emerged that acknowledged teacher thinking and actions, but within a rich context of influences, activities, interactions, and change. Teacher as reflective professionals (Schön, 1983) are continually engaged in their own learning as well as the learning of their students. The “constraints and opportunities” component of the Clark and Peterson model assumes an increased emphasis as a rich set of contexts, including unpredictability of the classroom, as well as the influences of parents, schools and governments and the broader influence of the culture on both teacher and student (Borko & Shavelson, 1990). A practice that is complex and uncertain requires that teachers experiment, reframe, and reflect during and after teaching (Schön, 1987).

**Engaging in Dialogue**

A fourth element of a means to teach instructional design includes dialogue between all participants, teacher and student. According to Vygotsky (Wertsch, 1991), language influences “the entire flow and structure of mental function” (p. 137). The way in which language is viewed and used by participants is critical.

Socrates replaced monologue, in which one speaks while others listen, with dialogue, the idea that two individuals could discover their own understanding by questioning each other. Rather than borrowing beliefs one had to develop them for oneself (Zeldin, 1994). However, these were beginnings to dialogue, which is more than questioning. As Arnett (1992) states, “dialogue is an invitation …to conversation…not a demand, nourished not so much by the guarantee that it will happen as by patience” (pp. 4, 7). The quality of conversation between teacher and students, says Arnett, “shapes the educational environment,” and is the linchpin for all of the teaching model’s participation structures. Dialogue within these structures could be characterized as “acts of cognition,” to use Freire’s (1998) words. “The teacher is no longer merely the one-who-teaches, but one who is himself taught in dialogue with the students, who in turn while being taught also teaches. They become jointly responsible for a process in which all grow” (Friere, 1998, p. 61).

Dialogue provides an opportunity for communication, an “exchange of meaningful messages” (Pomorska in Bakhtin, 1984, p. viii) between participants. The requirements for dialogue, according to Friere (1998), is a humility and a faith in others before one meets another. Based on this foundation, trust may become established as long as words match one’s actions. In addition, the participants must engage in critical thinking, a continual re-examination of the world and a willingness to “let go” one’s position when faced with new information. Arnett (1992) argues that dialogue requires attitudes: a willingness to enter conversation about ideas and one’s position; a commitment to honesty and to maintain relationships; and a desire to ask value questions about the implication of ideas. Additional ingredients needed for dialogue (Anderson in Arnett, 1992) is an awareness that the outcome of dialogue cannot be predicted, implying also a willingness to take risks not knowing the outcome of a communication exchange. Another ingredient is the realization that in dialogue we may learn about ourselves as much as we learn about others.
The central basis for the principle learning task in the course, the ID project, is the instructional problem, which as an authentic task and context for instructional design learning, is an example of what Friere (1998) called “problem-posing” education, in which teachers and students are always “cognitive” as learners and in their respective roles as teacher and student.

“Students, as they are increasingly posed with problems relating to themselves in the world and with the world, will feel increasingly challenged and obliged to respond to that challenge. Because they apprehend the challenge as interrelated to other problems within a total context, not as a theoretical question, the resulting comprehension tends to be increasingly critical and thus constantly less alienated. Their response to the challenge evokes new challenges, followed by new understandings; and gradually the students come to regard themselves as committed” (Friere, p. 62).

“Problem-posing” echoes another element of dialogue, cited by Arnett (1992), as the need of a position or place to begin a dialogue. “On a campus, dialogue is invited by a common commitment to inquiry and a sensitivity to a particular place—a campus, department, a cadre of faculty and students” (p. 11). Whether examining one’s learning beliefs or making design decisions, two features of our instructional approach, dialogue offers a unique starting point, a “creative blending of content and relationship between teacher and student… without forgetting the part people must play in learning” (Arnett, p. 12).

**Representation of Instructional Approaches through Models**

According to Dewey (1916), “the core of the teaching process is the arrangement of environments within which the learners can interact and study how to learn” (Joyce & Weil, 1996, p. 11). This shifts the teachers' concerns from a predominant focus and view of instruction as content delivery, to the design of the learning environment that will support the learner (Duffy & Cunningham, 1996). Such design would involve not only the physical environment (Tessmer, 1990) but also social and task structures of the participants (Doyle, 1983), as well as the formal and informal rules and procedures used by the participants (Lave & Wenger, 1991).

A teaching model, then, could be viewed as a representation of a means to create a learning environment in which to conduct instruction. However, definitions are more pragmatic. According to Gunter, Estes and Schwab (1995), “an instructional model is a step-by-step procedure that leads to specific learning outcomes” (p. 67). Joyce, Weil, and Showers (1992) define a model of teaching as a “plan or pattern that we can use to design face-to-face teaching in classrooms or tutorial settings and to shape instructional materials…” (p. 4). This definition reminds us that the learning materials, such as those we adopt for ID instruction (e.g., ID textbooks), require the same scrutiny as our instruction.

In addition, instructional models provide a theoretical basis for leveraging learning theories into methods of instruction, based on research on what works in instructional settings. Models provide a set of steps to guide a new user or a “jumping-off place” for experienced teachers. In a larger sense, these models also amplify and energize the repertoires of teachers to deliver instruction (Joyce & Weil, 1996). Developing an instructional approach via a model also allows one to scrutinize its basis and features systematically. The years of research on pedagogy have concluded that the teaching model should fit the content and one’s beliefs about learning (e.g., Gagné, 1985; Joyce, Weil & Showers, 1992).
Types of models. According to Echenique (1963), "a model is simply a representation of relevant characteristics of a reality … a means of expressing certain characteristics of an objective, or system, that exists, existed, or might exist" (p. 1). The "selection of relevant characteristics" is framed by the intent of the modeler (Echenique, 1963). Rowe (1987, p. 164) summarizes a generalized set of steps for model making:

1. Identifying an object, setting, or system.
2. Specifying an intention for the model, which enables the selection of appropriate characteristics.
3. Observing and thinking about the characteristics.
5. Testing the congruence of the model with reality.

Models can be hierarchically classified to clarify their purpose (Steinitz & Rogers, 1970): descriptive models, predictive models, explorative models, and planning models. The purpose of a descriptive model is to explain a phenomenon of interest, identify new phenomena, and possibly reduce the perceived complexity of what occurs. A descriptive model, according to Rowe (1987), with its fundamental description of the reality under study, allows one to develop models that predict, explore, or plan.

A predictive model provides a forecast of how the phenomenon under study will behave, by either a continuation of past trends or a prediction of change, which is more useful than relying on historical data. Explorative models allow for systematic examination of new possibilities by varying certain features of a descriptive model. Planning models, as well as instructional design models, enable the evaluation of outcomes in terms of goals.

Teaching models. A number of authors have documented a collection of teaching models. Joyce and Weil's (1996) Models of Teaching organize models into four families that "share orientations toward human beings and how they learn" (p. 12). These groupings include the social family, which focus on ways for people to work together, and include learning dyads and cooperative learning, group investigation, role playing, and jurisprudential inquiry. The information-processing family of models focus on teaching students how to think effectively and include ways to analyze information (inductive thinking, advance organizers), create and clarify concepts (concept attainment), conduct scientific inquiry, and stimulate creative thinking (synectics). A personal family features a set of models that center on the individual and include nondirective teaching and self-actualization. A fourth family, behavioral systems, are based on social learning, the notion that humans modify their behavior in response to new information. Models in this family include mastery learning and programmed instruction, direct instruction, and simulation. Joyce and Weil’s (1996) synthesis of theory and action describe each model by describing the goals of the model, its theoretical assumptions, its syntax, social system, principles of student reaction, and support system.

Gunter, Estes, and Schwab (1995) take a more practical approach; rather than using learning theory as a structural framework, the authors selected models that many teachers would benefit from, including direct instruction, concept attainment, concept development, synectics, inquiry, classroom discussion, cooperative learning, and conflict resolution. Meanwhile, Freiberg, and Driscoll (1996) organize their instructional approaches as a set of strategies, those useful for organizing, instructing, and assessing. Organizing strategies, those useful before
instruction, included planning and designing, time and classroom management. Instructing strategies included the lecture, questioning and discussion, interactive practice, grouping, reflectivity, roleplay, and using instructional media, computers, and community resources. Assessing strategies included teacher assessment methods and self-assessment strategies.

Developmental Research and Research Objectives

The purpose of this section is to summarize how developmental research can be used to study teaching models. Richey and Nelson (1996) claim developmental research is “often unclear, not only to the broader community of educational researchers but to many instructional technology researchers as well” (p. 1213). Developmental research is defined by Seels and Richey (1994) as “the systematic study of designing, developing and evaluating instructional programs, processes, and products that must meet the criteria of internal consistency and effectiveness” (p. 127). Developmental research within instructional technology concerns itself with improving the “gradual growth, evolution, and change” (Richey & Nelson, 1996, p. 1213) of the processes of instructional design, development, and evaluation. Development within a research context involves not only the creation of instructional products or programs, but their use and evaluation.

Developmental research lends itself to the generation of knowledge which has practical consequences. Richey and Nelson (1996) describe two types of knowledge that may arise out of this applied research: (1) process knowledge of dynamic systems, frequently represented by models; and (2) process understanding as a result of this knowledge. The process knowledge and understanding examined in this dissertation are the context-specific description and evaluation of an instructional approach to support learning of instructional design. Although fore-fronting the evolution of a teaching model, this dissertation also documents the ongoing changes in the instructors’ understanding of the ID process and learner characteristics (both student and teacher), both of which are represented within the model.

Type 1 and Type 2 Research

Richey and Nelson (1996) describe two types of developmental research. Type 1 developmental research studies specific products or programs and produces lessons learned from developing and analyzing the conditions that facilitate their use. Since specific products or programs are studied, Type 1 conclusions are context-specific. Meanwhile, Type 2 research studies design, development, or evaluation processes, tools, or models. Type 2 products include new procedures or models and the conditions that facilitate their use. Conclusions drawn from Type 2 developmental research can be generalized to other situations. Figure 2 summarizes the characteristics of Type 1 and 2 research and highlights in shaded areas the aspects of this research that characterize it as principally a Type 1 study.
This dissertation corresponds to a Type 1 developmental study, because its emphasis is describing and documenting a context-specific teaching approach that supports the learning of instructional design. The product from this study includes lessons learned from implementing the instructional design for a course enacted by specific individuals, plus an updated teaching model, one of the components of the ID plan. The conclusions from this study are limited to how this model supports ID learning within this particular course. The model may have implications for other ID course settings and the teaching of other complex processes after trying out the model with others in different settings Type 2’s emphasis on “study of design, development, or evaluation processes, tools, or models” suggests that research could be Type 2 if the analysis moves beyond descriptive models to exploratory, predictive, or planning models (Rowe, 1987). Subsequent research on how this model supports ID teaching and learning by other instructors and settings would qualify it for Type 2 developmental research.

Richey and Nelson’s (1996) developmental research characteristics further characterize this research in terms of product/program focus, process focus, use context, tools/techniques emphasized, research methods used, and nature of conclusions. This characterization is represented in Figure 3, which includes the options Richey and Nelson identified for each category. Options that are in bold describe features of this research. The focus of this research is how a teaching model supports co-participant learning of ID over a semester course. The developmental research process examined is the full design, development, implementation, and evaluation cycle. The context of the model’s use is post-secondary. Although most of the tools and techniques Richey and Nelson identified are addressed to some extent in the development
cycle, those emphasized are needs assessment and student learning. The research method used is the case study of a particular course (e.g., 15-week semester). Within each case study, descriptions and observations are used. In addition to these methods, the overall nature of the inquiry is qualitative owing to research on the use of the teaching model in real settings. The nature of conclusions in this Type 1 study are context-specific, applicable to this particular course, with some generalizations made to the teaching of ID in other settings.

<table>
<thead>
<tr>
<th>Product or Program Focus</th>
<th>Process Focus</th>
<th>Use Context</th>
<th>Tools and Techniques Emphasized</th>
<th>Research Methods Used</th>
<th>Nature of Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Full course</td>
<td>A. General Description, Development, Evaluation Process</td>
<td>A. K-12 schools</td>
<td>A. Problem analysis</td>
<td>A. Case study</td>
<td></td>
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<tr>
<td>B. Full program</td>
<td>B. Needs assessment</td>
<td>B. Post-secondary</td>
<td>B. Needs assessment</td>
<td>B. Descriptive</td>
<td></td>
</tr>
<tr>
<td>C. Workshop</td>
<td>C. Content selection</td>
<td>C. Business</td>
<td>C. Environ. analysis</td>
<td>C. Ethnography</td>
<td></td>
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<tr>
<td>D. Printed Materials</td>
<td>D. Design</td>
<td>D. Health care</td>
<td>D. Evaluation</td>
<td>D. Evaluation</td>
<td></td>
</tr>
<tr>
<td>E. Instructional module</td>
<td>E. Production</td>
<td>E. Military and government</td>
<td>E. Experimental</td>
<td>E. Experimental</td>
<td></td>
</tr>
<tr>
<td>F. Study Guide</td>
<td>F. Formative evaluation</td>
<td>F. Continuing and community education</td>
<td>F. Historical</td>
<td>F. Historical</td>
<td></td>
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<tr>
<td>G. Job Aid</td>
<td>G. Use and delivery</td>
<td>G. Employee training, other</td>
<td>G. Sequencing</td>
<td>G. Observational</td>
<td></td>
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<tr>
<td>H. Games or Simulation</td>
<td>H. Management</td>
<td>H. International</td>
<td>H. Cost analysis</td>
<td>H. Philosophical</td>
<td></td>
</tr>
<tr>
<td>I. Instructional TV</td>
<td>I. Summative evaluation</td>
<td>I. Context free</td>
<td>I. Dissemination</td>
<td>I. Qualitative</td>
<td></td>
</tr>
<tr>
<td>J. Computer-based</td>
<td>J. Learner outcomes</td>
<td>J. Learner verification</td>
<td>J. Learner verification</td>
<td>J. Survey</td>
<td></td>
</tr>
<tr>
<td>K. Any project</td>
<td>K. No development involved</td>
<td>K. Specific technology</td>
<td>K. Specific technology</td>
<td>K. Specific technology</td>
<td></td>
</tr>
</tbody>
</table>

Figure 3. Matching this study with developmental research characteristics.

Summary

Two issues influence the teaching of instructional design: (a) how one views learning and teaching, and (b) how one understands and depicts instructional design. This chapter summarized the theoretical assumptions underlying our view of learning and teaching; namely, that learning is constructed by the individual, that learning occurs in a context and is influenced by that context, and that teaching is viewed by us as assisting learning. This assistance takes multiple forms, including modeling, contingency management, feeding back, instructing, questioning, cognitive structuring, and reflecting. In addition to assistance, our role as teachers is to
participate with students in the learning and through collaborative, dialogic activity, mutually construct new understandings.

This chapter summarized the purposes to design, essentially a problem-solving endeavor. Instructional design is an example of using the systems process to respond to ill-defined human problems. This chapter summarized the heritage of instructional design, citing its systems and behavioral theory roots, and the influences of cognitive and constructivist perspectives on the ID process. Research on ways to teach instructional design has been few, although more writing has been published about what should be taught in terms of ID components and competencies. Holistic aspects of the systems approach, systems thinking or design thinking, have not been addressed in detail. Also, how this “content” is presented to students and particularly in ways that are meaningful to new and experienced teachers is a critical issue for ID instruction. Differences in technical and creative views of instructional design also influence ID’s presentation and the type of activities employed.

Our view of the ID process, which is the content to be taught, is also critical. This chapter related our theoretical assumptions about learning and teaching and laid out four elements of an instructional approach based on these assumptions. These elements included teacher and student participating in authentic ID tasks, modeling of ID expertise, reflecting on learning activities, and engaging in dialogue. This chapter also discussed the use of teaching models, with a descriptive model being an initial step in representing this approach. Developmental research was described as a means of studying the development of a teaching model. The inquiry, being context-specific, was labeled a Type 1 developmental research effort.