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Participatory Instructional Design: a contradiction in terms?

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Participatory Instructional Design: A contradiction in terms?

by

Rema Nilakanta

A dissertation submitted to the graduate faculty
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Major: Education (Curriculum and Instructional Technology)

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Ames, Iowa
2006

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Dedication

I dedicate this dissertation to the memory of my father and to my mother. I owe them my love for learning; I owe them my unshakeable faith in the power of the human mind and spirit, and above all, I owe them for believing in me.
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ABSTRACT

This dissertation is an inquiry into the apparent absence of participatory approaches in instructional design (ID). It explores the question “what happens when ID becomes participatory?” with the help of three articles. The first article proposes a new approach in ID called Participatory ID, which incorporates principles and techniques of participatory design (PD), a software design approach that calls for genuine user involvement in the design, development, implementation, and maintenance of educational technology. Article 2 explores the feasibility of such an approach in higher education by studying an authentic case of participatory design and development of an electronic portfolio system by its users, namely, by Ph.D. students and faculty members. The design team consisted of 8 Ph.D. students, 1 faculty member, and 1 systems analyst at a large Midwestern US university. The study used qualitative methods to identify activities and processes invented by the design team members to satisfactorily complete their design task. The study also explored ways in which these activities reflected PD principles. Findings indicated five key factors that characterized the design process: 1) maintaining transparency of work processes, 2) continued invoking of the design ethos, 3) maintaining a sense of community, 4) embedding design in user context, and 5) recursive design. Article 3 presents a microanalysis of the participatory ID process described in article 2. It studies the use of language in user-designer conversation during design work. The goal of this article was to understand how design team members used language to negotiate power differences that typically arise when multiple stakeholders participate in a design project. The study used Critical Discourse Analysis (CDA) (Fairclough, 1995), a research approach from sociolinguistics and influenced by critical theory, to examine user-designer conversation from the first year of the electronic portfolio design project. Analysis indicated a strong use of modality (words such as “would,” “could,” “need to”), cohesion (“and,” “therefore,” “then”), and intertextuality (repeating or revoicing other people’s utterances), which seems to have helped create a non-threatening atmosphere and support a critical, democratic, and constructive environment for creative design work.
CHAPTER 1. GENERAL INTRODUCTION

The dissertation title, *Participatory Instructional Design: A contradiction in terms?* seems to question the general perception that instructional design (herewith referred to as ID) practice and participative processes are mutually exclusive. In other words, ID practice cannot be participatory. This perception is not without justification and stems from ID’s predominant technical-rational approach to educational technology design that has come to embody typical ID practice. In addition, it can be argued, the two terms “instruction” and “participatory” seem to connote contradictory processes. “Instruction” appears to suggest an activity that *reinforces* the distance between two distinct and unequal groups, i.e., the instructor and the student. In contrast, the word “participation” refers to a process of bringing people together. Wenger (1998) defines participation as “a process of taking part and also to relations with others that reflect this process. It suggests both *action and connection* [italics added for emphasis]” (p. 55). Thus, it can be argued, participation suggests action that *connects* people, while “instruction” implies activity that *separates* people.

The dissertation challenges the above perception that ID work cannot be participatory. It examines the feasibility of a new ID approach that I call *Participatory ID*. Participatory ID is derived from the incorporation of Participatory Design (PD) principles and practices into educational technology design. PD is a software design approach pioneered in Scandinavia (Ehn, 1993; Floyd et al., 1989; Greenbaum, 1993; Schuler & Namioka, 1993). It stresses *democratic* as well as *functional* empowerment of users\(^1\) (Blomberg et al., 1997). Although scholars have called for making ID participatory (Carr, 1997; Reigeluth, 1997; Willis, 1995; Wilson, 2005a, 2005b), except for Carr’s *user-design* approach (1997), the meaning of participation as democratic empowerment of users is not central to ID practice. In contrast, *Participatory ID* advocates democratic as well as functional empowerment of end users.

I do not mean to muddy the waters by introducing another new term into a discipline already suffering from a profusion of ID models and terms (Gustafson & Branch, 2002). It is quite possible that Participatory ID, once adopted and established in ID practice, would

\(^{1}\) “Put simply, *functional empowerment* holds work groups accountable for the results of tasks, and in return gives them a degree of power over how to execute the tasks. *Democratic empowerment* ideally gives workers a decision-making role in operational planning as well as organizational and technological change” (Blomberg, et al., 1997, p. 281).
evolve to form its own unique identity and earn its own unique name. However, I believe, it takes time for an approach or methodology to mature within a new context and blend with existing practices of the respective community. In the meantime it needs to be distinguished from other viable approaches. Participatory ID seems an appropriate and adequate characterization of ID process informed by PD principles.

**Dissertation Organization**

The dissertation is organized into five chapters; the first and fifth chapters constitute the introduction and conclusion for the entire dissertation. The first chapter, *General Introduction* briefly outlines the main purpose of the dissertation and describes the organization of the dissertation chapters. The fifth chapter, *General Conclusion* synthesizes dissertation’s main argument. It summarizes the findings from chapters 2-4 and presents recommendations for ID educators and practitioners interested in pursuing Participatory ID.

Chapters 2-4 consist of three independent but related publishable articles: a) Participatory Instructional Design: A new approach in Instructional Design, b) Participatory Instructional Design: Study of an emerging paradigm, and c) Critical discourse analysis of user-designer negotiation in participatory instructional design.

**Participatory Instructional Design: A New Approach in Instructional Design**

This article represents the literature review portion in a traditional dissertation. It reports on the current state of ID practice stressing its behavioral and engineering character. It also describes changes occurring in education that call for social and critical perspectives. The article argues that ID practice needs to align itself with these changes to remain relevant to educators. It presents Participatory Design (PD) as one way of addressing the problem. The article also draws implications of incorporating PD in ID and sets out an agenda for future research.

**Participatory Instructional Design: Study of an Emerging Paradigm**

The second article provides empirical evidence supporting first article’s main argument, i.e., the incorporation of PD principles and methods into ID. Article 2 examines in depth an authentic case of participatory design of an electronic portfolio system by students and faculty in the Curriculum and Instructional Technology Ph.D. program at Iowa State University. The case study uses qualitative methods to study a software design process in
action over a period of one year. The main questions governing this study relate to identifying activities characterizing the design work and examining ways in which these activities address criteria for participatory design.

**Critical Discourse Analysis of User-designer Negotiation in Participatory Instructional Design**

The third and last article in this dissertation takes a linguistic approach to the study of software design. I consider this paper a microanalysis of the second article, the case study. I use a research approach from sociolinguistics known as Critical Discourse Analysis (Fairclough, 1995) to analyze two short passages from the weekly design team meetings to understand how language helped support the design work. I was especially interested in design team member’s use of language to help negotiate and navigate between evolving individual member identities, the design task on hand, and the design context.

As can be seen by the brief synopses of the three articles, my interest lies in confronting and addressing the complexity of participatory design, especially the issue of power, which is not typically studied in ID (Carr 1997; Wilson, 2005a, 2005b). This dissertation therefore urges the ID community to reexamine its current practice and explore new design approaches that resonate with social and critical theories of learning.

**References**


CHAPTER 2. PARTICIPATORY INSTRUCTIONAL DESIGN: A NEW APPROACH IN INSTRUCTIONAL DESIGN

A paper to be submitted to the journal of Educational Technology Research & Development

Rema Nilakanta

Abstract

This article presents a critical review of current instructional design (ID) practice and proposes a new ID approach, namely, Participatory ID to address the absence of critical perspectives in this field. The article defines Participatory ID as an approach that incorporates principles and techniques of Participatory Design (PD), a software design approach that calls for genuine user involvement in the design, development, implementation, and maintenance of educational technology. Through detailed description of benefits and challenges of PD, the article draws implications of Participatory ID for ID students, scholars, and practitioners. It argues such an approach would provide instructional designers tools to help them become more reflective in their work, support collaborative learning, and help in the integration of technology in education.

Introduction

Instructional Design (ID), a North American phenomenon, is defined as “a system of procedures for developing education and training programs in a consistent and reliable fashion” (Gustafson & Branch, 2002, p. 17) and typically involves the use of analog and/or digital media. Principles and procedures of ID are expected to help “guide designers to work more efficiently while producing more effective and appealing instruction suitable for a wide range of learning environments” (Molenda et al., 2003, p. 574). ID thus deals with the procedures involved in instructional technology design and development.
ID’s strong emphasis on efficient and effective\(^1\) design reflects its systems engineering roots (Molenda, 1997). Systems engineering is a rational design approach that deals with “choosing the best means for achieving given ends (i.e., maximize efficiency and effectiveness)” (Hirschheim & Klein, 1989, p. 1203). Critics (postmodernists and constructivists)\(^2\) point out ID’s technical-rational stance highlights an absence of critical perspectives. This diminishes ID’s effectiveness and value in education since it does not possess tools to “challenge the underlying belief structures associated with the current practices” (Carr-Chellman & Reigeluth, 2002, p. 241). For instance, according to Subramony (2004), the preponderance of “conservative Western philosophical canons of positivist science, patriarchy, and Eurocentrism” (p.19) in instructional technology has made the discipline irrelevant to learner populations in the U.S. that are becoming culturally and socio-economically more diverse. Likewise, citing inadequacies in current ID approaches, the editorial of a special issue of Educational Technology *Cultural Studies in ID* (April-May 2005) argues for integrating cultural studies concepts in instructional design because “like all educational enterprises, instructional design practices are necessarily deeply implicated within particularly cultural spaces” (Rose, 2005, p. 8). In addition, Nichols & Allen-Brown (1996) argue a critical outlook would help bring instructional technology’s dependence on rationality and science “to balance with other aspects of life, such as moral perspectives” (p. 228) and result in a more holistic ID approach.

Besides cultural critiques of ID, it has been noted that ID practice\(^3\) is changing. Reiser (2001) observes, “the need for high quality Internet based instruction already has created some new job opportunities for instructional designers, and is likely to create many more such opportunities in the near future” (p. 64). In addition, since the early 1990s there has been a general push for more team and lifelong learning (Senge, 1990) in business and

\(^1\) According to Reigeluth (1999) “level of effectiveness is a matter of how well the instruction works, as indicated by how well (to what degree of proficiency) the learning goals are attained...Level of efficiency is the level of effectiveness of the instruction divided by the time/or cost of the instruction” (p. 9).

\(^2\) Molenda (1997) classifies ID critics as *postmodernists* and *constructivists*. Postmodernists reject notions of modernism characterized by objectivism and rationalism. Constructivists object to ID’s positivist foundations and believe “truth is made, not discovered” (p. 46).

\(^3\) In this article, the term “practice” implies ID thinking/philosophies, curriculum, research, and ID work.
industry where interest in ID has grown (Richey & Morrison, 2002). This is evidenced by the development and proliferation of new technologies that support flexible and group work. Such a trend is blurring the lines between educative practice and professional work practice. Some ID scholars view this as an “encroachment from other fields … engaged in IDT [Instructional Design and Technology]-related work … with a stake in education and training” (Wilson, in press) while some others view it as a convergence of ID with other fields (Sherry & Wilson, 1996). Irrespective, the changes taking place today call for a critical examination of ID practice.

However, there seems to be little concerted effort in this direction. Molenda (1997) notes postmodernists that are critical of current ID practice, do not “propose a competing methodology of design; rather, they seek to make researchers and designers more reflective in their work - to examine their motives and heighten their ethical antennae” (p. 46).

Reflection is essential to critical ID but reflection by itself is not sufficient. Advocates of reflective design also need to provide effective design methods and frameworks to translate reflection into action.

This article proposes a new design approach that has the potential to make instructional designers more reflective of their work and action-oriented in their practice. It argues for incorporating principles and techniques of Participatory Design (PD), a systems design approach from the field of software design that promotes direct stakeholder participation as co-designers in all phases of systems design and development (analysis, design, develop, implement, and evaluate). I call this new design approach Participatory ID.

Adapting software design methodology to ID context is not new. Tripp & Bichelmeyer (1990) argued successfully for incorporating Rapid Prototyping, a software design process, into ID. A year before Tripp & Bichelmeyer’s article, Ingram & Maher

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4 Dix, Finlay, Abowd, & Beale (2004) make a distinction between different types of stakeholders –primary or end-user, secondary, tertiary, and facilitating. Primary stakeholders are those that actually use the system; secondary stakeholders are those that do not directly use the system but “receive output from it or provide input to it” (p. 459). Tertiary stakeholders are those who do not fall under the former two categories but are affected by the failure or success of the system. And, facilitating stakeholders are those involved with the design, development, and maintenance of the system. PD advocates involving, at the minimum, primary stakeholders as co-designers.
highlighted parallels between ID and software design. They recognized that both disciplines share common origins in general systems theory and share methods and techniques of systems design. The authors argued ID and software design could learn from each other given their close resemblance. This article can be considered a response to Ingram and Maher’s suggestion.

PD is successfully used in disciplines such as Human-Computer Interaction (HCI) and Information Systems (IS) (Ehn, 1993; Floyd et al., 1989; Greenbaum, 1993; Schneiderman, 1998; Schuler & Namioka, 1993). It is known in education as situated design (Wilson, 1995) or user-design (Carr, 1997; Carr-Chellman et al., 1998; Carr-Chellman & Savoy, 2004). Regardless, PD stands in sharp contrast to traditional instructional systems design (ISD) that continues to dominate the field of ID (Gustafson & Branch, 2002; Visscher-Voerman & Gustafson, 2004; Wilson, 2005a, 2005b). A review of ID literature shows numerous writings on ISD theory and models with little mention of PD. Carr-Chellman & Savoy (2004) contend, “there is almost no research that is specific to the field of user-design within instructional systems” (p. 711) and “no strong evidence is offered for use by training, instructional design, or systems designers” (Carr-Chellman et al., 1998).

Although there have been strong arguments for participatory techniques and methods in ID from time to time, these have been rare. For example, Parrish (2006) recommends storytelling, a method used often in PD, as a means for instructional designers to “walk in their client’s shoes.” Reigeluth (1997) and Wilson (1995) have called for including participatory approaches in ID in order to create more meaningful design. Carr (1997) argues in favor of user-design claiming it addresses “the frustrations of dynamically changing organizations and bureaucracies” (p. 6) and is an effective way to bring systemic change. In fact, Carr also discusses in length the use of action research, ethnography, and cooperative design as methods for implementing user-design in education (pp. 11-16).

In spite of these efforts, there appears to be no coherent participatory ID framework to date nor does PD occupy a place in mainstream ID. PD is not included in ID curriculum at U.S. universities; there is scant research in this area; and ID professionals are not trained in

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5 Rapid Prototyping is characterized by the rapid development of multiple prototypes for testing before deployment. Rapid Prototyping has become mainstream in ID practice today.
this methodology. However, it is important to note, this article does not propose replacing ISD or current ways of doing ID. The value and importance of ISD has been well documented (Gustafson & Branch, 1997; 2002). Instead, this article extends current ID practice by introducing a new approach that favors stakeholder participation.

**Article Audience and Outline**

Since this paper deals with ID practice in education and the industry, it targets instructional designers in corporate and/or educational institutions who are engaged in developing educational and/or training software. It also targets educators who are responsible for teaching instructional design at educational institutions. In addition, this article will benefit students in ID programs, teachers in K-12 institutions and education faculty members who use technology in their teaching.

The article is divided into four sections. **Section 1** briefly critiques current ID perspectives and explores reasons for the seeming absence of participatory approaches in ID. **Section 2** introduces PD, a software systems design methodology, highlights differences between PD and other user centered design approaches, and outlines benefits and challenges of PD. **Section 3** draws broad implications of incorporating PD in ID. The information in this section should be considered a first step in exploring PD’s appropriateness as a new design methodology for the development of educational technology. The article concludes with **Section 4**, which identifies areas for future research.

However, before we proceed in depth with the main discussion, I would like to set the stage by presenting 1) the current state of ID research since it served as the main impetus for this article and 2) the methodology used for collecting data that ground this article.

**Current ID Research**

As mentioned earlier in *Introduction*, a review of ID literature made it apparent that there exists scant research on PD in ID. Mention of participation in ID work is typically included within discussions of constructivist models (Willis, 1995; Wilson, 1995). These discussions form part of ID scholarship, which is typically characterized by reports and position papers on dominant ID thinking and ID models, mainly ISD (Instructional Systems Design) models (Gustafson & Branch, 2002). ID research also includes evaluation studies of
educational software (e.g., what difference a particular software made in learning) or evaluation of new instructional strategies integrated with the software (Chin, 2004).

In other words, ID scholarship appears to have little research on the process of developing educational software. Research on the software development process is called developmental research (Seels & Richey, 1994). Developmental research, according to Seels & Richey, is defined 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). Such research “may take the form of a case study with retrospective analysis, an evaluation report, or even a typical experimental research report” (Richey, Klein, & Nelson, 2004, p. 1099).

In order to provide a sound foundation for this article therefore, the literature search had to move beyond the confines of ID and explore fields where PD had been successfully incorporated, fields such as HCI (Human Computer Interaction) and IS (Information Systems).

**Literature Search Methodology**

Due to the apparent scarcity of ID research pertinent to this article, the search for relevant literature became an exploration into three major disciplines: Education, HCI and IS. The search methodology resembled qualitative data analysis, which typically involves iterative cycles of data collection, analysis, and synthesis. Articles collected in the first round were analyzed and their number reduced based on the quality of the article and its publication source. Article quality was determined by the soundness of argument, the breadth and depth of background literature, its value to its parent discipline, the feedback/reaction it elicited, and finally the author – greater attention was given to work by recognized scholars in the field. Additional relevant references gleaned from articles were also reviewed subsequently.

Publication sources included peer-reviewed journals, conference proceedings as well as books on ID, software design, and PD, as well as well-respected online resources such as electronic listservs in instructional technology, such as ITForum, and online encyclopedia

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6 The terms “internal consistency” and “effectiveness” imply internal and external validation. According to Richey (2005), “internal validation focuses upon the integrity of the model and its use” and “external model validation addresses the effects of using the model – the instructional products themselves, and impact of these products on learners, clients and organizations.”
such as Encyclopedia on Informal Education. These sources (print and online) were selected based on their credibility in their respective communities. The credibility of the source was judged by its reputation in the respective field and recommendations from educators in the field. For instance, ITForum is an electronic listserv on instructional technology founded in 1994 and contains contributions from ID leaders who use the forum as a platform for intellectual dialog with people interested in instructional technology. Similarly, books on ID and PD were selected based on recommendations by educators in the field and the book’s perceived value to the field.

The following keywords were used in the search: “participatory instructional design,” “participatory design +educational software,” “participation +instructional design,” “stakeholder participation +educational software design.” The search involved three online databases, namely, ERIC, ACM Transactions, specifically ACM Transactions on Computer Systems and ACM Transactions for Computer Human Interaction, and CSA Technology Research Database. The search also involved Dissertation Abstracts database. ERIC search resulted in 10 hits of which only 7 seemed relevant to participatory ID. ACM database provided about 200 hits of which only 50 were relevant to the topic. Dissertation Abstracts provided 3 promising dissertations. After following up on subsequent relevant citations, the literature search yielded in all 103 documents. Half of the data set helped shed light on current ID scholarship, which included, to a large extent, descriptions of ID models and their close alignment to learning theories, opinion papers on philosophies underlying ID models, articles on the history of ID illuminating its roots, and book chapters on the changing face of ID. The other half of the data set dealt with PD, mainly in the areas of HCI and IS. Articles on PD in education were rare; there were a total of seven such articles. All in all, PD articles were descriptive. They included PD’s history, its principles and practices, its advantages and disadvantages, and reports on authentic cases of PD implementation and lessons learned.

Due to the scarcity of empirical research in PD, the argument in this article will be based on a mix of research and thought pieces from ID, HCI, and IS. The paper now presents its main discussion starting with Section 1 that includes a critique of current ID practice and explores probable reasons for the absence of PD in ID.
A Critique of Current ID Practice

As mentioned earlier in Introduction and Current ID research, there appears to be an absence of participatory and critical perspectives in ID. The reasons for this lie, to a great extent, in ID’s history. A review of ID’s history shows its affiliation to psychological learning theories, behaviorism and cognitivism, and its strong roots in systems engineering. Molenda (1997) however believes ID owes its present form more to the field of systems engineering than to psychology. He argues,

Instructional design can be seen as having two parents--systems engineering and behaviorist psychology. The relative contributions of each are difficult to assess because instructional design was conceived during the period when the behaviorist paradigm was dominant in American psychology, so there may be influences that are tacit and indirect. What is clearer and what is not well acknowledged in the conversations about the field is that the language and general “look and feel” of early instructional design models are explicitly derived from systems engineering. The dominant genes for instructional design come from systems engineering. (p. 42).

ID originated in the military during World War II and gained in momentum during the post-war era. During this time educators and psychologists were brought together to conduct research and develop instructional materials and training programs for military personnel (Reiser, 2001). They drew upon their knowledge of theory and research on instruction and used testing and evaluation techniques to screen candidates that would most benefit from the training. Research on human learning at the time was greatly influenced by behaviorism. About this time, the military developed its own training models based on systems engineering approach (Molenda, 1997).

After the war, researchers and educators continued studying and working on solving instructional problems, but their context of work shifted to education (Reiser, 2001). In the 1970s a number of ID models were developed that came to be known as the ISD (Instructional Systems Design) family of models. ISD models aimed at the systematic design of instruction and were based on the systems approach introduced in the military. Hence, although ID work had shifted into education, it was unable to shed its military influence.

The ISD models were introduced in schools as a way to improve classroom teaching (Molenda, 1997). ID became popular in higher education as well. Academic programs in ID
and instructional centers were introduced to help faculty improve their teaching with the help of instructional media (Reiser, 2001). Very soon, the industry also adopted ISD processes to develop training. Thus, ID practice evolved concurrently in education and in the industry.

Today ID continues to reflect its engineering behaviorist roots. This can be seen in ID’s underlying assumptions of linear causality (You, 1993) and objectivism.

**Linear Causality**

In an assumption of linear causality “cause and effect are proportionally related … Change in the initial state leads to a proportionate, linear change due to the clear linear relationship between cause and effect” (You, 1993, p. 20). ISD models dominate the ID landscape and reflect a belief in linear causality in that they appear to assume if instruction is designed systematically, it will lead to rich learning. An assumption of linear causality also implies that there is a beginning and an end to a process. In education this translates to an assumption that learning is a closed system, i.e., there is a definite beginning and an end to learning (Jonassen et al., 1997). Learning begins when a need is felt and goals are identified to address those needs; learning ends when the goals are determined to have been met. In software engineering term, such thinking represents “hard systems thinking” (Hwang, 1995). However, it is well known that learning is open and dynamic, which makes ISD models insufficient to handle sophisticated and complex learning systems (You, 1993).

**Objectivism**

Hard-systems thinking is characterized by an objectivist worldview, which regards truth/knowledge as independent of its context, absolute in itself, and acquired through scientific methods. Such a perspective symbolizes the acquisition metaphor (Sfard, 1998), which dominates educative practice. Learning theories such as behaviorism, cognitivism, and even constructivism seem to embody the acquisition metaphor. They either define learning as a transmission of knowledge between teacher and learner or as an acquisition of knowledge by the learner with facilitation from the teacher. Such a perspective views knowledge as something tangible that can be “applied, transferred (to a different context), and shared with others” (Sfard, 1998, p. 6).

Current ID models, especially the family of ISD models, tend to treat knowledge as a commodity that can be shaped by creating “certain conditions of learning” (Gagne, 1985).
This is evidenced in the new role of instructional designers as knowledge managers (Reiser, 2001). Knowledge management, according to Rossett (1999), involves recognizing, documenting, and disseminating explicit and tacit knowledge within an organization in order to improve the performance of that organization. In other words, it treats knowledge as something that is produced and packaged for quick and easy consumption.

*Absence of Postmodern Perspectives in ID*

The dominance of acquisition thinking in ID also highlights the absence of participative practice or the *participation* metaphor (Sfard, 1998). Participative practice represents a postmodern orientation that recognizes the dynamic, social, distributed, and political nature of learning. It involves critical inquiry that “questions reality, looking for contradictions [and] is change/action-oriented” (Koetting & Malisa, 2004, p. 1009). Such an approach is important in educational technology because “educational technology is founded on philosophical assumptions and designers of educational technology (and designers in general) work under certain interpretive and normative processes that are essentially philosophical” (Koetting & Malisa, 2004, p. 1018).

However, “postmodern scholarship in educational technology is not mainstream…there appears to be no strongly unified body of work that presents a clear postmodern strand of scholarship,” (Hlynka, 2004, p. 244). Although there have been advocates (Bethany, 1991; Parrish, 2005, 2006; Rose, 2005; Solomon, 2000; Solomon, 2004; Voithofer & Foley, 2002; Wilson, 1995, 2005a, 2005b) of postmodern approaches in ID and some ID models, for e.g., Willis’ (1995) *R2D2* model and Cennamo, Abel, & Chung’s (1996) *Layers of Negotiation*, within the constructivist paradigm reflect postmodern thinking, postmodernism has not impacted ID practice greatly. ID practice remains a technical activity undertaken by expert designers. This paper argues that the incorporation of PD in ID would help designers become more reflective in their work and mindful of the social and ethical impact of their designs.

The next section describes the PD approach. It presents a brief history of PD, highlights differences between PD and other design models that involve users in software development, and outlines PD’s benefits and challenges.
Participatory Design (PD): A Software Design Approach

Since PD was developed and implemented mostly in work environments, this section includes studies and discussions of PD in the context of professional practice.

PD is a software design approach pioneered in Scandinavia in the 1970s (Ehn, 1993) for the purpose of designing and developing useful computer systems that work in practice. It advocates the direct and full involvement of end-users (people that use the software to do their work) in the design process. Ehn describes PD as a design approach that aims for:

Democratic participation and skill enhancement - not only productivity and product quality - themselves considered ends for the design...

Two important features of participatory design shape its trajectory as a design strategy. The political one is obvious. Participatory design raises questions of democracy, power, and control at the workplace. In this sense it is a deeply controversial issue, especially from a management point of view. The other major feature is technical--its promise that the participation of skilled users in the design process can contribute importantly to successful design and high-quality products. (p. 41).

Bjerknes & Bratteteig (1995) argue a review of PD history indicates two major movements: The Collective Resource approach (Ehn & Kyng, 1987) and the Socio-Technical approach (Scacchi, 2004). Both movements consider the practice of technology design within the larger context of its use, i.e., the type of work and the work environment, differing only in emphasis and strategies. The former, The Collective Resource approach, is a critical approach tracing its ancestry to action research\(^7\). It assumes an inherent conflict between management and worker and advocates action research on systems design processes to give workers more control over designing their worktools. This has given rise to the “tool perspective” that views tools as “extensions of the accumulated knowledge about tools and materials in a given work process (Bjerknes & Bratteteig, 1995, p. 78). In contrast, the Socio-technical approach reflects a “harmonizing” perspective and emphasizes consensus building.

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\(^7\) “Action research is a form of collective self-reflective enquiry undertaken by participants in social situations in order to improve the rationality and justice of their own social or educational practices, as well as their understanding of those practices and situations in which the practices are carried out” (Kemmis & McTaggart cited in Smith, 2001). It is a form of critical inquiry popular in education due to its potential to generate effective and sustained improvement in schools.
over confrontation. It considers the organization as a whole and advocates the involvement of end-users in all stages of design as a way to balance different interests in the organization.

Several PD methods and techniques have been developed and often PD is viewed as another design method or as a collection of discrete design methods. However, according to Muller & Kuhn (1993), PD is best understood as a design approach, as an area of research that deals with theories, methods, and action, “with the goal of working directly with users (and other stakeholders) in the design of social systems including computer systems that are part of human work” (p. 25). There exists a range of PD methods such as Contextual Inquiry (Holzblatt & Jones, 1993), Co-operative Inquiry (Reason, 2002), Cooperative Prototyping (Bødker & Grønbæk, 1991), PICTIVE (Muller, 1993), to name a few. These methods differ in type and degree of user involvement. Muller et al. (1993) have developed a taxonomy of participatory design methods (see Appendix A) to help guide novice and potential PD practitioners. Their purpose was also to persuade “software management and other stakeholders [who] may believe incorrectly that PD has not been used in commercial products, or that it has not been successful outside of Scandinavia” (p. 26). This article does not deal with PD methods listed above in detail since, as we have seen already, there exists a rich body of literature in this area. Readers are requested to refer to the source materials if they are interested in details of specific participatory methods.

**Difference between PD and User-centered Design (UCD) and Computer-supported Cooperative Work (CSCW)**

PD is often confused with UCD and/or CSCW. All three design approaches, PD, UCD, and CSCW, are characterized by user-involvement in the design and development of computer systems. The differences are based on how and why users are involved in the design process and the degree to which they are involved. This is now briefly outlined.

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8 *Co-operative Inquiry* is a participatory action research (PAR) method developed by John Heron in 1971. PD practitioner’s use of PAR methods can be seen as a natural result of PD’s roots in action research (see PD introduction).

9 PICTIVE (Plastic Interface for Collaborative Technology Initiatives through Video Exploration) is a technique that allows non-technical people to contribute to the design and development process. Users create paper mockups of graphical user interfaces (GUI) to help them understand how the intended software will look and behave. The design session is video taped and reviewed by the development team.
**PD and User-centered Design (UCD)**

PD is often confused with UCD; some call UCD collaborative design (Sherry & Myers, 1998). UCD is defined as a design approach whose goal is to develop usable and useful systems by involving end-users in the design process (Karat, 1997; Nielsen, 1993; Schneiderman, 1998). According to Karat (1997), “In general, the activities of UCD are focused on understanding the needs of the user as a way to inform design…” (p. 35). UCD’s focus is typically on “functional” empowerment while PD aims for functional as well as “democratic” empowerment of users.

*Functional empowerment* holds work groups accountable for the results of tasks, and in return gives them a degree of power over how to execute the tasks. *Democratic empowerment* ideally gives workers a decision-making role in operational planning as well as organizational and technological change” (Blomber et al., 1997, p. 281).

The difference between UCD and PD can be further clarified by Druin’s (2002) analysis of user roles in design. Druin, who has worked with children in designing interface for kid software, identifies four user roles based on the degree of user involvement: user, tester, informant, and design partner.

In the role of *user*, children contribute to the research and development process by using technology, while adults may observe, videotape, or test for skills... In the role of *tester*, children test prototypes of technology that have not been released to the world by researchers or industry professionals... In the role of *informant*, children play a part in the design process at various stages, based on when researchers believe children can inform the design process... And finally, with the role of *design partner*, children are considered to be equal stakeholders in the design of new technologies throughout the entire experience. (p. 4)

UCD typically engages users in the first three roles – as a user, a tester, and an informant. In UCD although “users are considered central to the design specifications, … design control remains firmly in the hands of the professional designers and approval power remains with leadership” (Carr, 1997, p. 10). In PD however the user is elevated to the level of a co-designer and control is distributed equitably across all stakeholders. Actually, PD introduces a dramatic shift in power; the full and active participation of users as designers transforms the role of traditional designers, who no longer represent the “unchallenged power
and authority” (Schuler & Namioka, 1993, xii). In addition, PD also demonstrates that users’ involvement as a form of “knowledge extraction” or of “adjusting their expectations” (Grønbæk et al., 1993, p. 79) may no longer be sufficient for successful instructional design. Learner’s full commitment is crucial to implement a PD model. Learners need to get involved intensely and early in the process of design. This vision seems consistent with what Reigeluth (1999) describes as “user-designers,” as going “beyond measuring and incorporating relevant potential user perceptions,” by “having the users play a major role in designing their instruction” (p. 18).

**PD and Computer-supported Cooperative Work (CSCW)**

Both PD and CSCW are considered design-oriented research areas that include within their realm a range of design methods or techniques. According to Kensing & Blomberg (1998) research on PD and CSCW indicates considerable overlap as well as differences. Both fields are interested in designing systems that are informed by and responsive to people’s everyday work practices. “However, there are differences in the emphasis placed on their shared concerns of technology design, cooperative work analysis, methods and techniques, worker participation, and organizational and political change. (pp. 179-180).

CSCW’s main focus is on the type of work for which a technology is being designed. It distinguishes between cooperative work, individual work, and other types of work. Such focus is characterized by an emphasis on work/task analysis and technology design over direct user-participation. “In fact, some [CSCW scholars] have argued that it is too costly and logistically problematic to have users directly involved in design … As an alternative, social scientists and others may act as user surrogates or representatives in design discussions” (Kensing & Blomberg, 1998, p. 181).

PD, on the other hand, does not focus on work alone or on technology design alone. It believes all work, by its very nature, is social. PD’s main focus therefore is on ways, i.e., techniques and methods, of enhancing user participation in design in “an effort to rebalance the power relations between users and technical experts and between workers and managers. As such PD research has an explicit organizational and political change agenda” (Kensing & Blomberg, 1998, p. 181).
Thus, PD can be described as a design approach that is fundamentally action and change-oriented. These principles are consistent with the goals of critical inquiry, which, as mentioned in Section 1, appear lacking in ID. PD therefore has the potential to introduce a critical orientation in ID. The next section briefly describes PD’s benefits and challenges to understand its value to systems design.

Benefits of Participatory Design (PD)

PD’s strengths and weaknesses lie in its multifaceted nature. Its benefits presented here are based on three dimensions: pragmatic, theoretical, and political (Chin, 2004).

**PD Benefits: A Pragmatic Design Approach**

PD is a flexible, pragmatic design approach. It is not defined by a specific method or methodology. “There is an improvisational quality to much of the Scandinavian work in participatory design. There is a recognition that no two situations are alike. Each situation requires a creative weaving of skills, technologies, people, organizations, and opportunities for change” (Muller, 1991, p. 389). PD offers designers freedom and flexibility to work with an assortment of techniques.

The improvisational quality also gives PD an edge. It allows designers to use their creativity to respond to the needs of the context. A review of software design practice by Löwgren (1995) demonstrated that in software design, a creative design approach typically co-exists with the traditional technical approach resulting in two distinct design perspectives: the engineering design perspective and the creative design perspective.

Engineering design assumes that the “problem” to be solved is comprehensively and precisely described, preferably in the form of a requirement specification. …In contrast, creative design is about understanding the problem as much as the resulting artifact. Creative design work is seen as a tight interplay between problem setting and problem solving … The given assumptions regarding the problem are questioned on all levels. (p. 87-88)

PD’s focus on the work context highlights another advantage not typically seen in current ID practice. PD is embedded in the “use situation” i.e., how software is actually used in practice (Greenbaum & Kyng, 1991). PD focuses on the way people actually work and live rather than relying on management views of how users should live and work as is
typically done in traditional software design\(^\text{10}\) (Dix et al., 2004; Kuhn, 1996). PD therefore deals with user’s problems as users perceive them. It implies a context of use and values that results in quality experience for the user (Winograd, 1996, p. xvi).

A concentration on the way people actually work has lead scholars to label PD as work-oriented design (Ehn, 1993). “Work” in PD implies activities that define the practice of a community. Practice in PD is understood socially and historically. Practice is “doing, but not just doing in and of itself. It is doing in a historical and social context that gives structure and meaning to what we do” (Wenger, 1998, p. 47). Practice includes activities that are explicit as well as tacit. Explicit practices can be observed and documented and typically represent the organizational view (Sachs, 1995), while tacit practices remain hidden from the actors and members of a community but are crucial to the success of the community, such as conventions, unspoken codes of conduct, gestures (Wenger, 1998). Design errors typically result when designers are not able to understand the importance of tacit skills and make “assumptions … as to how tasks are performed rather than unearthing the underlying work practices” (Suchman, 1995, p. 56).

Suchman’s observation supports Argyris & Schön’s (cited in Argyris, 1982) thesis that our actions are governed by two types of theories: espoused theory and theory-in-use (also known as theory-in-action). Espoused theories are theories that we use to communicate our beliefs to others. These theories characterize what we believe we do. Theory-in-use are theories that govern our actual behavior and these tend to be tacit. PD practice engages both types of theories. It allows designers and users to share information democratically and also helps them confront their hidden, underlying assumptions through critical reflection, articulation, and action.

PD is also shown to be cost-effective in the long run (Hirschheim, 1985, Wilson et al., 1996). In a comprehensive study assessing the impact of participatory systems design on organizations and workers, Hirschheim surveyed 20 individuals from eight distinct organizations that had extensive experience in participative design. He was interested in assessing “(a) the nature of participation…; (b) whether there had been any post-

\(^{10}\) A similar practice exists in traditional ID. Instructional designers are expected to identify the “discrepancy” between “what is” and “what should be” (Kaufmann & English, 1979) and design for “what should be.”
implementation evaluation…; (c) experiences with conventional systems development methodologies…; and (d) details relevant to assessing the value of participative design…” (p. 298). The study findings revealed there was increased communication, less resistance by users to adopt new systems, a decrease in implementation time, and increase in productivity and savings. Besides self-reported data, the study also included objective data such as number of user complaints or requests for change as a measure of product quality.

Hirschheim (1985) and Wilson et al. (1996) also noted that users became more demanding of the system; the systems designed through PD generated calls for change. However, Hirschheim (1985) observed these requests were for further enhancements that went beyond initial system requirements rather than for modifications “to meet those requirements which had not been met initially” (p. 302). Hirschheim believes this is because the workers felt they had a greater say in the design of the software and therefore were invested in its continuous improvement. It is possible that this motivation also lead to keeping costs down in the long run.

PD’s pragmatic benefits discussed above also demonstrate a theoretical dimension. The process by which designers come to understand user’s needs appears to be consistent with principles of active and collaborative learning and knowledge building (Bereiter, 2002; Dewey, 1938; Pea, 1994). We will discuss this next.

**PD’s Benefits: A Theoretical Design Approach**

PD’s hallmark is generative learning that occurs when people with different perspectives come together for a common purpose. This is also called mutual or collaborative learning and has been shown to lead to superior learning outcomes in educative practice (Pea, 1994). Mutual learning highlights PD’s theoretical aspect.

**Mutual learning.** Mutual learning, in the context of systems development, is known to be valuable. It initiates “client learning,” which in turn is believed to result in superior design outcomes. Client learning is characterized by “the acquisition of new knowledge [by representatives of users and sponsors involved in the development process] that causes changes in requirements that reflect an enhanced understanding of the technology, organizational, and work environment in which the system will operate” (Majchrzak et al., 2005, p. 654). Majchrzak et al.’s empirical study instantiates the positive relationship
between client learning and superior design phase outcomes. The study involved 17 IS development projects and 85 participants (developers and clients) at a US university. The sample was relatively homogenous, in that the authors were able to hold relatively constant the effects of many contextual variables on the relationships between CE [Collaborative Elaboration, a collaborative learning strategy], client learning, and outcomes of the IS design phase including … power differentials among stakeholders, organizational ability to accommodate changes, system complexity, development process, nature of client-developer relationship, developer's experience, and how the project was led. (p. 657)

Author’s findings based on repeated client surveys (3 times in 12 weeks) and data on short and long-term design phase outcomes “suggested that teams using more collaborative elaboration will engender more client learning and teams with more client learning will achieve better IS design-phase outcomes” (p. 666). One of the limitations of this study cited by the authors is its lack of generalizability since the sample was restricted to graduate students within one university under relatively controlled conditions. In addition, I believe the study’s findings could have been strengthened had the authors surveyed the developers (the students) as well. The authors point to “classroom bias” as the reason for excluding students in their data pool, however, I believe, not including the developers in the survey resulted in the study being one-sided. Nevertheless, this study represents a theoretically sound example of work that highlights the close relationship between design and learning.

Creating opportunities for mutual learning during design is a hallmark of PD. According to Chin (2004),

…the role of participatory design is to facilitate understanding between system designers and users by giving each the opportunity to engage in hands-on activities in the professional domain of the other. The basic approach is best described as “learning-by-doing.” Users come to understand the work of designers by doing authentic analysis and design. System designers come to understand the work of users by participating in authentic work activities or simulating work activities through games and other workplace simulation techniques. (p. 3)

“Learning-by-doing” echoes Deweyian principles of experiential learning. In PD, through direct involvement of users in the design process, designers gain insight into user’s world. Similarly, users become aware of designer practice as they engage in design activities
that include making observations, collecting and analyzing data, drawing up design specifications, building prototypes with the help of tools familiar to them, and helping with implementation. Participants (designers and users) gradually develop a shared repertoire and realize the potential to function as a community of practice (Wenger, 1998). According to Wenger, a community of practice serves as a breeding ground for learning. Learning is fundamentally social and emerges when members of a community develop a shared repertoire (common understandings, language, conventions) while engaged in a joint enterprise that is mutually beneficial.

PD’s emphasis on collaborative and active learning engages every design member as an active participant in designing his/her own work tools. Active participation thus also helps users take control of designing their own work tools. This is a crucial and identifying feature of PD and also highlights its political dimension (Ehn, 1993; Greenbaum & Kyng, 1991, 1995; Schuler & Namioka, 1993).

**PD’s Benefits: A Political Design Approach**

From a political perspective, PD helps empower users by supporting them to participate fully in the design of their worktools. “Full participation” implies users have a direct role in the design, which is not appropriated by “middlemen” systems designers. It is driven by the belief that “people who are affected by a decision or event should have an opportunity to influence it” (Schuler & Namioka, 1993, p. xii). Accepting users as design partners implies giving up the power traditionally residing with the designer and establishing a new power structure defined by shared leadership. Shared leadership also benefits technology diffusion and adoption. When users become decision-makers in the design of tools meant for them, they are more willing to adopt it, and sometimes become its best advocates (Bjerknes & Bratteteig, 1995; Clement & Van den Besselaar, 1993; Kujala, 2003).

I would argue that PD’s facilitation of technology diffusion, learning, and user empowerment is of even greater value in education. It can help foster individual reflection, mutual learning, and mutual respect among participants of a design team – a goal that indicates democratic ideals in education. An example of the power of PD can be seen in an empirical study of a participatory ID project (Nilakanta, 2006) that forms chapter 3 of this dissertation. However, PD also has its challenges, which we shall explore next.
Challenges of Participatory Design (PD)

PD’s strengths also serve as its drawbacks. This section briefly describes PD challenges based on pragmatic, theoretical, and political grounds (Chin, 2004). The challenges range from purely logistical concerns such as time and personnel coordination problems to deeper philosophical concerns regarding cultural differences between PD’s Scandinavian roots and the North American market-driven, individualistic culture.

PD Challenges: Pragmatic

The explorative and collaborative nature of PD gives rise to logistical challenges for the designer (Hirschheim, 1985; Schneiderman, 1998). Some of the obstacles, according to Grudin (1993) are: a) motivating users to work with designers and provide substantial feedback, b) identifying potential users and having access to them, and c) investing time and resource into the project. Yet, not actively involving users/learners in the design process can bring disastrous results, such as creating context and culturally insensitive interventions and ineffective instructional systems.

Hirschheim’s (1985) study on cost-effectiveness of PD described earlier in PD Benefits: A pragmatic design approach, noted that in spite of PD project’s success, respondents had expressed reluctance to undertake PD again due to problems “finding sufficient time and opportunity to bring people together for discussion and consultation” (p. 301). In addition, the explorative nature of PD can get time-consuming. Hirschheim (1985) notes “the participative approach leads to delays in the design phase…some problems which arise during the design phase may not be resolved quickly” (p. 301). Also time-consuming is the analysis phase where designers and users typically process large amounts of data collected through qualitative research methods such as ethnography (Wilson et al., 1996).

Besides designer challenges, PD presents challenges for the user as well. Lack of time on part of the users to participate in the design has been noted-- this is especially true when organizational structures do not support user involvement in design projects considered outside their typical job descriptions. Wilson et al. (1996,1997 cited in Kujala, 2003) interviewed designers and users in a longitudinal study of a design project. The survey findings indicated users were too busy, did not seem motivated, and seemed reluctant to talk to the designers. This hampered a democratic exchange of ideas and undermined PD’s goals.
**PD Challenge: Theoretical**

The improvisational character of PD mentioned as one of PD’s benefits can also pose methodological challenges. Brown (1997) points out that in the absence of a specific PD methodology, participatory methods are applied haphazardly and unsystematically without logical continuity between individual methods and proper integration into the whole design process. She notes, “Methods are seen more as a resource for designers to use as they deem appropriate and are not gathered into a coherent framework” (p. 34).

Critics of PD also contend that an absence of a full lifecycle methodology makes it difficult to gain an overview and evolutionary path of the project, giving rise to project management problems (see Brown, 1997 for benefits of methodology in system design). Although there have been attempts to employ participatory methods throughout a project such as in the pioneering Scandinavian project UTOPIA (Ehn, 1993), Chin’s (2004) critique notes that the methods are still “loosely integrated…with little regard for how their analysis and design products will be applied together or passed downstream in the development lifecycle” (p. 39).

The absence of methodology also makes it harder to facilitate mutual learning among different stakeholders (see “client learning” in *PD benefits: A theoretical design approach*). Majchrzak & Beath (in press) believe this problem exists because “the learning focus is often limited to the accurate transfer of knowledge from user to analyst, rather than the building of mutual understanding and insight or the surfacing of emergent requirements.”

This poses a formidable challenge to novice designers interested in PD. Designers do not have a systematic way of identifying when learning takes place during design, which leads to problems structuring critical encounters to generate learning (Majchrzak & Beath, in press). This is especially problematic since mutual learning lies at the core of stakeholder design. As Majchrzak & Beath (in press) note,

> …stakeholder participation is of value only when it leads to mutual learning. Thus, a criterion for evaluating which participative behaviors stakeholders should engage in should be the learning that is likely to be fostered by the behavior. Learning should thus become the focus of research on how users participate, not the participation behavior per se.
Besides pragmatic and theoretical challenges, PD ethos presents a cultural challenge for North American designers. We will discuss this now.

**PD Challenge: Political and Philosophical**

PD scholars have pointed out the mismatch between PD’s social-democratic orientation and North American technical, market-driven culture (Carr-Chellman & Savoy 2004; Greenbaum, 1993; Muller, 1991). Muller explains:

> It has been argued that the workplace democracy themes of the Scandinavian challenge are difficult — or even impossible—to carry out in corporate or institutional environments that are not characterized by high unionization, by legislative protection of the users’ roles in system design, or by a relatively small-scale, highly integrated software development process...then in what sense can we talk about a participatory design approach or for that matter about adapting the “Scandinavian Approach” to the North American context? (p. 389)

PD researchers concerned with the appropriateness of PD for North American contexts have attempted, in many instances, to shift their attention from creating workplace democracy to facilitating and enhancing existing work practice (Muller, 1991; Spinuzzi, 2002). This shift in focus is also seen in Scandinavia, the home of PD, as well as all over Europe. It is driven by organizational changes and changes in computer technology and computer use, which has resulted in a shift in focus from employee to customer and an emphasis on service over production, respectively (Bjerknes & Bratteteig, 1995). According to Bjerknes & Bratteteig, such changes have modified PD’s focus from promotion of democratic practice in the workplace to advocacy of *individual ethics*. The authors explain the difference between a political and an ethical systems developer thus:

> The political system developer is an emancipator, carrying out an action programme to give the weak parties knowledge they can use to increase their power. The emancipator uses and strengthens existing institutions as means to achieve working life democracy. The ethical system developer is mainly responsible towards their own individual ethical codex—which might happen to be political. Ethical individuals act morally in the particular work situations in which they find themselves, promoting workplace democracy through engagement in system development situations. (p. 85)

An analogous shift, however subtle, is occurring in the ID field as well. Discussions on the need for designers to shift their focus from technical issues to aesthetics (Parrish,
2005) and ethics (Wilson, 2005a) of their design are gradually gaining ground. Parrish argues for pragmatic aesthetics (following Dewey) in ID. An aesthetic experience, according to Parrish, is “one that is particularly heightened and especially meaningful. In this sense, the aesthetic is a potential not only of the arts, but all activity” (p. 19). Hence, a perspective on aesthetics supports design that brings meaning and value to those impacted by the design, i.e., the end-users.

Wilson (2005a), in turn, argues for ethical perspectives in ID. He contends it is important for instructional designers to engage with the technical as well as the ethical and political aspects of design. A designer should be able to confront questions such as “How is expertise presented in instruction?... Who is being trained, and for what? … How does instruction represent fuzzy areas where experts might disagree? …who is paying the tab, and for whom?” (pp. 13-14). Instructional designers do not typically ask such questions, nor are they trained to do so. In fact, a recent survey (Larson & Lockee, 2005) indicates 69.2% of the instructional designers that participated in the survey felt their ID programs did not prepare them sufficiently to tackle internal workplace politics. Since PD is based on the assumption that design is a political activity, its addition to ID would be valuable to designers. It would push them to ask questions regarding the ethical and political implications and ramifications of their design and also provide them with ways and means of addressing those questions.

However, we have also seen that PD poses challenges of time, methodology, and differing philosophies. Therefore, it is important to explore PD’s appropriateness as an ID approach and also see how far PD can be successfully implemented in ID.

**Implications of PD in ID**

The previous section presented benefits and limitations of PD. This section explores implications of integrating PD into ID. As mentioned previously in *Current ID Research*, there is scant mention of PD in ID scholarship and therefore, the implications listed below are inferences drawn from existing PD scholarship in IS and HCI.

**Introduction of a New ID Paradigm**

The first implication of incorporating PD principles and practices into ID field would be the induction of a new ID paradigm that I prefer to call the *Participative* paradigm. The participative paradigm recognizes the complex nature of learning; it argues human learning,
irrespective of its context (formal or informal), is fundamentally social (Wenger, 1998) and therefore also political. The participative paradigm supports principles of democratic learning that characterize “education that develops in humans the dispositions to make choices that benefit self and community mutually” (Goodlad, cited in McNabb & McCombs, n.d.). It recognizes the synergy between the individual and his/her community of practice. Participatory ID, as a design approach within the participative paradigm, succeeds in supporting the goals of democratic learning with its combined emphasis on mutual learning as well as individual and community renewal.

**Potential for Promoting Collaborative Learning**

Since PD is embedded in the “use situation” and is also characterized by mutual learning, it possesses the potential to foster situated and collaborative learning in education. In fact, PD’s “work-oriented” and democratic nature can be seen to address Barab & Duffy’s (2000) critique on teaching practices and models developed within the socio-constructivist paradigm, such as project-based learning. The authors argue instructional strategies within this paradigm require students to engage in activities that are ‘‘school tasks’ abstracted from the community, and this has important implications for the meaning and type of practices being learned, as well as for the individual’s relations to those meanings and practices” (p. 34). These activities help acculturate students into becoming schooled adults who “participate in the reproduction of the high school itself” (Lave & Wenger, 1991, p. 99).

PD’s contextualized nature broadens the definition of collaborative and situated learning in education by enlarging its context from classrooms to the real world. PD calls for engaging teachers, students, school administrators, parents, and designers in genuine participation in the design of educational technology. This has two major advantages. First, stakeholder beliefs and practices are made explicit making it easier for designers to take them into consideration. Second, due to the participation of stakeholders as full partners, designers and stakeholders get exposed to each other’s contexts and experience transformational learning (Pea, 1994) where “not only students but also teachers are transformed as learners by means of their communicative activities” (p. 289-289). This has the added benefit of demysifying teaching practice (Freire, 1998) for all participants, including teachers.
Letondal & Mackay’s (2004) seven-year study illustrates PD’s potential for fostering a culture of collaborative learning in education. The authors used action research, over a period of seven years, to study the growing participatory design culture in a group composed of research biologists (the end-users), programmers, and bioinformaticians at the Institut Pasteur in Paris. The authors studied several research and development projects involving PD activities. In addition to research projects, the authors also ran an intensive four-month course for the research biologists on aspects of computing, including PD techniques taught by computer science professors and IT personnel. The aim of these projects and courses was to teach and engage research biologists in designing and developing their own software tools in collaboration with IT people. The authors called this participatory programming, a natural extension of PD.

The authors interviewed, carried observations, and videotaped biologists at work in their labs as well as during PD workshops, where research biologists brainstormed, created mockups, developed prototypes with IT people and bioinformaticians. The findings revealed that PD activities served as:

- a forum for discussing and sharing scientific ideas and hypotheses [and conversely,] through design workshops, scientific ideas play a leading role in the artefacts that are ultimately produced; biologists often push particular hypotheses and some are able to teach them to the computer scientists participating in the workshop. (p. 37)

PD thus lead to mutual learning among the design team participants - biologists learned programming, programmers and computer scientists gained knowledge of biology. In addition, computer scientists became aware of PD’s value and incorporated it into their curriculum.

**Potential for Improved Technology Integration**

PD’s potential to support collaborative learning among stakeholders implicates teachers, primary users of educational technology, directly in technology design. This can lead to improved technology integration in classrooms (Silva & Breuleux, 1994). It is well known that teachers play an important role in the use and integration of technology in education. It is usually the teacher who implements technology in the classrooms. Administrators might mandate technology use, but teachers are the ones who decide how and to what extent it will be used in the classrooms (Chin, 2004; Martin & Clemente, 1990;
Niederhauser & Stoddard, 2001). If technology (software/hardware) design or new work processes do not align with teacher’s belief system, they are unlikely to be successfully integrated. During 1971-77 there was a push to teach instructional systems design (ISD) approach in instruction (Molenda, 1997). However, teachers resisted and it did not succeed. Martin & Clemente (1990) argue that one possible reason for teachers resisting ISD was that ISD did not match up with teachers’ pedagogical beliefs and perceived needs. ISD treated teaching as a logical activity with predictive steps, when in essence, teachers knew from experience that teaching is opportunistic and calls for “thinking on your feet.” Martin & Clemente conclude that designers need to take teacher’s perceived needs and values into consideration when designing.

Yet, teachers are not typically consulted or involved in technology design (Chin, 2004). The closest teachers come to having an influence on educational technology are as testers of already developed software (Chin, 2004). With respect to student’s role in designing educational technology, they are even further marginalized. Although there are a few exceptions, such as Druin’s (2002) participatory design work with school children and Ultralab’s design projects with school children in the UK, these instances remain rare. Typically students are required to use technology in their studies without being actively involved in its design. PD provides an approach for students and teachers to design technology that they perceive as beneficial. Such practice not only helps them “increase their competence on new technology [but they also] become more willing to take initiatives around it” (Clement & Van den Besselaar, 1993, p. 34) and become its greatest advocates (Kujala, 2003).

Chin’s (2004) dissertation study provides evidence supporting PD’s value in technology integration. Chin and his design group attempted over a period of two and one-half years to develop and evaluate a science collaborative environment with a group of secondary schoolteachers and students. The researchers were interested in finding out if the participatory design model improved the relevance and practicality of educational software technology and lead to greater technology integration in classroom teaching. Chin’s study was part of a larger research and development project that lasted 5 years with the goal of studying and evaluating the utility and effectiveness of networked collaborative technologies
to support secondary school science education. The designers developed and implemented a PD model called *Progressive Design* in collaboration with students and teachers from four middle and high schools. The model included the use of scenarios, ethnographic observations, and collaborative design. Chin’s group was particular that the different design methods were integrated seamlessly. They also paid close attention to the types of participatory methods used in their design model. They selected a set of methods based on the use context (expertise of students and teachers at different stages of design and development and resources available to them). Through non-participant observations, interviews with teachers and students, focus groups, the researchers found that PD was a viable design approach in K-12 setting and that it helped produce instructional software that matched teacher’s needs and beliefs. The findings also showed that it motivated teachers to integrate technology creatively into their pedagogy (p. 391).

In spite of the study’s success, Chin admits to a limitation. The study did not include students as co-designers. Chin admits,

> In our case study, student participation was limited mainly towards evaluating the utility of specific analysis and design methods as well as incorporating their views, concepts, and ideas into the design of educational systems, but their overall participation was neither as in-depth nor comprehensive as that of the teachers’. (p. 397)

Selecting teachers over students as co-designer was a conscious decision and was based on the knowledge of teacher’s central role in curriculum development and technology integration. However, Chin concurs teachers and students are important stakeholders and should be included in such studies, because “teacher and even student involvement may foster a better understanding of the needs of the user with an optimal integration of the technology with everyday tasks” (Silva & Breuleux, 1994, p. 101).

**Potential to Empower Teachers, Instructors, and Students**

Initiating teachers and students into design activities gives them a voice in the design of their work tools. PD thus has the potential to include those whose voices do not typically find expression in educational technology design. In fact, a consideration of PD in ID holds the promise to address failings in educational reform often highlighted by educators. In their critique of North American public school reform, Tyack & Cuban (1995) point to the low
status of teachers in American educational system as one of the reasons for failed school reform. They argue that the “policy elites have often bypassed teachers and discounted their knowledge of what schools are like today” (p. 135). Tyack & Cuban contend teachers hold valuable practitioner knowledge crucial for educational change. Incorporating PD into ID would help engage that knowledge and empower teachers by giving them a voice in the design of educational software. This has two benefits: 1) it creates educational tools that resonate with teacher beliefs and hence are more readily adopted by the teachers and integrated into the classrooms, and 2) it empowers teachers, which has the potential to change educative practice and educational structures and thus pave the way for educational reform.

Researchers, Carroll, Chin, Rosson, and Neale (2000) observed PD’s potential to empower teachers in their 5-year long PD project.11 The authors remark:

Looking back at the past five years, we can distinguish four stages in our collaboration with the teachers: At first, the teachers were practitioner-informants; we observed their classroom practices and we interviewed them. Subsequently, the teachers became directly and actively involved in the requirements development process as analysts. Some two and half years into the project, the teachers assumed responsibility as designers for key aspects of the project. Through the past year particularly, the teachers have become coaches to their own colleagues within the public school system.

In some cases, these roles were suggested to them, in other cases, they defined and claimed new roles. But in all cases, these transitions exemplified the defining characteristics of developmental change: active resolution of manifest conflicts in one’s activity, taking more responsibility, and assuming greater scope of action. (p. 240)

Teachers in Carroll et al.’s PD study thus became mentors to other teachers and also agents of change in their respective schools by taking control of designing their work tools.

11 Chin’s study described earlier in Potential for mutual learning under Implications of PD in ID was part of Carrol et al.’s PD project.
Potential to Promote Design-based Research and Initiate Educational Reform

In addition to teachers, organizational factors also impact technology integration and educational reform. A 2001 report by Becker notes that constructivist use of technology is strongly influenced by organizational factors such as:

- teacher’s own technical expertise and professional experience in using computer applications,
- the number of computers in their own classroom,
- and their personal involvement in their profession, both within their school building and beyond…appear to be stronger determinants of constructivist uses of computers during class than the teacher’s philosophy itself.

Since PD is grounded in its context, it implicates organizational factors necessary for technology integration in education. In addition, it holds the promise of supporting and promoting design-based research, a research approach increasingly seen as playing an important role in affecting educational reform. The Design-Based Research Collective (2003) describes this research approach as “an emerging paradigm for the study of learning in context through the systematic design and study of instructional strategies and tools” (p. 5) and considers it necessary to make educational research relevant and valuable to educative practice.

A review of conditions (The Design-Based Collective, 2003) defining design-based research indicates many parallels between this research approach and PD, sufficient to make them mutually beneficial. These factors are: contextualization, interdisciplinary collaboration, and iteration.

Contextualization

Design-based research sets itself apart from traditional forms of educational research by its contextualized nature. Design-based research

View[s] educational interventions holistically—… as enacted through the interactions between materials, teachers, and learners. Because the intervention as enacted is a product of the context in which it is implemented, the intervention is the outcome (or at least an outcome) in an important sense. (p. 5)

12 A group of educators interested in design-based research have formed a group called The Design-Based Research Collective. The Collective is funded by an Advanced Studies Institute grant from the Spencer Foundation. More about the group, its aims, and its members may be viewed on-line at http://www.designbasedresearch.org/ (Accessed November 9, 2006).
In this respect, design-based research is consistent with PD’s work-oriented ethos (Ehn, 1993). Both approaches consider context as integral to the process of research and design. Hence both approaches can be said to harbor pragmatic goals. PD aims to develop software that enhances user’s work practice. While design-based research deals with the design of technology-enabled instructional interventions typically to improve educative practice.

**Interdisciplinary Collaboration**

Both approaches are collaborative and welcome diversity of thought and perspectives. PD and design-based research believe in genuine engagement of relevant stakeholders in the process for increasing the validity of their work as well as to achieve a sense of participant ownership in the process. In turn, participant ownership is shown to lead to adoption and sustainability of innovation (Clement & Besselaar, 1993). In this, both approaches resemble participatory action research (PAR), a research approach popular in sociology and social/cultural anthropology that is becoming increasingly popular in education. PAR is a mode of inquiry undertaken with people rather than on people in order to improve their professional practice (Reason, 1998).

**Iteration**

Lastly, PD and design-based research are emergent and use iterative cycles of design and development to continuously address emerging needs. Their pragmatic nature allows for early realization of design, i.e., creation of prototypes in the early stages of design to increase clarity of vision.

Where PD and design-based research diverge is with regard to their scope. PD typically deals with the design and development of specific system software. While design-based research, in addition to designing technology-enabled interventions, is also concerned with studying their effectiveness and with developing theories that “refine our understanding of the learning issues involved … [In addition, design-based research] relies on methods that can document and connect processes of enactment [technology implementation] to outcomes

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13 Reason (1998), one of the founders of PAR, explains, “the outcome of such [PAR] inquiries is both practical and intellectual, with the intellectual growing out of the engagement in real life issues and opportunities. Our aim is to work toward greater effective participation, so that all involved in situations can contribute their ideas and effective action; it is thus grounded in values of democracy, equal opportunities, and education as personal development.”
of interest” (The Design-based Research Collective, 2003, p. 5). In other words, design-based research attempts to seek causal relationships whenever possible and utilizes design science principles to pursue research goals. It appears to possess a broader agenda than PD and aims to bridge theory with practice.

However, the two approaches can be mutually beneficial and of value to educators as seen in Bannan-Ritland’s (2003) proposed design-based research framework called ILD (Intergrative Learning Design). ILD framework

draws from traditions of instructional design (Dick & Carey, 1990), product design (Urlich & Eppinger, 2000), usage-centered design (Constantine & Lockwood, 1999), and diffusion of innovations (Rogers, 1995), as well as established educational research methodologies (Isaac & Michael, 1990)… The first phase of ILD … is rooted in essential research steps of problem identification, literature survey, and problem definition. To this foundation, the ILD framework adds (a) a needs analysis activity from the field of instructional system design and innovation development studies and (b) a research focus on audience characterization from the field of usage-centered design. (pp. 21-22)

Although ILD utilizes traditional ID steps such as needs analysis, the example shows the feasibility of combining ID methods with research processes. Similarly, PD as a new ID approach can illuminate design-based researchers on techniques and methods of designing and researching interventions collaboratively and democratically. In turn, design-based research can enhance PD by introducing a research orientation.

Laferrière’s (2002) case of TeleLearning-PDS (Professional Development School), a telelearning experiment, is an example of design-based research involving PD activities. The researchers and other partners (preservice and in-service teachers, university faculty members, educational consultants, school principals, and other policy-makers) collaboratively designed a virtual community to support the development of preservice teachers. PD methods besides other methods were used in developing and nurturing this community. The project seemed to gain momentum on its own and,

What began as a virtual community of support and communication for preservice teachers (phase one) soon reached inservice teachers, university colleagues, school principals, educational consultants, and policy-makers in order to engage in collaborative inquiry (phase two) for the renewal of school learning, teacher education, and professional development. (p. 33)
The participative design of a virtual support system for preservice teachers lead to new research on teacher education and professional development thus highlighting the feasibility and benefits of combining design-based research and PD.

In the face of its benefits and positive implications, instructional designers cannot ignore PD. PD offers the following advantages. It:

- Improv[es] the knowledge upon which systems are built
- Enabl[es] people to develop realistic expectations, and reducing resistance to change,
- and increase[es] workplace democracy by giving the members of an organisation the right to participate in decisions that are likely to affect their work. (Bjørn-Andersen & Hedberg 1977 cited in Bjerknes & Bratteteig, 1995, p. 74)

Therefore to ignore PD would be unethical and a disservice to the users, designers, and possibly, to the field of ID.

**Future Research**

This article argues for introducing critical perspectives in ID by incorporating PD into ID. It claims current ID perspectives reflect a technical design orientation consistent with ID’s behaviorist, systems engineering roots, which diminishes ID’s educative value. The introduction of PD, a software design approach originating in Scandinavia, would provide ID with much needed critical approaches since PD is a form of critical inquiry used in the development of computer systems. The article also outlines benefits and limitations of this design approach and discusses the implications of incorporating PD into ID.

However, more study is needed, especially with regard to PD’s implications for ID. Four areas are described below for further investigation:

1) Research is needed to identify and understand roles and organizational structures that emerge from participatory ID. Unlike traditional ID, the locus of power in PD is distributed. Participants become co-designers whose contribution counts as much, if not more, than that of professional designers. This has the potential to destabilize existing power structures in the design team and in the organization within which design activities take place. In education this would mean instructional designers who have traditionally occupied the role of expert designers would no longer be the only experts. Research is needed to study new roles that emerge from such displacements and their impact on educative practice.
2) Another area for research is the study of the process of participation. PD has been criticized for “imprecise definition of participation” (Silva & Breuleux, 1994, p. 117). Participation is sometimes understood as full participation of all stakeholders in all stages of design and development, and sometimes participation is “dependent on representation by union members, managers, and top management” (p. 117). Since active participation from all members is central to PD, it becomes important to study the nature of participation in greater depth to understand optimal modes and degrees of participation and their respective consequences.

3) Furthermore, the ambiguity of the term participation necessitates a definition of user and user communities in PD projects. The term “participation” involves users, and as we have seen, users can be of varying importance relative to the project (Dix et al., 2004). It is therefore important to find ways and means of identifying users critical to the project. But this has not been a traditional area of research in systems design (Kujala, 2004). According to Kujala, “It is critical to the success of a system that appropriate and representative users are involved in the development work” (p. 297).

4) Research is also needed to explore, develop, and test new participatory ID models to help guide instructional designers in their work. Developing and testing design models would address Richey’s (2005) call for more developmental research in ID. According to Richey, the few developmental studies that exist are difficult to access since they are published in the form of dissertations or lengthy technical reports. Therefore, conducting developmental research on PD would be challenging, but essential to establish Participatory ID as a feasible and valuable design methodology for developing educational technology. An example of such a study forms the third chapter of this dissertation (Nilkanata, 2006).

In summary, it is safe to conclude that introducing PD into ID would be valuable. The benefits of such a step seem to outweigh its challenges. PD would serve as a form of critical inquiry that is missing in current ID practice. It would challenge long-standing beliefs and practices in the design and development of educational software. It is therefore only apt that the ID community begins to explore PD in greater depth to understand its value for education.
References


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Reason, P. (1998). Political, epistemological, ecological and spiritual dimensions of


APPENDIX

A Taxonomy of PD Methods

<table>
<thead>
<tr>
<th>Taxonomy of PD Methods</th>
<th>Position of Activity in the Development Cycle or Iteration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-development [9]SM</td>
<td>Early</td>
</tr>
<tr>
<td>Low-tech Prototyping²</td>
<td>Early</td>
</tr>
<tr>
<td>Participatory Ergonomics [13] SM</td>
<td>Early</td>
</tr>
<tr>
<td>Low-tech Prototyping²</td>
<td>Late</td>
</tr>
<tr>
<td>Low-tech Prototyping²</td>
<td>Late</td>
</tr>
<tr>
<td>Theatre for Work Impact M,R</td>
<td>Early</td>
</tr>
<tr>
<td>Video Prototyping [11]</td>
<td>Late</td>
</tr>
<tr>
<td>Card Games TS</td>
<td>Early</td>
</tr>
<tr>
<td>Storyboard Prototyping SM,R</td>
<td>Early</td>
</tr>
<tr>
<td>Collaborative Prototyping TS</td>
<td>Early</td>
</tr>
<tr>
<td>Cooperative Prototyping S</td>
<td>Early</td>
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<tr>
<td>Cooperative Evaluation T</td>
<td>Late</td>
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<tr>
<td>Collaborative Prototyping for Design TS</td>
<td>Late</td>
</tr>
<tr>
<td>Participatory Analysis of Usability Data TS</td>
<td>Late</td>
</tr>
</tbody>
</table>

Key:
- Commercial use: Techniques used on commercial products/services. Researcher and user groups often appear in brackets.
- Geography: Techniques developed or used in specific countries are noted (e.g., US, UK, etc.).

References:
- Muller et al. (1993)
- Other references appear in parentheses next to the technique names.

Figure 1. Reproduction of a taxonomy of PD methods by Muller et al. (1993)
CHAPTER 3. PARTICIPATORY INSTRUCTIONAL DESIGN: STUDY OF AN EMERGING PARADIGM

To be submitted to: Journal of Educational Research (JER)

Rema Nilakanta

Abstract

This article reports on an empirical study of a participatory instructional design (ID) project involving the design and development of an electronic portfolio system by a team of Ph.D. students and faculty members at a large US university. The main aim of the study was to investigate activities and processes that were generated during the participatory ID process and their relationship to participatory design (PD), a software design methodology popular in Scandinavia. The study used qualitative methods and the findings indicate five key factors that undergird the design project: 1) maintaining transparency of work processes, 2) continued invoking of the design ethos, 3) maintaining a sense of community, 4) embedding design in the context, and 5) recursive design.

Introduction

Participatory Design (PD) is a software design methodology known for involving users as co-designers in all stages of design work. It was pioneered in Scandinavia in the 1970s to introduce workplace democracy. PD is based on the premise that “people who are affected by a decision or event [such as, users of computer software systems] should have an opportunity to influence it” (Schuler & Namioka, 1993, p. xii). PD therefore stresses user empowerment and promotion of democratic work practice by involving users in technology design (Bjerknes & Bratteteig, 1995; Bødker & Grønbæk, 1991; Ehn, 1993).

PD also believes that quality design stems out of a concern for enhancing the actual rather than the stipulated work practice of a community. Actual practice is socially constituted and is usually hidden or tacit (Sachs, 1995); it consists of “how working people communicate, think through problems, forge alliances, and learn as a way of getting work done” (p. 40). Sachs argues work practice that is tacit is best understood by supporting users design their own work tools. However, this is not standard practice in conventional design,
specifically in the field of instructional design (ID) (Carr-Chellman, Cuyar, & Breman, 1998; Carr-Chellman & Savoy, 2004). ID deals with procedures for designing, developing, implementing, and evaluating educational material, which nowadays typically consists of stand-alone software or web-enabled learning systems.

The absence of PD in ID has always intrigued me. Since its inception, ID has been dominated by technical-rational design models borrowed from the military and software engineering (Molenda, 1997; Reiser, 2001; Visscher-Voerman & Gustafson, 2004). These models assume a simplistic perspective on learning – they view learning as a rational and logical process, which can be explained, manipulated, and predicted with the help of scientific methods (Jonassen et al., 1997; You, 1993). However, we know today that learning is an open and complex system, which defies systematic decomposition and ready control through artificial means. Wenger (1998) believes learning is complex enough that it “cannot be designed but only designed for” – that is, facilitated or frustrated” (p. 229). Therefore, I proposed in another article (Nilakanta, 2006a) a new ID approach called Participatory ID that incorporates PD principles and practices in designing and developing educational software. This article extends this proposal and presents a detailed documentation and analysis of an authentic case of participatory design and development of an electronic portfolio system in higher education.

**Research Question**

The goal of this study was exploratory; it aimed to understand how end users (people who actually use the software in their work) with different and sometimes, conflicting needs (vis-à-vis, faculty and students) worked together and succeeded in designing and testing a prototype. Specifically, the study focused on two issues:

1. What activities and processes were generated during the participatory ID process? Alternately, what is the structure of participatory ID?
2. How are these activities classified as PD?

These research questions are framed by two theoretical perspectives, namely 1) the language learning theory of Invention Convention (Goodman, 1986) and 2) the principles of Participatory Design (PD).
**Invention Convention: A Theory of Language Learning**

Invention Convention is a theory of language learning introduced by Ken Goodman, a language teacher and an advocate of whole language pedagogy. It reflects a socio-constructivist orientation (Duffy & Cunningham, 1996). According to Goodman:

Learning is a process of social and personal invention. Each person invents language all over again in trying to communicate with the world. But these inventions involve the use of the surrounding public language, and they are constantly tested, modified, abandoned, or perfected in use against it. Parents and siblings do not really teach language. They help to shape its development by the way they respond. (p. 18)

Thus, learning is “self-inflicted” and learners in general learn by constantly testing their understanding against existing knowledge. Goodman’s theory of language learning sheds light on my research in a very significant way. When seen from the lens of Invention Convention, my research question can be rephrased as follows: “how did the participatory design team comprising of students and faculty invent its design practice in order to successfully design and test a prototype of an innovative software within the context of a traditional educational institution of higher learning.”

**Participatory Design (PD)**

I was also interested in finding out in what way or how did team’s inventions (activities that the group invented) characterize PD. In other words, I wanted to find out if the activities addressed PD principles of authentic task (in what way did the design task have meaning and relevance to the group members), mutual learning (how did members learn from and with each other), and democratic practice (how did the group allow for user participation and empower individual members).¹

**Study Value**

The above questions have practical as well as theoretical value. Firstly, as noted earlier, the study investigates Participatory ID, a design approach new to the filed of ID. It documents the successes and challenges experienced by the design team. It thus serves as a practical guide for ID practitioners, educators, and those interested in this design approach.

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¹ For a full discussion of these principles, please refer to my article, *Participatory Instructional Design: A new approach in Instructional Design* (Nilakanta, 2006a).
Secondly, this study possesses theoretical value in that it investigates software design and development in an educational context from a socio-critical approach. The study is based on the assumption that design is a social activity that takes place in the real world and hence is subject to the politics of the real world. By “politics” I mean, anything and anyplace where human social interactions and relationships have implications for how ‘social goods’ are or ought to be distributed. By ‘social goods’ I mean anything that a group of people believes to be a source of power, status, or worth. (Gee, 1999, p. 2)

Thirdly, this study addresses Richey’s (2005) call for increased developmental research in ID. Developmental research is defined as “the systematic study of designing, developing and evaluating instructional programs, processes and products that must meet the criteria of internal consistency and effectiveness” (Seels & Richey, 1994, p. 127). This study describes and analyzes the process of designing, developing, and testing a prototype by a diverse group of people. It however, does not include a formal evaluation of the design process. Hence it meets partially the criterion of developmental research.

**Method**

**Research Design**

This study follows a case study research design (Yin, 2003), since its primary goal was to gain an intimate understanding of the dynamics of Participatory ID as it occurred within an academic context. The context of the study and the phenomenon under study were thus intricately woven together necessitating a case study research design.

An interesting point of this study is that I, the researcher, was part of the design group. This study therefore shares features with action research and design-based research. Similar to an action researcher, I studied the design process that I was engaged in as a design

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2 The terms “internal consistency” and “effectiveness” imply internal and external validity. According to Richey (2005), “internal validation focuses upon the integrity of the model and its use” and “external model validation addresses the effects of using the model – the instructional products themselves, and impact of these products on learners, clients and organizations.”

3 Action research is research done by practitioners to improve their own practice. For a brief but well written overview of action research read Dorothy Gabel’s *An Introduction to Action Research* (1995).

4 Design-based research is “an emerging paradigm for the study of learning in context through the systematic design and study of instructional strategies and tools” (The Design-based Research Collective, 2003, p. 5).
team member. I shared challenges typical to action researchers, i.e., of maintaining a “researcher stance” while engaged in the activity under study. As a design-based researcher, I was engaged in the systematic design and study of the design process with the aim of contributing to ID scholarship an understanding of participatory design approaches in educational settings.

However, this study cannot be characterized as action research or design-based research. Its main focus was exploratory instead of action-oriented as is the case with action research or design-based research. Therefore, I view my study as “a case study with retrospective analysis of product design and development” (Richey, Klein, & Nelson, 2004).

**Sample**

The sample consisted of eight design team meetings out of a total of 23 meetings. The sample was purposive and theoretical (Miles & Huberman, 1994), in that “choices of informants, episodes, and interactions [were] driven by a conceptual question, not by a concern for ‘representativeness’” (p. 29). The meetings included dynamic interactions involving negotiated decision-making.

**Instruments**

In qualitative research the researcher becomes the instrument for data collection (Lincoln & Guba, 2000). Therefore, it is important to make explicit researcher’s assumptions and philosophical leanings. As the researcher for this study, I present below a brief description about my motivations and beliefs on learning, education, and design.

**The author and researcher of this study.** I am a Ph.D. student in Curriculum and Instructional Technology (CIT) at Iowa State University, a large US university in the Midwest. I am a “returning” student, i.e., I returned to college after earning my Masters 15 years ago. During this break I reared a family and pursued a career in publishing. I returned to school to learn about instructional design, since I had become interested in developing educational multimedia material.

On my return to school as a mature adult, I found it challenging to adjust to the didactic culture of a traditional US educational institution. I had experienced the joys of shaping my own learning through my work and personal life and found it challenging to assume the mindset of a traditional student. This lead to an interest in learner autonomy and
in designing ways of supporting it. Moreover, as I went through my coursework I realized my fundamental beliefs in learning coincided with a socio-critical perspective on education. I believe learning is a cognitive as well as a social and a political activity. I also believe in the power of technology to enhance learning. However, in order for technology to be of value, it should be designed to address the needs and dreams of a community of users. This is best achieved when users become designers of their own tools. Hence, I believe in the value of participatory design, especially for developing innovative tools.

During my study program, I found my major professor and I seemed to share similar worldviews. This started a productive partnership that included redesigning and teaching a blended (face-to-face and online) course collaboratively, creating and managing an online international community of scholars in educational technology, and finally working on the electronic portfolio system design project, which forms the focus of this study.

Chiseri-Strater & Sunstein (1997) note anthropologists learn to “step in” and “step out” of contexts to accomplish “making the familiar strange and the strange familiar” (p. 8). I had to concern myself with making the familiar strange since I was involved in the design project at multiple levels: as a designer, a researcher, and a project manager.

On reflection I realize I did my own “stepping out” by assuming in my mind the role of a critical friend— a friend who had reservations about the credibility and practicality of a collaborative and democratic design process, and also about electronic portfolios as assessment tools. In effect, I tried to play the devil’s advocate sometimes challenging design decisions taken by the group, or whenever I found myself getting personally involved and losing perspective. In addition, I also followed traditional qualitative research methods for guarding against bias, vis-à-vis, through member checking and peer-review. (More on this under Data Analysis).

Data Collection

Due to the complexity of the study context and to enhance the “trustworthiness” of the study, I collected data from a variety of sources. These were: 1) transcriptions of weekly meetings, 2) focus group session, 3) individual interviews with the design team members, 4) my reflections, 5) archived minutes of the meetings and mockups, 6) e-mail correspondence among the design team members. Weekly meeting transcripts served as the primary data for
my research since I was interested in studying the dynamics of the design process. Data sources such as e-mail correspondence and archived minutes and copies of mockups and my reflections were used to verify ancillary events relating to the design work.

**Weekly Meetings**

I recorded and transcribed the weekly meetings, a total of 23 meetings from Sept 9, 2003 to May 4, 2004. The transcribing was done typically within a few days of the meetings so as not to forget finer details of the meeting. I also jotted down brief notes to myself while transcribing as something caught my eye.

**Interviews**

I collected individual members’ impressions three times during my research: 1) at the beginning of the project (hereby known as the *CIT eDoc Project*). The following terms “CIT” and “eDoc” represent the program of Curriculum and Instructional Technology and the electronic portfolio system software being designed, respectively., 2) in the middle (between December 2003-February 2004) of my research, and 3) at the end of my research. The mode of data collection each time was different. The first time data collection was done informally, as part of the weekly meeting. Each member introduced himself or herself and explained their motivations and interest in joining the team.

The second time I gathered individual member impressions through a semi-structured interview. I interviewed each team member during the middle of my research period, from middle of December 2003 till February 2004 - essentially when design work was well under way. Each individual interview lasted for a minimum of one hour. I had identified some key questions based on PD framework but was also open to emerging questions determined by member responses. The key questions ranged from member perceptions on 1) the nature of the design process (rigid, flexible, democratic), 2) the structure of the design group (hierarchical or not), 3) member role in the project (has it changed?) and member expectations of the project (have these been met?), 4) gain in new knowledge and its source (collaborative learning), 5) difference between collaborative learning and collaborative
design, and 6) relationship between the nature of the design process and the evolving design (model impact on end-product usability and usefulness).  

The third time I gathered individual member impressions was through a focus group session toward the end of my research in April 2004. It included design team members on site as well as members off-site, who joined us virtually using the free video conference software iVisit, and a new visiting faculty from England.

On reflection, interviewing design team members seemed to have multiple purposes: Firstly, I was interested in finding out members’ impressions of the evolving design of CIT eDoc (the electronic portfolio system) and the design process, and also help them reflect on changes in their own knowledge. Secondly, I wanted to see if “they were seeing what I was seeing in the data”; in other words, I was concerned with establishing “confirmability” of my data (Lincoln & Guba, 1985). And finally, I found myself unconsciously seeking feedback on improving the design – I was treating the interview as a form of formative evaluation of the CIT eDoc design. Team members typically precipitated this dynamic by expressing their opinion about the evolving design or the way the work was proceeding, but I found myself responding to their critique with interest.

The remaining data (e-mail correspondence, archived minutes and copies of the mockups, and my personal reflections) were used for triangulation. I had not planned to use archived e-mail correspondence, but found myself browsing through them to help me recall event dates and times.

**Data Analysis**

I used Glaser & Strauss’s (1967) constant comparative method for processing my data. Despite my best efforts, coding (organizing data into groups) did not begin in earnest till end of 2005 – a year and a half after the study came to an end. This was mainly due to my new study commitments that took priority. I had however begun tentative analysis while

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5 *Usability* implies the functional aspect of software design (Nielsen, 1993; Schneiderman, 1998). Usability questions ask, does the software work the way you expect it to? Is the screen navigation intuitive? Do the buttons function the way you expect them to? *Usefulness* implies if the software is going to enhance user practice. Questions of software usefulness include questions such as, will the software add value to what you do? Does it make you realize your *desiderata* (that which you desire)? Does it make you experience the “surprise of self-recognition?” (Nelson & Stolterman, 2003).
transcribing weekly recordings; I found myself highlighting text and making brief notes to myself when a sentence or a phrase caught my eye.

**Coding: Multiple Iterations**

For coding I used Hyperresearch, a cross-platform qualitative research software, since I use a Macintosh computer for my work and most of the qualitative research software are PC-based. I followed Lincoln & Guba’s (1985) advice on applying Glaser & Strauss’ (1967) first two steps of the constant comparative method used in grounded theory. Lincoln & Guba endorse this technique even if the study does not result in a new theory as per the goals of grounded theory. These steps are: “1) comparing incidents applicable to each category [and] 2) integrating properties and their categories” (Glaser & Strauss, 1967, p. 105).

At the beginning, the researcher codes a certain meaningful “instance.” This is also called the *unit of analysis*. The coding is based on a formal system that the researcher develops or s/he codes intuitively. Then keeping this coded instance in mind, the researcher codes the next instance s/he come across. This way the researcher compares data instances to data instances and ends up “chunking” data under different codes. At this time, the researcher also starts to notice some of these codes relate more strongly to one code; this code thus becomes a core code/category and the other codes become its “properties” or sub categories. Then the researcher starts to apply these core codes to individual units of analysis.

**Unit of analysis.** In this study, the unit of analysis was an instance of meaningful group interaction identified intuitively or by following predefined codes I had gathered from literature on PD. A “meaningful group interaction” could be represented by a sentence or several paragraphs. The main criterion for a meaningful interaction was its affinity to predefined codes – typically activities seen in PD projects, such as envision, brainstorm, collaborative review – or coherent actions designers engaged in during design work (such as articulate, mentor, disagree). Later, informed by the *Invention Convention* framework, my coding got further modified. Thus, I simulated Miles & Hubermann’s (1994) coding strategy of starting with a set of pre-defined codes and building up from there.
I cycled five times through my data; the process started tentatively but soon each cycle seemed to bring greater clarity and “shape” to my data. I describe the process briefly recounting challenges I faced.

The first cycle of data coding utilized the whole corpus of meeting transcripts, a total of 23 meetings. It was used to establish a preliminary codebook that included several codes. However, many of these were discarded in successive analysis till I ended up with a final set (see codebook in Appendix A).

I found the first stage to be the most challenging. The first challenge came in the form of creating a distance between my data and me to make the familiar strange (Chiseri-Strater & Sunstein, 1997). After assigning code names to individual design team members (I identified them by the first letter of their first name), I performed an initial “run through” of the meeting notes. I had the pre-defined PD categories “authentic task,” “mutual learning,” and “democracy” and tried to identify instances of these during my first reading, and was also open to new emerging categories. However, due to my “insider” status in the design team, I saw myself jump to an advanced stage of “pattern coding,” ⁶ which lead me to over interpret my data and generate an overwhelming number of codes that made the coding process difficult to manage. Through an informal peer review of my coding in progress I realized I was seeing things in the data that the others did not see. This was not surprising since I knew the design team members well and could recall vividly the “smells and sounds” of each meeting even after a period of one year. I had to step back and revise my strategy. My new strategy consisted of assigning each team member a random number preceded by the common noun MEMBER, for e.g., MEMBER 53. I took this drastic step to “hear individual members’ voices over mine.” This exercise surprisingly held up to its promise. I retained this strategy till it came time to writing up my report when I replaced the impersonal numbers with pseudonyms (Appendix B).

The first cycle of coding generated 102 codes. These included descriptive as well as interpretive codes (Miles & Huberman, 1994). Several of these codes were pre-defined and originated from PD literature. For e.g., COLLABORATIVE LEARNING, CONTEXTUAL

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⁶ Pattern Coding according to Miles & Hubermann (1994) is usually done later in the coding process. It involves identifying patterns or themes that help provide explanations.
DESIGN, ENVISION. The second cycle of coding helped me reduce the sample from 23 meetings to 12 meetings; these meetings represented rich conversations involving active discussions and a diversity of activities, such as brainstorming and debating. I selected these meetings because I was interested in studying how team members dealt with conflicts and worked together to execute their design task. Meetings that remained thus seemed to possess higher instances of negotiated decision-making. In addition, through constantly comparing new emerging codes with older ones, I was able to consolidate codes and reduce the number to from 102 to 57. The third cycle of coding was informed by the theoretical framework of Invention Convention in addition to PD. Codes that seemed to reflect conventional activities that the design team had to engage in such as facilitating meetings, I named them “D.CONVENTTION” for Design Convention, and code names that began with “PD.INVENTION” implied inventions by the group arrived at participatively such as the use of humor or sarcasm. This gave rise to new codes as well as the opportunity to revisit and refine old codes, which further helped decrease the total number of codes from 57 to 47. The fourth cycle of coding followed along the same lines as the previous cycle and reduced the number of codes from 47 to 34. In addition, I noticed eight meetings, three in September (September 9, 23, and 30), three in October 2003 (October 7, 21, and 28), one each in January (January 20), and April (April 6) 2004, respectively, as critical to the design process. I honed in on these meetings for my fifth cycle of coding reducing the sample from 12 meetings to eight; these eight meetings constituted the sample for my study.

Data Verification

By the fourth cycle of coding my codes seemed well established, in that I did not see any new codes emerging. I sought the help of two colleagues unconnected to my project to verify my coding system. One colleague was employed at the same institution as I and the other colleague, who was well versed in qualitative research, was employed as faculty at a university in Georgia. Both colleagues were aware of my involvement in the design project but neither had a good understanding of the project; they seemed appropriate choices to provide me with an outsider’s perspective. I sent them a copy of my codebook, a copy of a coded transcript, as well as my research questions; and they were duly verified. The only suggestion I received was to concentrate on the PD.INVENTION codes since these
addressed my research questions more directly. On completion of the first draft of my report I sent it to all design team members for verification. I also sent a copy to a professional from a non-education and non-design background to check for coherence.

I do not claim the findings of this study can be generalized to other settings but I expect this study to provide evidence of participatory ID’s feasibility and effectiveness in higher education and also expect it to offer guidance to those interested in employing this approach in their work. The next section presents the case study, which is divided into two parts: 1) a description of the design context and project and 2) a description of the findings followed by a discussion.

**Context: How Did It All Begin?**

The broad context for this study includes staff (systems analyst and web design staff), faculty, and students - specifically faculty and Ph.D. students in the Curriculum and Instructional Technology (CIT) program at Iowa State University, a large Midwestern university in the US. The CIT eDoc design project emerged from the confluence of three distinct events at the university. 1) The CIT annual review process, 2) Open source (non-proprietary) technology initiative, and 3) The CAC (Computation Advisory Committee – a university committee) funding for campus-wide initiatives. See Figure 1 for a timeline leading to the CIT eDoc Project and development of the first prototype.

**1) The CIT Annual Review Process**

In order to advise Ph.D. students more effectively in their program and to revise and improve the CIT program, the CIT faculty introduced in Fall 2002 a new assessment process in the CIT doctoral program. Ph.D. students who had not completed their course work and had not passed their preliminary examination were required to submit each year a portfolio in the middle of the following spring semester documenting their progress for the previous calendar year. For example, a portfolio submitted in Spring 2003 would include student artifacts (pieces of their work from their study program) and student-related academic information from the entire previous calendar year, i.e, from 2002 Spring, Summer, and Fall.

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7 In U.S. Ph.D. programs, students are typically expected to take a set number of academic credit hours before they qualify for doctoral research work. Qualification requirements usually consist of writing a comprehensive exam that tests student’s knowledge on his/her major, minor, and supporting areas of study followed by an oral
semesters. Student’s major professor would evaluate the portfolio and provide feedback. This process was titled the “annual review” process.

Figure 1. Timeline of CIT eDoc Project design and development

The CIT faculty body was supportive of the need to review student progress annually, however there were some reservations to using a portfolio as a tool for annual assessment. Some faculty members feared it would entail an inordinate amount of time and effort for both, faculty and the students. Nevertheless, faculty decided to go ahead with the plan and students received a formal memo in January 2003 outlining the requirements, which were broad and general (see Appendix C for a memo sample). The students were asked to submit artifacts from the previous year (2002) addressing CIT program criteria (see Appendix D) and showcasing their progress. The first batch of annual reviews were submitted in March 2003, but students failed to receive feedback. The main reason for this was the extreme examination where students are once again questioned by their committee members to determine their preparedness for doctoral research.
diversity of portfolio formats and structure that seemed to overwhelm faculty members.
Since the guidelines did not specify a particular format (electronic or otherwise), portfolios came in different configurations; some portfolios consisted of printed matter bound in 3-ring binders, others were saved on removable storage devices such as zip disks and CD-ROMs, and still others were submitted on the Internet as web sites. In addition, each portfolio was structured differently based on individual student’s interpretation of the annual review requirements. The variety of portfolio formats and structures made evaluation difficult. As a result, students did not receive timely feedback from faculty.

For the following year (2004), the CIT faculty made a concerted effort to facilitate the annual review process by standardizing certain procedures and communicating them to the students ahead of time. Students received a memo in Fall 2003 (memo sample in Appendix C) with new revised guidelines asking them to submit their annual review portfolios in Spring 2004. The portfolio was supposed to include artifacts from the calendar year 2003. Guidelines for structuring the portfolio were made clearer and the portfolio was required to be in electronic format (web-based or submitted on computer storage device). However, the new guidelines did not seem to improve students’ attitude toward the annual review process. A student, frustrated from past experience, complained,

It's a little bit difficult to work this way because this is exactly what we were given at the beginning of last year and we submitted the e-portfolio on the 31st of March and never got any feedback, which discourages me a lot because I don't really know how my portfolio is being evaluated, what is missing, how should I direct my activity next year, being almost in the middle of the semester now, and I'm working again.....because I don't really know what happened to the evaluation a year ago. (CIT eDoc meeting, September 16, 2003)

Her reservations were well founded. Once again students failed to receive proper feedback due to the same reason - faculty found assessing the portfolios challenging due to their diversity. A faculty member reflecting on the annual review experience commented, “I think our problem is our portfolio process last year [2003] didn't work well. We got such a variety.” (CIT eDoc meeting, April 6, 2004). The experience with the annual review process had left both parties (the faculty and the students) dissatisfied and it was an opportune
moment for exploring a more efficient and effective way of implementing the annual review process.

2) Open Source Technology Initiative

In the meantime, new developments were occurring in different areas of the university. The systems developer (hereby known as David) for the CIT eDoc Project, who is also a systems analyst at the university’s computation center, had become aware of the need for electronic portfolios in higher education. He had realized that,

There are certainly limitations as to the way people get evaluated in terms of the grade and requirements and so forth, and there’s a growing need apparently from Engineering to Education to many other disciplines where they are starting to require these portfolios. (Interview, April 29, 2004)

It would seem he was not alone in this observation. In Fall 2001 the university held a conference on electronic portfolios as an effective way to support and evaluate student learning. At this conference David proposed building an enterprise level electronic portfolio system software using open source (non-proprietary) technology. This software would be made accessible to the university community through an institutional portal8 software already under development by the JA-SIG9 uPortal group. He called this electronic portfolio system software eDoc. The portfolios created using eDoc software would be integrated with university’s computing resources through a portal; it would thus utilize space on the university server available to students, staff, and faculty and would not add to students’ costs. It is important to note that at the time of the proposal, the portal was awaiting university sanction, and the portal has still not been made official at the time of this writing.

3) CAC Campus-wide Funding Initiative

In addition to the above two events, a new source of funding opened up for addressing instructional computing initiatives at the university. In Spring 2003, the university committee responsible for student computing needs and for administering student computer fees called for proposals for innovative campus-wide initiatives supporting advances in instructional computing. This was unprecedented in the history of this committee. The

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8 A web portal is a virtual gateway into an institution. It is typically password protected.
committee had hitherto funded projects that mainly dealt with maintenance of computer facilities on campus, which included acquiring new software or hardware or updating existing hardware and software on campus. However, due to increases in student computer fees the previous year, the committee found itself with substantial amount of funds to support larger projects promoting the development of campus-wide computing services for students.

Thus, three seemingly unrelated events, namely, CIT faculty’s urgent need to find a new way to implement the annual review process, the access to technical infrastructure (open source technology and technical expertise), and the availability of in house funding for supporting innovative ways to address student computing needs, provided the impetus for the CIT eDoc project.

The Next Step: Seeking Funding and Writing the Grant Proposal

CIT faculty saw the availability of in house funding and technical expertise as a fitting opportunity to build an electronic portfolio system to address their urgent need for a more effective and efficient way to establish a smooth-running annual review process in the Ph.D. program. In January 2003 Dr. D, a CIT faculty member and my major professor, on the advise of a senior CIT faculty member, mobilized an interdisciplinary group (unofficially known as the eDoc Group) to write a grant proposal to CAC requesting funds for developing eDoc, the electronic portfolio system software. The group consisted of representatives (mainly faculty members, staff, and two graduate assistants) from the colleges of Agriculture, Education, and Liberal Arts and Sciences, David, the systems developer, and the web design staff from the Instructional Technology Center (ITC). The interdisciplinary group was essential since the eDoc software would be implemented across the university. The group requested funds for designing and developing themes (templates) for different academic programs based on individual department or program needs. One of the themes would be the CIT eDoc theme. The proposal was approved and the eDoc group was awarded seed money in the amount of $67,000 in June 2003 for one year.

Work on eDoc began almost immediately. David, who was termed the project manager, set up a development process, “to respond to bugs and suggestions as quickly as

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9 JA-SIG stands for Java Architectures Special Interest Group. Its main purpose is “to provide education and research in the applied use of open technology architectures and systems in higher education” (JA-SIG, n.d.).
possible” (posting on ISU eDoc WIKI). The process utilized an iterative design model and involved users in the development of the software. David believed,

Including users in the development process has the added benefit of giving them more control over the design and inevitable compromises that occur during development. Almost daily interaction also helps to keep the project from languishing because of lack of activity. This process results in a quicker time to product and a more satisfied user. (posting on ISU eDoc WIKI)

Each eDoc partner was expected to form a design team whose main job was to draw up design specifications for their individual eDoc theme, which would be converted to html pages by the web designers at ITC and then handed over to David for adding functionality, after which the teams would test it and provide feedback. Once satisfied, the design team would test the prototype with end users. User feedback would be reviewed and revisions made accordingly to the design.

The Design and Development of CIT eDoc

The CIT eDoc design work began in Fall 2003 and is still continuing at the time of writing. However this study focuses on the first year (from September 2003-May 2004) of design and development. The CIT eDoc team came together with the idea of developing an electronic portfolio that would help faculty and students address their most immediate needs, i.e., help make it easy to assess Ph.D. student progress annually, as well as help build a community of scholars. This was a unique idea, since the existing electronic portfolios were typically in the form of static web sites that functioned as repositories for student work and electronic portfolio systems (integrated interactive systems) were still too new and few in number. The CIT eDoc team had therefore embarked on a novel journey; the team had a strong sense of their “desiderata” or “the original expression of what is desired” (Nelson & Stolterman, 2003)\(^\text{10}\) but did not have a clear idea of the final form of the end product.

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\(^{10}\) According to Nelson & Stolterman (2003), “The designer’s role is to midwife that desiderata, which could not have been imagined fully from the beginning, by either client or designer and to provide end results in the form of an expected unexpected outcome” (p. 48).
**CIT eDoc Design Team is Formed**

The CIT eDoc design team came into being in the beginning of Fall 2003. It consisted of members from the larger eDoc team as well as some that were selected specifically for the CIT eDoc design project. Members who shared responsibilities in the larger eDoc group were: Dr. D, David, Donna (CIT Masters student), Kristin (English Ph.D. student), and I (CIT Ph.D. student). Dr. D lead the larger eDoc group; David was the systems developer for the larger eDoc group; Donna was the technical liaison between the different eDoc teams and the web design staff; Kristin and I were both project facilitators for the larger eDoc group. Our role was to, “assist the faculty interest groups (FIG) in formulating the design documents required to build a portfolio system suited to their needs and to conduct other project business” (personal correspondence from David, June 5, 2003). Eventually Kristin assumed the administrative job for the larger eDoc group and became a CIT eDoc team member, while I took over the project management of CIT eDoc and worked closely with Dr. D providing her strategic support for the eDoc project as a whole. See Figure 2 for CIT eDoc structure and its relationship to the larger eDoc project. As per Figure 2, CIT eDoc is part of the larger eDoc project and shares resources with other eDoc projects (eDoc Projects A and B). The illustration also indicates that CIT eDoc, similar to the larger eDoc project and its sub-projects, is embedded within Iowa State University and hence has access to ISU’s resources such as hardware and software, server space, library, and other ISU resources.

Dr. D and I selected the remaining members of the CIT eDoc design team. The main criterion for potential candidates was that they should be graduate students (preferably Ph.D.) in the CIT program. We were also interested in assembling a diverse group of students – students that were at different stages of their graduate program and who possessed different knowledge and skills. The need for diversity stemmed from our philosophical beliefs and theoretical orientation. We believed in pluralism and democracy as fundamental to educative practice. We also believed in the power of multiple perspectives to bring new insights to old problems (in this case, assessment of student progress) and promote creativity. Principles under girding PD not only seemed to align well with our beliefs but also held the promise of helping diffuse new technology after development (Hirschheim, 1985).
Figure 2. Relationship between CIT eDoc project and the larger eDoc project

We identified three eligible candidates in the CIT graduate program: Brenda, Melanie, and Nick and invited them via email (see Appendix E) to join the group. Brenda was a Masters student with her sights set on a Ph.D. degree, while Melanie and Nick were already enrolled in the Ph.D. program since two years. These students knew each other but did not have intimate knowledge of each other’s research interests or shared close personalities with each other. We stressed in our invitation that the job was voluntary and people were free to choose their roles and degree of commitment to the design project. Students were aware the job did not offer any tangible benefits or compensation in the form of academic credit or stipend, and that the job would add to a student’s regular workload. However, all students that were invited agreed to join the team for various reasons. For example, Nick joined the team due to his interest in instructional design, whereas Brenda’s joining was
triggered by her curiosity; she was intrigued by our interest in her since she did not consider herself a designer or have interest in instructional design. Within a week, two additional Ph.D. students, visiting scholars from Europe (Jakob and Sophia), joined the team as well. Both were interested in the role of technology in education and/or in the workplace. They had been enrolled in the ISU CIT program for Fall 2003 as part of an internationally funded initiative for preparing leaders in educational technology. We also requested another CIT faculty member who had reservations about the value of portfolios in assessment, to join the team in order to increase faculty representation as well as to increase perspectives in the design team. However, the faculty member was unable to join our team due to other commitments, but was kept updated on the project’s progress.

The core group membership thus consisted of eight graduate students (Brenda, Melanie, Nick, Sophia, Jakob, Kristin, Donna, and I), Dr. D (the CIT faculty member and eDoc group leader), and David (the eDoc systems developer). Of the eight students, three were CIT Ph.D. students (Melanie, Nick, and I), two were CIT Masters students (Brenda and Donna), one was a Ph.D. student from the English department (Kristin), and two were Ph.D. visiting international students (Jakob and Sophia). Please see Appendix B for the full list of members with their respective profiles. Pseudonyms are used to maintain confidentiality.

Regarding role assignment in the team, there were five pre-set roles: 1) leader, 2) manager, 3) systems developer, 4) recorder, and 5) technical liaison. Dr. D, the faculty member and the eDoc Group project leader assumed the role of the CIT eDoc design team leader. The role of the systems developer naturally went to David since he was the only member with the required technical expertise as well as a major contributor to the eDoc idea. The role of the recorder went to Kristin since she had assumed the administrative assistant role for the larger eDoc project and maintaining record of CIT eDoc group proceedings was part of her job. The role for the technical liaison was assigned to Donna, who was hired officially for the position. Her duties included coordinating work between individual design teams and the web design group. The design team coordinator role was assigned to me, also almost by default, since I had been associated with the eDoc project from the beginning and had also taken an active role in writing the grant. I took on the role of CIT eDoc project manager readily since I saw the project as an opportunity to pursue my research interest in
participatory design more closely. In accordance with our democratic approach, remaining members were free to choose roles or invent their own as per the needs of the project and/or their convenience.

Thus, the CIT eDoc design team consisted of end users, vis-à-vis, CIT graduate students and faculty. This was an open and public group, i.e., its membership was open to the CIT community and its formation was announced via email and in weekly seminars. The CIT eDoc group welcomed visitors, who were mainly faculty members from other departments and visiting faculty from the U.S. and international universities interested in educational technology. However, the core membership of the team remained the same.

**CIT eDoc Design Team Operations**

The group met every Tuesday morning for an hour - anywhere between 9a.m. and 12 noon. Typically all members, except for David, attended the weekly meetings. Since David was the sole systems developer for the entire eDoc project, he decided to work closely with the CIT eDoc team from the “outside” advising and directing them on technical issues and developing the software.

The meetings took place in a classroom with audio video facility, since the group often had to make use of the multimedia facilities to present and review material posted on the web or in electronic format. The meetings started and ended on time. Sometimes students stayed behind chit chatting or clarifying points discussed earlier in the meeting. The meetings were kept open to the CIT community at all times, but generally people did not attend unless invited by one of the members.

**Meeting format.** The meetings took place in a professional but relaxed and friendly manner. As the CIT eDoc project coordinator, I would send a draft agenda the previous week and convene the meetings. Members in attendance and those absent would be noted. Visitors or potential design team candidates would be welcomed to the group. If the visitor did not belong to the CIT community or was not familiar to the group there would be an informal introduction exchange. The new member was also updated on the project work. The passage below represents a typical scene of initiating new members into the team and updating them about the project:
REMA: Today we have a new member, Jim... We are the CIT eDoc design team. We wanted to have some faculty, but faculty are very busy so we have Dr. D as our leader and she's the one who'll be communicating with the faculty. We have another person who's missing today Donna, - she said, she'll be here at 9:30. She'd forgotten this was going to be at 9 - usually we meet at 10 - no, 11, 11 - we meet at 11. So, Jim you want to go ahead and just introduce yourself and then we can ...

JIM: I'm Jim and I'm a doctoral student [in the] 3rd year of the doctoral program in CIT and I'm done with the course work and am working on my dissertation, which is a project related to software development. And my area of - the major is Instructional technology with emphasis on computer assisted language learning.

[team members ask Jim about his background, his current work and experience in software design. The conversation then veers to the topic of CIT eDoc project.]

REMA: we're looking at having a prototype by summer of 2004, something that we can sort of implement on a larger scale. Right now what we're trying to do is create mockups. This is our second mockup…

[and the conversation continues with a description of the project] (CIT eDoc weekly meeting, September 30, 2003)

Once introductions were made, I would hand over the proceedings to a member who had agreed or had volunteered to facilitate that week’s meeting. The meeting would begin with a review of the agenda. This was typically followed by reports by team members on new developments. The reports would deal with happenings that related to the CIT eDoc project in some manner. This also acted as a time to share information with the group. For e.g., this was the time when members who also held positions in the larger eDoc group level such as Dr. D, Donna, Kristin, or I, would typically inform the group about changes in organizational policies or management that could impact the CIT eDoc project. The activity of presenting reports was professional but relaxed. People could interrupt and ask for further clarification or express their opinion.

Presenting reports was typically followed by a recap of the previous meeting. For the most part it included reviewing design mockups (rough visual representations) of our evolving understanding of CIT eDoc. The mockups were created by Donna and their review occupied the major part of the meeting. It was a collaborative exercise that afforded individual members time and space to articulate their independent views.
The weekly meetings thus became a way for members to collaboratively reflect and build their own assessment tool—a tool that was traditionally built by faculty or professional designers for students had now become the work of student thinking.

**Development of CIT eDoc**

The design of CIT eDoc first began with CIT eDoc prelim portfolio. However, due to changes in program policies, the design team had to focus on the annual review portfolio design. The change was based on the fact that the annual review process had been made mandatory for all CIT Ph.D. students who had not passed their prelims. With respect to CIT eDoc development, this would ensure prototype testing of the annual review eDoc. On the other hand, the prelim portfolio was optional. Students, in consultation with their committee, had the option of either taking the traditional prelim examination, or of creating a prelim portfolio, or a combination of both. Therefore, for CIT eDoc development, the user group would have been smaller and prototype testing would likely have become problematic.

The design process was iterative and recursive and followed Willis’ (1995) R2D2 ID model. The design process can be viewed as consisting of three major phases: 1) idea generation and reification, 2) public presentation and scrutiny, and 3) prototype testing and evaluation.

1) **Idea generation and idea reification.** This stage is also known as the *Need Analysis* stage in traditional ID, which consists of understanding design context and user needs. The first half of the design period consisted of brainstorming and testing ideas. The team members unanimously agreed as a first step to articulate a vision for their design; they called it their *design ethos*. The team agreed the term “design ethos” reflected their desiderata (their original vision of the design) more accurately. Dr. D’s thoughts below typify team’s thinking on this matter:

**DR. D.:** … I thought our philosophy is actually a misleading term; it’s too high fluting and abstract for what we really need. And, that word ethos that Kristin used was important, …so, I thought, yeah, ethos that’s what we really want. We want to really know what’s the community spirit in here that faculty who’re trying to advice and allow some quality assurance of this process are going to be comfortable with. And the graduate

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11 R2D2 (Reflective, Recursive, Design, and Development) is an ID model from the constructivist paradigm. It stands in contrast to traditional ISD models and highlights phronesis (contextual understanding), user participation, and recursive design leading to progressive problem solving.
students who’re going to be the real engines of the process, that are going to be producing using these tools and we’re going to be advising and helping them manage. (CIT eDoc meeting, September 9, 2003)

During articulation of their design ethos team members realized they needed to expand CIT eDoc’s original purpose– from annual review of student progress to supporting an environment conducive to democratic learning.12 This was notable, since by expanding CIT eDoc’s scope, the student designers in effect overturned CIT faculty’s original motivation for CIT eDoc, challenging thereby traditional roles and assumptions.

A number of innovative ideas were generated during this phase. Ideas “thrown into” the group were picked up and critiqued, if they survived, they got “mocked up” or a proof of concept13 was developed. Donna created the mockups; she decided to use Flash, a software tool for developing interactive websites, as a way to create speedy interactive mockups. The exercise also helped her become proficient in the use of this software. The interactive screen designs helped simulate an experience of creating, editing, assessing, and navigating a web-based portfolio. The team critiqued each mockup thoroughly, analyzed the design and made determinations for further modifications. As per eDoc workflow guidelines, the final mockup that represented CIT eDoc design specifications, was sent to the web design staff to generate a display, which was then submitted to David to add functionality.

The design ethos and mockups occupied a central role in CIT eDoc design and development. They moved “the project at different levels. The prototypes helped at a ‘what-to-do level’ and to some extent the ‘how-to-do level.’ The ethos addressed the ‘why-do level’ and moved the project on at that level” (Jakob, CIT focus group session, April 20, 2004).

The team members tested the software among themselves and reported bugs to David between December 2003 and January 2004. A partially functional prototype was produced in March 2004. The design included features to upload, download, and display artifacts and reflections (file in different formats) as well as to engage in discussion and assessment of the

12 Goodlad (cited in McNabb & McCombs) describes democratic learning as “education that develops in humans the dispositions to make choices that benefit self and community mutually.”

13 “A proof of concept is a short and/or incomplete realization (or synopsis) of a certain method or idea(s) to demonstrate its feasibility. The proof of concept is usually considered a milestone on the way of a fully functioning prototype” (“Proof of concept,” 2006, para 1 and 2).
portfolio (see Figure 3). The team presented the partially functional prototype to the rest of the CIT community.

**Public presentation and scrutiny.** The software was introduced to the CIT community for the first time at a weekly technology seminar popularly called CIT Technology Seminar and attended by faculty and graduate students. The group felt it was important to demonstrate the software to faculty members even though it was not fully developed, since faculty members formed part of the user group but were underrepresented in the design team. The whole team collaboratively planned the presentation and decided to demonstrate it as a group with each member presenting a portion of the story, based on their respective interests and degree of comfort. The presentation was interactive and included questions from the audience during and following the presentation. Although the prototype was not fully functional at the time, the feedback was positive. However, faculty suggested simplifying the visual design and reducing the clutter. Changes were made to the screen design, faculty members reviewed it one more time during a faculty meeting, and David produced a fully functional prototype in April 2004.

**Prototype testing and evaluation.** The prototype was tested in March and April 2004 by three CIT Ph.D. students, even before it was fully functional. For instance, the discussion function had not been implemented. However, in keeping with the R2D2 model of instructional design, design and development went hand-in-hand. Once again, this activity was planned collaboratively. The team brainstormed and identified three students who had not yet completed their coursework and passed their prelim examinations. They also possessed different levels of technical expertise. Kristin and I drew up the usability test tasks with help from others in the team (Appendix F). The format for the tests were open ended. Students were given specific tasks that needed to be performed without the help of a tutorial. The tests were conducted individually with each student in the computer lab on Macintoshes and PC-compatible computers. We observed the students as they navigated their way around CIT eDoc, took notes, and followed up with a personal interview.
The results were mixed; the testing uncovered technical bugs and problems that initially appeared to be related to screen navigation. However, follow up interviews with student users indicated student users were having problems navigating because the design did not reflect the annual review guidelines that had been revised again in Spring 2004. Since CIT eDoc design was based on the guidelines issued in Fall 2003, it did not match student’s expectations. As a result the design had to be revisited. By the end of this study, new plans were afoot to simplify the design and make changes to match the revised guidelines.

**Findings: What Does My Study Reveal?**

The nature of this study was exploratory – its purpose was to understand and identify critical factors of participatory ID in an academic setting. The analysis revealed that the recursive and collaborative nature of CIT eDoc design and development gave rise to a complex web of interactions. Activities undertaken during the design process (see code book in Appendix A) seemed to work at different levels. These activities seemed to possess
“layers” that got “peeled back” (Chiseri-Strater & Sunstein, 1997) during analysis. For e.g., the activity of facilitating meetings seemed to do more than just advance the meeting agenda. It helped inform members of group activities and thus made work processes transparent to individual members.

Thus, a closer examination of these activities and their intersections revealed five major features that seemed to characterize the design process: 1) Transparency: Creating and maintaining transparency in design work, 2) Design Ethos: Invoking the desiderata during design work, 3) Community: Creating and maintaining a sense of community, 4) Contextual Design: Embedding design in user practice, and 5) Recursive Design: Allowing for continuous analysis of design.

These themes are intricately intertwined, as are the activities that generated them. For instance, themes of Transparency and Community share similarities, but are distinct from one another. Similarly, the activity of “presenting reports” is also part of “running a meeting,” but also constitutes and activity by itself. Thus, many of these activities and themes “run” into each other or “pick up” from each other. I therefore prefer to view the analysis as an attempt to “highlight aspects in a complex whole” (Eisner, 1998, p. 88).

**Transparency: Creating and Maintaining Transparency in Design Work**

The need to maintain transparency of member roles, group structures, and work processes seemed primary to this team. It manifested in three major activities integral to the effective functioning of any project work, namely, 1) following meeting protocol and facilitating weekly meetings, 2) bringing people up to speed, and 3) presenting reports.

**1) Following Meeting Protocol and Facilitating Weekly Meetings**

Meeting protocol deals with following conventional procedures of running a meeting. In this group it took the form of announcing the date and time of the meeting, introducing newcomers to the group, chit chatting with members to settle the group before implementing the agenda items. A typical example of newcomer introduction can be seen in the light-hearted exchange below:

REMA: Today's the 28th, this is the CIT eDoc meeting. We have a couple of new people today. We have Dr. T from Meteorology. He and Dr. S have been working together for how many years now?

DR. S: since '96.
REMA: since '96. It's quite a while and we're hoping that their work might shed some light or give us some idea as to how we want to design participation tool; then you have Dr. Z from UVA, Univ. of Virginia, and you'll be here for how long?

DR. Z: till Thursday.

REMA: till Thursday? And he does some neat things with technology …he's already given me a few ideas of what I might want to do with my dissertation. (laughter). With your expertise also you can guide us and then

[looking at the CIT design team]
you guys can go ahead and introduce yourself.

MELANIE: yeah, my name is Melanie... (CIT weekly meeting, October 28, 2003)

The conversation begins comfortably; newcomers are introduced and individual team members proceed to introduce themselves. To be noted here is that newcomer introduction does not stop with introducing names, member designations, and institutional affiliations. Rema provides “insider” information to the group, information that is not fully public. For instance, the first paragraph tells us that Dr. T, a visitor and a faculty in the Meteorology department, has worked with Dr. S, also a visitor and a faculty in educational technology at an international university. The design group knows Dr. S and her research interests, since she had attended previous week’s eDoc meeting. Thus, the seemingly perfunctory observation by Rema that the two faculty members work together provides the group useful information about Dr. T’s research interests as intersecting between meteorology and educational technology due to his collaboration with Dr. S. In other words, Dr. T is now seen as a peripheral member of the educational technology community of practice.

Regarding Dr. Z, we see that he is not only a senior member (faculty or staff) at the University of Virginia, but is also well versed in technology and is known for his innovative ideas. In addition, the short introduction also informs us that he is enthusiastic and forthcoming with his expertise; he has already provided Rema with some helpful suggestions about her dissertation.

Member introductions were reciprocal in this team, i.e., not only were newcomers introduced to the group but each group member introduced themselves to the newcomers. These introductions also included official as well as non-public information about the member such as their motivation for joining the team and their perception of their role in the
group. Thus, people’s roles and motivations were made transparent within the CIT eDoc design community.

Facilitating weekly meetings was another activity that helped make work processes transparent. Often, meeting facilitation would involve members summarizing ongoing discussions from time to time, which would become grounds for further discussions. For e.g., while planning the group presentation for the upcoming CIT technology seminar, Brenda attempts to veer the discussion back on track:

**BRENDA:** … not to interrupt, but did we finish what we were talking about tomorrow?
**DR. D:** this is what I've got.
**BRENDA:** I have down to when we're asking volunteers and demonstrating the portfolio.
**DR. D:** and I don't think we've quite finished it, but um. I'm going to start off with the historical perspective of why we're doing this. Rema and Melanie are going to share 2 slides on what a portfolio is and its different types and dropping names in there - gurus. Um, I'm then going to introduce the specific project eDoc and the CIT, and then Brenda is going to go into the process that we're using to evolve the eDoc. I'm thinking that now we're going to leave the volunteers to the workshop afterwards. But we'll say what we're going to do … (CIT eDoc weekly meeting, January 21, 2004)

Brenda and Dr. D advance the meeting agenda by recapping what has been discussed before; in other words they reify plans discussed earlier in the form of a verbal report and articulate it publicly in the group so that *not only are all members privy to the same information but also each member is aware that the others have been exposed to the same information*. In other words, members become cognizant of resources and information residing in the group. Thus, the activity of facilitating a meeting results in making group thinking and group work public and transparent.

At times the activity of facilitating a meeting got more involved and branched off into a new activity that dealt with bringing people “up to speed” with project work.

**2) Bringing People Up to Speed**

Whenever new members joined the team, or the team had visitors, or when people came in late for the meeting, they were brought up to speed with the ongoing design work. For new members and visitors, this entailed a recap of the project from the beginning, which implied articulating project’s ethos, goal, and context. For people coming in late for the
meeting, it entailed summarizing decisions and steps taken before they arrived at the meeting. Although minutes of each meeting were duly recorded and posted on the web site, the group felt it was important that each member be brought up to speed personally. When Dr. T and Dr. Z visited the group, Nick updated them on their work,

NICK: We first tried to find out what our philosophy and framework in doing this kind of thing [e-portfolio] was. And we thought that this thing shouldn't be just student's assignments and artifacts to show faculty member but also we want them to be able to communicate with each other and faculty members and get feedback regarding their artifacts. So, the discussion tool, which we will be embedding in this, we think, is going to be the most important part of it. So, we're trying to make it as interactive as possible … for the sake of learning, not just [for] gathering their artifacts together. And, we've come to this point so far - this is the first version of how it's going to look like. This is the university site portal.

Although the push for updating usually came from Rema and Dr. D, the trend seemed to catch on and others followed suit. For instance, Jakob updates Dr. T about the evolving CIT eDoc design:

DR. T: what's the purpose of the discussion?
JAKOB: well, the purpose is to give the students a chance to get some feedback on what he/she has shown his/her peers. So, this is a sort of the first stage in the process… this is the way of showing your work in progress to your peers and have them give you feedback on it. And then the next stage or the third stage - anyway it's a later stage, is when you hand it in for assessment as your portfolio.

The two instances of bringing people up to speed show evidence of laying bare project’s underlying ethos of supporting democratic and collaborative work practice.

3) Presenting Reports and Sharing Information

Transparency in the group was also promoted by the way members presented reports or shared information. Typically in teams such as design team, or teams that come together to develop a product, presenting reports is standard practice. As part of accountability, team members are expected to report their progress periodically either through formal structured reports or informal presentations. The CIT design team members periodically reported on
their progress. However, the presentation resembled a story-telling activity; members shared minute details of their interactions. For example, Jakob narrates to the group his meeting with David, the systems developer:

JAKOB: just very briefly because it's not all that interesting to go through all the details. Something about the logo - we talked about the CIT logo of some sort and then some other logo because students have some other connections. Ok, that's possible with some obvious limitations. Then, some of the things that are obviously more important is the question about how to submit the portfolio for assessment. And he [David] said, I mean, it seems to be a good idea - his suggestions. Well, he said who's going to release it again if it's locked by the student who's then going to release it because then the student cannot unlock it? So, you can do more things - you can say ok it's not the student that locks, it's the one assessing the portfolio. Or, it's the student that locks the portfolio and then the one assessing it unlocks it. (CIT eDoc weekly meeting, Oct 21, 2003)

Jakob begins his report succinctly, however, not too far into the report, he adopts a narrative stance as he recounts, almost verbatim, David’s questions and his reflections on it. This feature of who is saying what, where, and when, enhances the degree of transparency within the group. Accountability is laid bare. Members become privy to happenings as they occurred, making them live these experiences vicariously through the reporter. In this case, members understood the technical and organizational challenges posed by their seemingly simple request for “locking” the portfolio for assessment.

Thus, the principle of transparency afforded members insight into the complexity of design activity as well as the resources available to them to address this complexity.

**Design Ethos: Invoking the Desiderata During Design Work**

As seen earlier, activities of presenting reports and bringing people up to speed with the ongoing design helped members articulate their desiderata or design ethos (that which is desired/felt to be essential in the design). The frequency of these activities kept members acutely aware of their ethos throughout the design process. This seems to be noteworthy, since there is scant mention of this phenomenon in design literature.

CIT eDoc members also invoked their design ethos by engaging continuously in critical review of their evolving design. Critical review often shifted the conversation from
the local context of CIT eDoc to engagement in critical inquiry\textsuperscript{14} of practices and principles of effective design and democratic learning. In groups, critical inquiry is typically evidenced when members assume a meta view reflexively or when challenged by others, which allows them to see their own contributions in a new light. Critical inquiry by a group assumes mutual learning and collaborative knowledge-building.

This group facilitated critical inquiry to a large extent by giving space for members to reflect together and for individuals to articulate their thinking. Instances of members engaging in critical inquiry are numerous and seem to cut across the whole year of the study.

I present three instances as three different expressions of critical inquiry in CIT eDoc design and development. These showcase instances of invoking the design ethos as well as of mutual learning. They are: 1) articulating new perspectives, 2) collaborative reflection by the group, and 3) challenging decisions taken by the group.

\textit{1) Articulating New Perspectives}

In the first instance, the group was debating whether the CIT annual review design needed a grid to present artifacts in an organized manner. Below is the excerpt:

NICK: Rema, I think when Dr. D was discussing about the grid thing, she was more concerned about the Prelim portfolio. Because in the final portfolio, your committee is interested in seeing how you covered all this criteria and how is your level of covering? I remember her saying that this particular student needs to address at least one of these criteria on an expert level. And others should be advanced. So, in the annual portfolio, these novice, advanced, expert won't be so necessary.

REMA: so, do you think we won't need the grid for the annual portfolio?

NICK: yeah, we may need the grid to show what criteria were addressed by what artifact, but not level, I don't think it will be necessary.

JAKOB: I'm not an expert at how you do things, not at all. [but] I'm thinking perhaps this will be useful for the annual portfolio because it'll be a way of discussing what your progress is and what

NICK: why don't we let our committee members decide on that.

JAKOB: yeah, there's another thing I just want to mention is that by designing this portfolio we're also shaping somehow the way things will be done from now on. If there's a grid like this in the annual portfolio then

NICK: it'll provide consistency, yeah I understand that.

\textsuperscript{14} Critical inquiry is “a mode of philosophical inquiry that questions reality, looking for contradictions. Critical inquiry is change/action-oriented” (Koetting & Malisa, 2004, p. 1009).
JAKOB: no, but then it would be, it would probably be a part of practice.
RICHARD: so, this is continuous - does the matrix show your continuous progress like including two years annual portfolio, or just the current annual portfolio? If it includes the progress you've done in two years then it's good. But, if it only shows each year I think it has no function. (CIT eDoc weekly meeting, October 7, 2003)

In the conversation above, the group debates whether the artifact grid is necessary for the annual review portfolio. The debate does not appear to reach a logical conclusion, instead a new perspective is introduced when Jakob interjects and draws attention to the importance of a grid as an artifact that could impact future practice of the CIT community. This socio-cultural view invokes group’s ethos and elevates the discussion from the design of a specific electronic portfolio to the larger role of technology design in changing community practice. It reminds the group of their original vision of developing a portfolio to promote democratic learning and also helps advance the conversation and thus the design work forward. This is seen in Richard’s recommendation to improve grid’s design by having it display student’s progress across student’s entire study program. The need for the grid is no longer in question; instead the topic shifts to its improvement.

2) Collaborative Reflection

The second instance again showcases how members repeatedly invoked their desiderata to help guide them in heir work. In the conversation given below, the group collectively reflects on the difference between a comment and a discussion.

DR. D: we're going to be asked later on what we mean by the difference between Discuss and Comments. We're going to be - later going to be asked and we need to be sure whether we want those two things there.
REMA: Discussion is more like a dialoging - Comments is just a …
[Rema’s continues to reflect on the meaning of a comment.]
DR. S: Comment is a remark that you make that you don't expect reaction on.
REMA: Exactly! That doesn't initiate or you don't expect a dialog or a conversation.
JAKOB: could be that different people - some people discuss and in some place comments are made. It could be for assessment that you place comment.
DR. S: yeah, what happens if you're commenting on a comment?
PEOPLE: yeah!
NICK: then, that starts a discussion. (all laugh)
REMA: then, perhaps in the Comment box there should be a link if you want to discuss. Move that into a discussion.

DR. D: that's going to drive the programmers mad. (all laugh)

DR. S: maybe then, if then automatically if somebody replies at least not add a new comment, if they reply to one it should automatically become a discussion.

REMA: how would you reply to a Comment? How would you indicate that this is a reply to a comment?

DR. D: I think we need to move back to from there to WHY do we have comments and discussions? (CIT eDoc weekly meeting, October 21, 2003)

This light-hearted conversation represents team’s concern over ways of supporting dialog they believe is essential for deep learning. The deconstruction of terms “feedback,” “comment,” and “discussion” indicates team members’ engagement with bringing clarity to their understanding of their ethos. The members are aware that dialog is essential for democratic learning, and they persist in exploring different options of getting it realized in their design.

3) Challenging Group’s Actions

The third instance is representative of the mutual learning that occurred in this group through democratic exchange of ideas. The group allowed individual members the space to challenge group decisions. It was not unusual for members or visitors to express their opinions and challenge the evolving design or design specifications. For instance, Richard, a graduate student in instructional design and a short-term CIT eDoc design team member, questioned the group about their rationale for the interface design they were proposing.

RICHARD: first of all, in my opinion, functional specifications and justifications for your functions [are important]. What do you want to have? Why? So, according to those functional specification and your justifications you can create new models based on this model or any other kind of model.

REMA: that's what we're here for.

RICHARD: what's your functional specification or justification? I haven't seen anything like that...[do] you have a kind of list that includes your specifications and justifications?

REMA: we haven't yet made it explicit right now. We're still in the process of...

JAKOB: to some extent you have a list. We have...
REMA: [looking at Richard] but, I think you're asking for making it very explicit - this is the function this is the justification. And that - one of the reasons why we went this route was because that was holding us back.

RICHARD: what's the functional specification of artifact 1 [as illustrated in the mockup being critiqued]?

REMA: well those are the artifacts that you're including in the portfolio

RICHARD: what's it for? When you click it where do you go? (CIT eDoc meeting, September 23, 2003)

Richard’s questioning reveals an instance of learning. Richard’s critique of group’s operation has two functions. First, it judges team’s execution of needs analysis as unsystematic and below par, since, according to Richard, members failed to follow standard ID procedures. Second, through Richard’s evaluation of team’s performance, he educates the team on standard ID practice. Thus, the conversation moves from the particular instance of CIT eDoc design to a discussion of ID procedures and principles.

The feature of invoking group’s design ethos was central to CIT eDoc design and development. The analysis revealed that all activities seemed to invoke group’s design ethos at some level, which seemed to have helped guide the designers and keep design work on track. However, it is important to note that this feature is intricately tied with other features (Transparency, Community, Contextual design, and Recursive design) and would likely not have been realized in their absence.

Community: Creating and Maintaining a Sense of Community

The third feature to under gird this design project was a sense of community. By sense of community, I refer to Wenger’s (1998) seminal work on Communities of Practice. According to Wenger, a community of practice is formed when people come together for a common goal and work together interdependently creating over time, a “shared repertoire.” The CIT eDoc group seems to have achieved a sense of togetherness bordering on the likes of a community of practice as evidenced in different activities, such as 1) collaborative design that included brainstorming new ideas and reviewing design specifications together, 2) recognizing and making public individual member contributions to the evolving design, and 3) collaborative task assignment.
1) Collaborative Design

Members collaborated actively in design activities as can be seen by the large number of codes generated indicating collaboration and as per their frequency count (see codes prefixed with the term “collab” in Appendix G). At first members worked together to develop group’s design ethos – a broad vision for the project. They also collaborated on creating design guidelines and standards (Nielsen, 1993). Members reviewed material relevant to their design task such as critiquing current and competing electronic portfolio software in the market and investigated new electronic portfolios initiatives. Members collaboratively visualized the “ideal” electronic portfolio and critiqued the evolving CIT eDoc design continuously. Ideas got revisited and revised. Each meeting began with a review of the developing design. Hence, collaborative review and design was an integral part of CIT eDoc design work.

By working together on a regular basis the team developed its own vocabulary. For instance, the term “mockup,” a design term denoting a rough sketch or visualization of the final product, was adopted by the design team; it became part of group’s vocabulary. Similarly, the concept of “sharing” a portfolio with others, first introduced by David, the systems developer, was again something foreign to the CIT community but adopted by the group readily.

2) Public Recognition of Individual Contributions to Design

The feeling of community was further enhanced by the fact that individuals were recognized for their contributions. This legitimated individual’s membership in the community.

The meetings, especially in the first three months generated almost 90% of the ideas that were adopted and implemented in the first functional prototype. Although these ideas emerged from collaborative work, the group publicly acknowledged individual authorship and its value to the overall design. This happened typically when the idea was still new and under group scrutiny. However, once the group adopted the idea, it became part of group’s repertoire or shared knowledge base, and personal attributions to the idea seemed to be forgotten or were sometimes made erroneously. The instance of generating speedy mockups is a good example of idea migration from individual to the group. During the focus group
session, Donna attributed the idea of mockups to Rema though it was first introduced by Jakob. See excerpt below:

DONNA: I think the first thing was when you [Rema] said to do the rapid prototyping model and asked me to do the mockups. I think that helped the team a lot in terms of actually visualizing what it is going to look like. But, what I designed initially was very basic and then Dr. D brought in the table structure. I think that was a big point in the shift toward how you’re planning to assess and how you see your – you had Novice, Middle [Advanced], and Expert – those three – it sort of shifted the whole focus of how you’re planning to think about the portfolio.

REMA: I think the rapid prototyping – the mockups was Jakob’s idea.

DONNA: Jakob’s idea? Ok!

[others agree] (Focus group, April 20, 2004)

In the above exchange Donna mentions two ideas as innovative, namely the idea of mockups and the idea of the artifact grid, and attributes them to Rema and Dr. D, respectively. The first attribution is however misplaced and she is duly corrected. This instance is representative of the way the CIT eDoc design team functioned. The group helped give voice to individual members’ ideas and thus legitimated their membership in the team.

3) Collaborative Task Assignment

I would now like to focus on one activity in particular that may not necessarily appear to be community-building, namely, task assignment, but which, in this group, appeared to enhance the feeling of community. The activity of assigning tasks to team members is instrumental and managerial in nature; it is one of the first steps in a collaborative design project (Sherry & Myers, 1998). Members are identified by the knowledge and skills they possess, and tasks are assigned accordingly. But, in this team, the nature of task assignment changed. It was difficult to distribute tasks based on people’s expertise since the majority were volunteers and had their own study commitments. The only members that were paid to be part of the team were Donna, Kristin, and I. In addition, Dr. D and I had decided people would not be forced to take on jobs they could not handle outside their regular course workload. Thus, the activity of task assignment changed from a formal directive to a collaborative and negotiated activity. Tasks assignments emerged cooperatively and were negotiated at every step. Conversations such as, “So who would like to do that one? I’m thinking if I do a slide and then somebody does a slide on what we know about portfolios,
Such work practice could have lead to “free-loaders” – people joining the team but not doing any work. However, in this team, data shows that there were hardly any instances of free-loading. Members who could not take an active role, contributed in other ways, such as researching and presenting relevant literature that they came across while working on their regular coursework, or by facilitating meetings, or helping review tasks and designs created by others. Members seemed to share a feeling of responsibility. Melanie expressed it best when she confessed in her interview,

When I first got an email from you saying that oh Melanie, do you want to lead the session? I [didn’t] want to – this is not my thing, you know. I’m just coming [for the meetings] and giving my ideas and I’m leaving in an hour. But then there came this understanding that my responsibility comes with my participation in this project ... It means that I come to the sessions maybe trying to lead part of it, maybe assisting somebody else to lead it or to conduct it… (Interview with Melanie, December 19, 2003)

The fact that tasks assignments took into account demands placed on people speaks to the pragmatic aspect of this design process. The next section discusses this in detail.

**Contextual Design: Embedding Design in User Practice**

Like typical PD projects, the CIT eDoc design and development also emerged from the needs of the CIT program and seemed to constantly reinvent itself in response to external and internal demands. Members used different strategies to adapt and continue with their design work. There were two activities that were instrumental in helping team members execute their task successfully and collaboratively. These were activities of *engaging in political strategizing* and the use of *humor.*
1) Engaging in Political Strategizing

The activity that specifically highlights the context-embedded nature of this design process is reflected in the constant strategizing/planning by team members to facilitate adoption of this innovative tool. I call this activity *political strategizing*.

The project had limited support and resources at its disposal. The CIT eDoc project had low faculty representation and involvement. The members also realized the project relied on technology (uPortal), which had still not been sanctioned by the university. In addition, there was just one systems developer and one web design staff for all the teams. And finally, the CIT eDoc design team was aiming for an innovative tool that would have been better served with greater resources in the form of people with appropriate skills and funding and greater support from faculty and administration.

The constant “strategizing” by the group to manage challenges facing them is reflected in the session where the team is preparing their presentation for the CIT Technology seminar.

REMA: so are you thinking about having students use this for the annual portfolio this year?
DR. D: yes, but not mandating it.
REMA: not mandating it?
DR. D: making it one of their choices, - I'm not sure that - like for example, if we continue to have platform problems.
REMA: yeah, that's right.
DR. D: that would be not good.
REMA: yeah, they would lose a lot of their stuff and we don't want that to happen.
DR. D: so we might need to recommend processes whereby they have their artifact and they have their reflection - keep a backup someway? That shouldn't be too difficult. Then if anything goes wrong -
BRENDA: they SHOULD have a backup of it.
DR. D: right - exactly! (CIT eDoc weekly meeting, January 20, 2004)

The above exchange alludes to two challenges: 1) the software is under development and therefore not stable, and 2) the design team is aware of this vulnerability and the implications arising from it, namely, if software breaks down while being tested by potential users it could severely damage chances of adoption by the CIT community. Team members’
concerns thus extended well beyond the technical design of the software, to the larger issue of technology diffusion.

The pragmatic nature of the design process also shows up in the form of power struggles between stakeholders who sometimes have conflicting needs, such as faculty and students.15 This struggle becomes more pronounced given the fact that the project did not enjoy the full support of the faculty. The utterance below reflects a request by a student group member for “backup” to meet with a faculty for updating her on the CIT eDoc work. This faculty member is known for her reservations about portfolios for student assessment.

This week I hope to get in touch with Dr. X. She was on our email list also and talk to her about our stuff. If anybody wants to come with me they're more than welcome. You know, because … you know, that Dr. X is sceptical about the portfolio. (CIT eDoc weekly meeting, December 2, 2003)

One can sense the speaker’s nervousness at the impending meeting in the words “more than welcome.” Another exchange noted below between Nick and Dr. D also highlights the delicateness of the situation on hand.

NICK: the reason why I asked the question [is] because if they [faculty] also have [to create a] kind of portfolio then they [can] see the use of portfolios better.
DR. D: I agree. But we can't push them too hard, because this is a high pressure process. (CIT eDoc weekly meeting, September 9, 2003)

The above exchange hints at the vulnerability of the design project, which at times seemed to be at the mercy of the CIT faculty. The design team needed faculty buy-in, however the members, being students, did not possess the authority to mandate it. Moreover, those with the power to mandate the use of eDoc (the administrators) were not part of the design team; the project had emerged organically within a small group of faculty, service staff, and students, and was still in its infancy and therefore did not include all stakeholders.

2) Use of Humor

Often members tackled their frustration at the lack of resources or power with the help of humor. During an intense discussion where members were trying to understand the

15 I have tackled the issue of power in the CIT eDoc design project from a linguistic angle in a related article, Critical discourse analysis of user-designer negotiation in participatory instructional design (Nilakanta, 2006b).
meaning and importance of the evaluation criteria established by the CIT program, Nick broke the tense unending discussion with a humorous observation.

NICK: The problematic part is this [the evaluation criteria] for me. How can we structure this … so they [students] can just put their [artifacts]… I don’t know. You know this Foundation, Application [referring to the program criteria] —they’re different structures.

REMA: Yeah, this is like forming the core, just like the competencies of FSHN [Food Science and Human Nutrition eDoc]. This is forming the core of our portfolio. This is what we take as our basis.

[describing to Nick the role and importance of program criteria]

DONNA: See it depends on how we approach it. If you are starting off from the artifact as the main thing or are you starting off from this [the evaluation criteria] as the main thing and artifact comes within it.

NICK: This guiding thing [the evaluation criteria] is misguiding people. (laughter) (CIT eDoc weekly meeting, October 7, 2003)

With his witty pun on CIT criteria (Appendix C) guidelines as misguiding those it is supposed to guide (the students), Nick adroitly deflects group’s attention on his frustration with CIT evaluation criteria, which he finds ambiguous and open to multiple interpretations, and therefore problematic to design. It also becomes clear in this exchange that the students do not “own” the program criteria, i.e., the guidelines were drawn up by CIT faculty without student input. It draws attention to students’ lack of voice in directing their own learning within the context of their study program and, students’ awareness of their disempowered status in the organization. This seems to place CIT eDoc design project in a unique position, since it offered students the promise of having a voice in the design of their study tools. It thus echoed PD’s principles of user empowerment.

Recursion: Allowing for Continuous Analysis

The fifth and last theme to resonate through the design process is its recursive nature. Recursion in design is also a critical feature of participatory design (PD). Recursion is evidenced clearly in the continuous critiquing of the evolving design by team members. As described in CIT eDoc Team Operations, the meetings typically consisted of collaboratively reviewing decisions made at the previous meeting and steps taken as a result. This usually involved critiquing mockups produced by Donna based on requirements specified by the group. One such meeting involved a conversation between Jakob, Rema, and Melanie where they revisited concepts and activities from the previous week’s meeting.
JAKOB: and what is - could you remind me what is Novice, Advanced, and Expert? What do they stand for?
REMA: last time when we discussed the grid Dr. D was labeling them as Introductory, Master, and Doctoral. That were the labels that we were talking about. Now, that confused me and … then, I had another talk with Dr. D, and I said what we are doing is the student has evaluated his or her artifact and says I think this is at the doctoral level. That's what you're saying and then the instructor goes in and checks it and says, hmm, yeah, I guess you're right, you've shown great expertise in this area and I agree with you. So, it's a tool whereby the students self-assesses the artifact and then gets it validated from the instructor.
MELANIE: how is Advanced different from Expert? [Rema explains the difference between the labels Advanced and Expert]… I do have an issue with the Advanced and Expert even though you explained it to me. I think the Expert has such an obscuring meaning, very much merged with what Advanced is supposed to mean. (CIT eDoc weekly meeting, October 7, 2003)

The above exchange represents a typical example of collaborative critique that the group engaged weekly in their meetings. Members would question one another seeking clarification and voicing their opinions. Often such critique would be followed up with design suggestions or brainstorming session, which would generate new ideas that would be implemented in a new mockup. The act of critiquing the design seems to be interwoven throughout the design process, often times moving from the particular instance of designing CIT eDoc to a higher, more abstract or meta level.

The findings thus show that CIT eDoc design team achieved its goal by inventing a complex web of interactions to confront conventions and constraints of their design context. Students had to work as designers within a typical US university heeding rules and regulations characteristic of an academic context. Also, in their new role as designers, students had to reinvent themselves within an already familiar context (their academic program). They had the difficult task of assuming the role of a student, a user, and a designer at the same time. The faculty member faced similar challenges as well. Dr. D. had to move across different roles - as director of the project, as mentor to students, and as designer of the portfolio. In addition, the design team members also had to pay attention to conventions of the design world. They had to work with relatively strict deadlines, follow a workflow for software development set up by David, and coordinate their work with others in the eDoc
group. They had to acquire appropriate design and computer vocabulary to successfully communicate with David, the systems developer and the design staff at ITC.

These interactions that design team members invented gave rise to five features that characterized the CIT eDoc design process: Transparency, Design Ethos, Community, Contextual Design, Recursion. The findings also indicate that these five criteria reflected PD’s core principles, namely, authentic task (design task relevance to group members), mutual learning (learning between and with members), and democratic practice (individual member empowerment).

To help understand and better situate the results of this study within the scholarship of educative and design practice, the next section relates these findings to existing literature on participatory ID (although scant), and to two theories on group interactions.

Discussion

The focus of this study was to understand the dynamics of participatory ID. Sherry & Myer’s (1998) study shed light on this topic from a sociocognitive and, to a lesser extent from a sociocultural perspective.16 Sherry & Myers (1998) applied theories of collaborative learning (Pea, 1994) together with Gould & Lewis’ (1985) principles of user centered design to design and study the process of developing a web site collaboratively with students and a faculty. Their intention was to develop a “model that focused on the simultaneous processes of learning, design and communication” (p. 127). The authors applied qualitative methods to analyze their data and developed a model of collaborative design that consisted of four interrelated critical factors: “1) working together on an authentic task, 2) developing a shared knowledge base, 3) allowing research questions to emerge from the design and development process as the product is constructed, and 4) intentionally sharpening our individual reflections through group interactions” (p. 136).

Sherry & Myer’s findings share similarities with this study. Both studies report on the building of a shared knowledge base when a diverse set of people work together collaboratively over a period of time toward a common goal. This shared knowledge base

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16 A sociocognitive stance views learning primarily as a cognitive process impacted by its social context. Its view of cognition is individualistic. A sociocultural view, on the other hand, defines learning as individuals participating in communities of practice. Here culturally organized activities form the point of departure (Cobb, 1996).
becomes a resource for the group for future learning. Similarly, both studies address the need for the design project to be relevant, i.e., it should be meaningful to the user-designers. This helps them take ownership of the task on hand.

However, my study takes a pragmatic approach to design compared to Sherry & Myer’s cognitive approach. It supports Nelson & Stolterman’s (2003) view of design as embedded in the “real world” and different from other modes of inquiry such as the sciences and the arts; design is best described as a mode of inquiry that provides “service on behalf of others.” In other words, design is “other-serving.” Designers help others experience “surprise of self-recognition.” This comes when that which emerges from a design process meets and exceeds the client’s original expression of that which they (usually only dimly) perceived as desirable in the beginning” (p. 48). Therefore, “design is a form of democracy. Design is the kind of democracy that … provides the possibility that each and every person’s individual good can be considered within the framework of the common good” (p. 55).

The CIT eDoc design team members also experienced “the surprise of self-recognition.” As noted earlier under Context: How did it All Begin?, the team wanted to build an electronic portfolio that supported democratic learning. Members tended to their desiderata together and eventually generated a design whose form and potential took individual team members by surprise. Donna’s reflections on her changing conception of the portfolio represents team’s thinking:

DONNA: for me it [understanding of a portfolio] has changed a lot because my initial idea of what an electronic portfolio is, … was to just put documents together and I wasn’t really sure how you would show the progress of student’s’ intellectual growth or learning, or assessment. It was very difficult for me to visualize how it’ll be. But, after discussing it with this team and with other teams, now I can understand how you would see a student’s learning through maybe 4 years of undergraduate program or through the annual portfolio... So I think I’ve learned a lot from this project and – especially from the CIT team. (CIT focus group, April 20, 2004)

The findings have shown that the strong emphasis on democratic collaboration, reflective practice, and sensitivity to one’s historical and immediate context helped the CIT eDoc design team successfully execute its task and achieve its goals. The findings also relate
to two theoretical frameworks, namely: 1) Theory of transactive memory (Wegner, 1986) and 2) Communities of Practice (Wenger, 1998)

**Transactive Memory: A Psychological Construct**

Transactive memory is a psychological construct developed by David Wegner and popular in the field of Information Systems Design. According to Wegner:

The transactive memory system in a group involves the operation of the memory systems of the individuals and the processes of communication that occur within the group. Transactive memory is therefore not traceable to any of the individuals alone, nor can it be found somewhere “between” individuals. Rather, it is a property of a group. This unique quality of transactive memory brings with it the realization that we are speaking of a constructed system, a mode of group operation that is built up over time by its individual constituents. Once in place, then, the transactive memory system can have an impact on what the group as a whole can remember, and as a result, on what individuals in the group remember and regard as correct even outside the group. In short, transactive memory derives from individuals to form a group information-processing system that eventually may return to have a profound influence upon its individual participants. (p. 191)

Transactive memory is based on the premise that one’s memory cannot hold and retrieve all the information efficiently at all times. Hence we store in our memory location of places where information resides, such as books, notepads, disks, and people. Thus, in a group, individual group members serve as external storage devices for each other and we carry labels for the type of knowledge residing in people’s memories. Thus,

one person has access to information in another's memory by virtue of knowing that the other person is a location for an item with a certain label. This allows both people to depend on communication with each other for the enhancement of their personal memory stores. At the same time, however, this interdependence produces a knowledge-holding system that is larger and more complex than either of the individuals' own memory systems. (p. 189)

The findings indicate that CIT eDoc team members had managed to build an extensive transactive memory system by making design work transparent. Members got to know each other’s interests and expertise. They also became informed about people and events surrounding the design project through regular reports and presentations. The members of the group thus became valuable resources for each other as well as for the team.
Knowing whom to approach with what information and tapping into that information and expertise in a timely manner is crucial for efficient functioning of a group. And, if expertise location is not clear, or roles are not made clear, Wegner warns,

Difficulties arise in the allocation of information within the group. Very commonly, formal groups will make the assignment of responsibility for information domains to individuals on other bases...Individuals are seen as linked to knowledge on the basis of their personal expertise or through the circumstantial knowledge responsibility that accrues as a result of how the knowledge has been encountered by the group.

An effective transactive memory in a group should not leave the responsibility for information to chance. If a clear expert does not exist in a domain, a channel for the processing of that information should nevertheless be established either explicitly or implicitly. (p. 192)

In CIT eDoc, certain roles were fixed or made explicit and others were made known as they got created publicly within the group. For example, Donna’s role as the technical expert in charge of creating mockups and communicating group’s needs to the web design staff was fixed, as was David’s position as the systems analyst. However, for the other members, their identities remained “suspended” to a greater or lesser degree and got “fixed” on the fly through task negotiation (see Task Assignment under Findings). The negotiation took into account the nature of the task on hand, members’ ability, and convenience or degree of comfort with the task. This lead to members taking turns facilitating meetings, presenting reports, researching, and testing the software. With each rotation, members became more intimate with the working of the team as well as the complexity of the design task. Thus, rotation of roles helped broaden group’s transactive memory system.

The CIT eDoc team’s extensive transactive memory system seemed to have contributed to the successful creation of CIT eDoc design specifications in a timely manner and to the development and testing of the first CIT eDoc prototype.

Communities of Practice: A Socio-historical Construct

Although not empirically tested, it would be logical to assume that a broad transactive memory is necessary for a community of practice (CoP) (Wenger, 1998) - the second theoretical framework illuminating this study. Wenger contends there are three critical aspects to a CoP: 1) joint enterprise, 2) mutual engagement, and 3) shared repertoire.
Members of a community of practice interact together based on a common domain of interest and in the process, develop a micro culture characterized by common conventions, language, and resources. This gives the community a unique identity.

CIT eDoc design team seemed to share characteristics of a CoP. The team members were engaged in a joint enterprise – the enterprise of designing CIT eDoc; they worked together and shared knowledge and skills, and developed, over a period of one year, a common vocabulary and conventions that seemed to set them apart from the rest of the CIT community. However, the group did not evolve into a fully functional community of practice; it is better characterized as a work group or a team (see Table 1 for comparison between a work team and a CoP).

Table 1: Difference between a team and a COP (community of practice). Adapted from Wenger (1998, p. 96, 118-119).

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Team</th>
<th>COP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus</td>
<td>Task – a common task</td>
<td>Learning – a common domain of interest</td>
</tr>
<tr>
<td>Structure</td>
<td>Planned</td>
<td>No identifiable/fixed structure.</td>
</tr>
<tr>
<td>Roles</td>
<td>Assigned roles – usually the facilitator is the leader</td>
<td>No assigned roles – usually the facilitator is a junior person and the leader/the one people look up to is the one with the most knowledge and experience</td>
</tr>
<tr>
<td>Motivation</td>
<td>• To complete a task or project&lt;br&gt;• Participant motives to joining a team are important&lt;br&gt;• It is necessary to have participants with similar motivation for the team to succeed.</td>
<td>• To learn from others&lt;br&gt;• Members join a COP for different reasons.&lt;br&gt;• However, there needs to be a common domain of interest.</td>
</tr>
</tbody>
</table>

Firstly, CIT eDoc design team was formally created to fulfill a particular task. It remained focused on the task and disbanded once the task was completed. Second, the CIT design team had a designated leader, Dr. D. Although her activities evolved in the course of the study period to include designing, her role did not. She remained the project leader and assumed additional responsibilities of a designer. And, third, members possessed different domains of interest. For instance, some members joined the group due to their interest in
instructional design (Nick and Richard), while others were relative strangers to ID or with little interest in ID (Kristin and Brenda, respectively).

Although CIT eDoc team cannot be characterized as a CoP it seemed to be on its way to becoming one. For instance, the group experienced exponential growth in its shared knowledge base and a common domain of interest – vis-à-vis, the design of software to promote democratic learning – had begun to form. The process of learning, along with the task of designing the electronic portfolio, started to take center stage. Members started to access expertise and knowledge present in the group for personal growth. For example, Melanie requested Kristin for literature on the concept of “ethos” for her portfolio paper. Rema asked Nick for seminal articles on usability testing to hone up her knowledge of software design and development. Experts and mentors emerged organically in the group. For example, members looked up to Jakob as an expert in the area of social design of technology. Thus, in many ways, the team was in the process of consolidating into a community of practice.

**Concluding Reflections: Study Limitations and Future Research**

This research explored the dynamics of participatory ID by studying an authentic case of software design and development. It studied how members of a specific community (CIT eDoc design team) invented their practice (design of CIT eDoc) to accomplish their goals and how the process of invention was facilitated by the community. The results indicated five major features that seemed to characterize the design process: 1) maintaining transparency in design work, 2), repeatedly invoking the design ethos, 3) developing a sense of community, 4) embedding design in actual work practice, and 5) allowing for recursion in design. Among these features, the principle of invoking group’s design ethos seemed to cut across all activities. Preliminary findings indicate the creation and invocation of design ethos repeatedly during the design process helped guide designers in implementing their desiderata and also helped them remain on task such that they were able to draw up specifications and cooperate with the systems developer to build and test a prototype in a timely and efficient manner. The validity of these findings is further strengthened by existing community-based theoretical frameworks of transactive memory and communities of practice.
Regarding the limitations of this study, as is generally the case with qualitative studies, its results cannot be generalized to new contexts. However the main purpose of this study was not to draw generalizations; the study set out to explore the feasibility of participatory ID, understand its structure (roles and activities) and identify its core principles. The study has succeeded in achieving its ends, but at the same time has also given rise to new questions that need further investigation.

In addition to conducting validation studies of the findings, the study raises another interesting question regarding the impact and relationship of a participatory model on the affordances of the software as well as the future practice of the community. As seen earlier, the project leader and facilitator (Dr. D. and I, respectively) adopted a democratic and collaborative design model due to their philosophical and theoretical beliefs in the importance of multiple perspectives and voices for creative design. Two questions emerge from this assumption; first, what impact did a participatory model have on the affordances of the software? And second, how much did that affect CIT community’s future practice? This implies undertaking a longitudinal study, which would be useful and necessary to realize the value of participatory ID.

References


Willis, J. (1995). A recursive, reflective, instructional design model based on constructivist-
You, Y. (1993). What can we learn from chaos theory? An alternative approach to
<table>
<thead>
<tr>
<th>1. D.CONVENTION-competitive analysis</th>
<th>Competitive Analysis (Nielsen, 1993) refers to an object of critique. But this excludes the object being designed. It involves analyzing and testing existing similar and/or competing software</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. D.CONVENTION-directing</td>
<td>taking a leadership role - asking people to do things in a nice but direct way Directing the project - more authority and power</td>
</tr>
<tr>
<td>3. D.CONVENTION-meeting facilitation</td>
<td>facilitating the meeting to advance the design work. 1. announcing the agenda to the group 2. moderating discussions 3. making sure people have a say 4. calling upon people to present their assigned work 5. summarizing discussions intermittently</td>
</tr>
<tr>
<td>4. D.CONVENTION-meeting protocol</td>
<td>deals with the procedures of running a meeting. 1. announcing date and time of the meeting 2. introducing newcomers to the group - informing the group of the newcomer's status in the organization, their interest in the project, their role in the project. 3. chit chatting to settle the group before executing the agenda</td>
</tr>
<tr>
<td>5. D.CONVENTION-present reports or share information</td>
<td>Presenting report of your progress to the group. But, this is a more informal kind of reporting, where people can interrupt and ask questions. Reporting regularly to the group also helps make the design process transparent to the team members. Maintaining transparency is essential for democratic practice to flourish</td>
</tr>
<tr>
<td>6. D.CONVENTION-project facilitation</td>
<td>Trying to keep the project going. Members follow conventions in keeping with the organizational culture to see that the project work progresses. They jump through necessary hoops to do that, such as identifying the people in authority and that need to be kept updated. Contacting the right sort of people to get the work done.</td>
</tr>
<tr>
<td>7. D.CONVENTION-task analysis</td>
<td>analyzing the problem, breaking it up into smaller parts, and deciding the order in which each part needs to be developed.</td>
</tr>
<tr>
<td>8. D.CONVENTION-task assignment</td>
<td>The assignment of task comes from design practice. It is usual to assign tasks to members in a traditional design group. Each one does his/her stuff (work in parallel) and then...</td>
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<td></td>
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<tr>
<td><strong>come together to complete the design. This is in contrast to Participatory Design (PD) where people are expected to work in genuine collaboration, integrating, &quot;composing&quot; a new design together.</strong></td>
<td></td>
</tr>
<tr>
<td>9. <strong>EPIPHANY</strong></td>
<td>A sudden understanding. Recognizing an idea that emerges from discussion as something new and of value.</td>
</tr>
<tr>
<td>10. <strong>PD.INVENTION-articulate</strong></td>
<td>articulating what one thinks and feels. It implies reflection and also indicates that people in the group feel free to verbalize their thinking. This also implies &quot;making explicit our own cognitive orientations and processes in relationship to the group goal&quot; (Sherry &amp; Meyers, 1998) Articulation also helps learn and understand new things.</td>
</tr>
<tr>
<td>11. <strong>PD.INVENTION-authentic engagement</strong></td>
<td>When the work starts influencing the way you work outside of the team. Relevance - members see connections between their design work and their current practice or past practice (includes member's experience, knowledge, and skills) Implies when design team members start relying on their team members to enhance their own learning.</td>
</tr>
<tr>
<td>12. <strong>PD.INVENTION-coaching-mentoring-educating</strong></td>
<td>Presenting information to teach, helping people understand by presenting evidence, coaching them.</td>
</tr>
<tr>
<td>13. <strong>PD.INVENTION-collabDesign.brainstorm</strong></td>
<td>brainstorming that results in a decision or not</td>
</tr>
<tr>
<td>14. <strong>PD.INVENTION-collabDesign.Crit</strong></td>
<td>Recaps previous happenings as a group and in the process also engages in reviewing what we had done earlier. This includes critique of our own design rather than someone else's design. It involves Q&amp;A, clarifying people's concerns, and taking feedback. It involves going over the specs.</td>
</tr>
<tr>
<td>15. <strong>PD.INVENTION-collabDesign.Crit.upToSpeed</strong></td>
<td>bringing newcomers, guest, and people coming in late, up to speed with the project work. This also has the added benefit of review for the rest of the group members. It also builds and strengthens shared history, group memory, and invokes design ethos.</td>
</tr>
<tr>
<td>16. <strong>PD.INVENTION-collabDesign.envision</strong></td>
<td>using envisioning the design or doing a &quot;walk through&quot; or creating scenarios and role-playing as part of understanding the emerging design better. also thinking aloud - part of design activity - the act of saying one's thoughts aloud – similar to articulation - it is part of PD</td>
</tr>
<tr>
<td>17. PD.INVENTION-collabDesign.negotiate</td>
<td>an idea is thrown into the group and then the members process it through open discussions before they decide to accept it or not. Negotiate implies a difference of opinion and people's attempt to bridge that difference. It implies making compromises - adapting to each other's thinking. This is done amicably, without arm-twisting. There are no winners and no losers. There is a sense of equality.</td>
</tr>
<tr>
<td>18. PD.INVENTION-collabDesign.planning</td>
<td>planning an activity in collaboration with others. It is working out the details. It deals with planning activities and resources for promoting the software. Has to do with technical design issues.</td>
</tr>
<tr>
<td>19. PD.INVENTION-collabDesign.reflect as a group</td>
<td>although one member is the main speaker, the others chime in, making it a collaborative reflection. This can include debates and discussions. The main thing is that it seems to have an energy of its own and engages the participants' imagination</td>
</tr>
<tr>
<td>20. PD.INVENTION-collabDesign.specs</td>
<td>Involves creating guidelines collaboratively for the software to be designed. Also called &quot;heuristic evaluation&quot; (Nielsen, 1993), which specifies guidelines and standards. Guidelines &quot;provides advice about the usability characteristics of the interface&quot; e.g., ability to return to the previous page Standard &quot;specifies how the interface should appear to the user&quot; e.g., back arrow on the upper left corner of the page</td>
</tr>
<tr>
<td>21. PD.INVENTION-collabDesign.testing</td>
<td>informal testing/debugging of our software by the group - trying it out</td>
</tr>
<tr>
<td>22. PD.INVENTION-collabDesign.troubleshooting</td>
<td>describing how one went about troubleshooting while working/testing with the software. It is similar to usability, except it details the steps taken.</td>
</tr>
<tr>
<td>23. PD.INVENTION-creating shared history</td>
<td>attempt at creating a shared memory or history by narrating to the group what happened in another situation - a situation not shared by the group members. This knowledge then becomes part of the group memory once it is made public.</td>
</tr>
<tr>
<td>24. PD.INVENTION-disagreement</td>
<td>able to express one's disagreement or dissatisfaction</td>
</tr>
</tbody>
</table>
25. PD.INVENTION-grounded in real life | embedded in practice - design is context-sensitive. It is grounded in the real world - the environment that surrounds us all with its demands and complexity. Organizational culture. 
Describing how users work, the steps they take, the reasons for the steps they take, and design to support that workflow. 
Involves drawing upon old knowledge that is embedded in the context - community knowledge

26. PD.INVENTION-humor sarcasm camaraderie | introducing humor to manage tension and create community. It helps: 
1) mediate lack of control over events 
2) decline ideas suggested by others without offending them 
3) break up frustrating moments when no solution is in sight 
4) pull each other's leg gives a sense of comfort and control - they know each other well enough to be able to pull each other's leg 
5) helps create light-spirited, friendly atmosphere

27. PD.INVENTION-individual recognition or affirmation | supporting what a member does by individually recognizing his/her contribution. 
recognizing individual member's contribution

28. PD.INVENTION-meta view | to take the view from above - to identify topics in conversation and articulate it to the group - helps crystallize group's ideas 
also, help conceptualize what the group is going through and its context - think strategically 
revisiting the rationale for the design and building on it. This can also help facilitate in ethos-building - involves critical inquiry

29. PD.INVENTION-mutualLearning | mutual learning - learning from one another - engaging in activities from other domains.

30. PD.INVENTION-negotiate.reframe | Supporting negotiation by recasting what others have said in a different light – reframing what others or the speaker had said earlier.

31. PD.INVENTION-political.lack of authority | shows the speaker/s are following rules over which they have no control and of which they have no sense of ownership acknowledging the difference in status - shows an implicit hierarchy or change in roles
| 32. PD.INVENTION-political.strategizing | an awareness of how to design a successful product in an academic environment. This involves having a research agenda, being aware of the reluctance of making one's work public - privacy issues, and resistance to change. Planning collaboratively how to get the design work to go smoothly and get good quality results. It is ACTING on an awareness that design is a political process. an awareness of power structures in the organization and how to deal with them in order to get a good quality end-product and promote its adoption. also acting with the knowledge of power imbalances in the design team as well |
| 33. PD.INVENTION-seeking consensus or cooperation | attempts are made to seek a consensus among group members - decisions are not taken unilaterally |
| 34. PD.INVENTION-taking initiative | Members take initiative to play an active role in the design. Volunteer to help. |
## APPENDIX B

### List of CIT eDoc Design Team Members

<table>
<thead>
<tr>
<th>Name</th>
<th>Role Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brenda</td>
<td>Active team member. CIT graduate student. Finishing up her Masters degree and applied for the Ph.D. program in CIT. Former elementary education teacher for 19 years.</td>
</tr>
<tr>
<td>David</td>
<td>Senior programmer and systems analyst</td>
</tr>
<tr>
<td>Donna</td>
<td>Active team member. CIT Master student. Hired as liaison between individual eDoc design teams and ITC (Instructional Technology Center) - university web design group.</td>
</tr>
<tr>
<td>Dr. D</td>
<td>Active team member. CIT faculty representative, eDoc and CIT eDoc project leader.</td>
</tr>
<tr>
<td>Dr. S</td>
<td>Guest (visiting faculty from a university in Denmark). Educational Technology faculty. Attended three weekly meetings.</td>
</tr>
<tr>
<td>Dr. T</td>
<td>Guest (visiting faculty from the Agronomy department at ISU). Attended one weekly meeting session.</td>
</tr>
<tr>
<td>Dr. Z</td>
<td>Guest (visiting faculty from university in Virginia, USA). Attended one weekly meeting session.</td>
</tr>
<tr>
<td>Jakob</td>
<td>Active team member for the first half of the design period. Visiting student from Denmark. Returned to home country in December 2003.</td>
</tr>
<tr>
<td>Jim</td>
<td>Guest (senior CIT Ph.D. student). Attended one weekly meeting session.</td>
</tr>
<tr>
<td>Kristin</td>
<td>Active team member. Ph.D. student from the English department and one of the eDoc coordinators.</td>
</tr>
<tr>
<td>Melanie</td>
<td>Active team member. CIT Ph.D. student. 2 years into the program.</td>
</tr>
<tr>
<td>Nick</td>
<td>Active team member. CIT Ph.D. student. 2 years into the program. Research interest in instructional design.</td>
</tr>
<tr>
<td>Rema</td>
<td>Active team member. Senior CIT Ph.D. student. eDoc coordinator, CIT eDoc project manager.</td>
</tr>
<tr>
<td>Richard</td>
<td>Active team member for the first 3 months. CIT Ph.D. student. 2 years into the program. Research interest in instructional design.</td>
</tr>
<tr>
<td>Sophia</td>
<td>Active team member for the first half of the design period. Visiting student from Spain. Returned to home country in December 2003.</td>
</tr>
</tbody>
</table>
The CIT Professional Portfolio

Doctoral students in the Curriculum & Instructional Technology program who have NOT passed the Preliminary Oral Examination need to submit a portfolio and current curriculum vita for the annual review by April 2, 2004.

The portfolio should summarize and document academic and professional progress made during the last calendar year (2003), and it should contain the following sections:

- Foundations – Core Knowledge, Interpretation, & Synthesis
- Application – Mastery of Skills
- Research, Evaluation, & Development – Disciplined Inquiry & Scholarly Work
- Leadership – Professional Engagement & Leadership

The portfolio should cogently communicate your progress in a brief narrative and include a selective sampling of artifacts that illustrate your progress.

[Part-time Ph.D. students (those completing less than 3 courses a year) need to submit a portfolio documenting progress for the last two calendar years (2002 and 2003).

The portfolio will be assessed using the following scale:

- O Outstanding Progress
- G Good Progress
- U Unsatisfactory Progress
- W Withdrawal Required

All portfolios should be submitted to […] (N108 Lagomarcino Hall) by 5:00 p.m. Friday April 2, 2004.

If you have any questions, please refer to the CIT Ph.D. program overview at www.ctlt.iastate.edu/program/overview.cfm then speak with your major professor.
APPENDIX D

CIT Program Criteria

The Professional Portfolio

A professional portfolio is required for all Ph.D. students enrolled in the program. This portfolio is a professional record that represents and documents your learning and growth throughout your program of study starting with a simple portfolio for your first annual review. The portfolio will provide a selective sampling of your work and should be continuously maintained to illustrate your growth as a scholar and professional. You will determine the content and style of presentation for all portfolio submissions based on your work setting, career goals, research and teaching interests. The structure of your portfolio will depend on how you choose to creatively document and reflect on your professional growth and development in each of the areas describe below:

Program Criteria

**Foundations.** Core Knowledge, Interpretation and Synthesis. You are able to accurately capture and reflect on current thinking related to your interests. You join the professional discussion, providing your own perspective on issues and questions. You are able to analyze, re-interpret, and synthesize issues, and frame problems in promising ways. You demonstrate an ability to understand and use research and scholarship from a wide range of traditions.

**Application.** Mastery of Skills. You demonstrate mastery of a range of educational technologies.

**Research, Evaluation, and Development.** Disciplined Inquiry and Scholarly Work. You are able to map out a line of inquiry and begin scholarly work accordingly. This requires a mastery of appropriate research, evaluation, and/or development methods, and a good sense of matching up appropriate methods and tools to your interests.

**Leadership.** Professional Engagement and Leadership. Through various service and professional activities you will demonstrate your skills and commitment to a leadership role in your areas of interest. This may be done through teaching, collaborative projects, innovative research, publications, and roles in which you provide leadership, mentoring, and guidance to colleagues.
On Wednesday, August 27, 2003, at 08:11 PM, Rema wrote:

Hello Brenda and Nick,

I would like to invite you both to join the CIT E-Doc design team. Melanie has already agreed. Thanks Melanie! Currently we are 3 in the team – Dr. D., Melanie, and myself. Below is some information on the project and a general description of how you could help us.

We are a part of a group of 5 colleges (Engg, FCS, LAS, Ag, and COE) who were awarded money from the CAC grant for creating campus-wide e-portfolio themes. Since the CIT Ph.D. program requires every student to present annual portfolios, we've decided to use this opportunity to design and develop a prototype to facilitate the creation of a CIT e-portfolio. Also, I hope to study the design process as the main focus of my dissertation research.

I'm in the process of forming a design team to help us develop the design specifications. We also hope that with your help (if you choose to join us as designers) we will be able to standardize some of the diverse terminology rampant in this area and create for us a common language to facilitate communication.

The members of the design team will participate fully or at whatever level they feel confident or is convenient to them. We're hoping this experience will benefit the members get familiar with developing their own portfolios.

We are planning on meeting every week for one hour. If you are interested please email me asap. Our first meeting will be either Tuesday or Wednesday morning next week. Let me know if it works for you.

Thanks a bunch!

Rema
APPENDIX F

CIT eDoc Usability Testing

Thank you for volunteering your time to test the CIT eDoc software. Your feedback is very valuable and will be used specifically for further improvement of the software. Your name will be kept confidential. We have listed below information and instructions for testing.

The electronic portfolio application (called eDoc channel) is integrated with the uPortal, an open source technology that helps individual users create their own personal view of their university on the web. ISU uPortal is called myIowaState and helps you create your own customized view of ISU. It functions like other portals such as Yahoo, Netscape, etc., where you can “add” channels such as News, Horoscope, Sports, etc. to your portal.

For this test, you will be creating your CIT portfolio (called CIT eDoc) with 3 artifacts and associated reflections. In addition, you will add an introduction to your portfolio, enter your student info, and upload your vita.

There are two stages to create your CIT eDoc and use it as a collaborative tool.

- First, you will enter the uPortal, create a new portfolio, personalize and share it with others.
- Second, you will access and engage with other students’ portfolios.

Create portfolio

1. To log into myISU, add an eDoc channel:

2. Go to https://portal.iastate.edu/uPortal. You may, if you wish, review tutorials on the uPortal at this location.

3. Login using your ISU NetId and password

4. Click on Personal tab above the page. You will see the eDoc channel identifiable by the icon [ ]. Click on Create Portfolio [ + ]. Enter a name for your portfolio, select CIT Theme for Portfolio type, and click on Create. In case you don’t see the eDoc channel, follow steps 4-7.

5. Click on Preferences on the upper right corner.

6. Click on “Personal” tab in the graphical layout. The tab changes color. Click on New Channel.

7. Select Applications category and click Go. Scroll down to Personal Portfolios for the choice of the channel. Click Add. Please note the tab (location) of the portfolio channel – make sure it is under Personal. You can always delete the channel and repeat steps 4 and 5. Close Preferences by clicking [x] on the upper right corner of the Preferences page.

8. Click on Personal tab. Click on Create Portfolio [ + ]. Enter a name for your portfolio, select CIT Theme for Portfolio type, and click on Create.
Personalize and share CIT eDoc

Once you’ve set up your portfolio, it is time to enter and edit it. Make sure you have access to all necessary files such as your vita and artifacts before starting with the second stage. Whenever you are unsure of your next step, just move your cursor over the different icons on the page to see their descriptions.

Please perform the following tasks:

1. After entering your portfolio respond to the Conditions of Use document.
2. Enter your Introduction.
3. Similarly, enter your Student Information.
4. Upload your vita. Please note you have to first upload all necessary documents to the repository [ ] by clicking on it before you link or add them to your portfolio.
5. Upload artifacts and associated reflections. (Remember, you should first upload your artifacts to the repository before you can link or add them to your portfolio). You are required to type in a brief abstract (150-300 words) for your reflection.
6. Please upload artifact files in 3 different formats such as, Word, JPEG, and html and place them in their appropriate cells.
7. Start a discussion thread on one of your artifacts.
8. Once you are satisfied with your portfolio share it with one of your colleagues and/or professors by clicking on Share [ ]. Assign appropriate permissions.
9. Close your portfolio

View other’s portfolio

Once you are done working on your portfolio you can access and engage with other students’ portfolios that have been released to you. (Note: you can do this even before starting work on your portfolio from inside the eDoc channel)

1. Click on the Share icon to view portfolios released to you.
2. Enter any one portfolio.
3. View one artifact and start a discussion on it.
4. Close the discussion area and return to the eDoc channel.

You are done with the testing. Thank you for your time and interest. We will make changes based on your feedback and contact you for a follow up round of testing. Please let us know if you have any objections and we will do our best to address your concerns.

Thank you!

CIT eDoc Usability Testing Team
APPENDIX G

*Code Frequency*

*(Sept 9, 23, 30; Oct 7, 21, 23; Jan 20; April 6)*

<table>
<thead>
<tr>
<th>Code Description</th>
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<tr>
<td>1. PD.INVENTION-collabDesign.Crit</td>
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<tr>
<td>2. PD.INVENTION-articulate</td>
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<tr>
<td>3. PD.INVENTION-collabDesign.specs</td>
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<td>4. PD.INVENTION-meta view</td>
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<tr>
<td>5. PD.INVENTION-collabDesign.negotiate</td>
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<tr>
<td>6. PD.INVENTION-creating shared history</td>
<td>68</td>
</tr>
<tr>
<td>7. D.CONVENTION-present reports or share information</td>
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<tr>
<td>8. PD.INVENTION-collabDesign.envision</td>
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<td>9. PD.INVENTION-grounded in real life</td>
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<td>11. PD.INVENTION-humor sarcasm camaraderie</td>
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<td>15. D.CONVENTION-meeting protocol</td>
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<td>16. PD.INVENTION-collabDesign.reflect as a group</td>
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<td>17. PD.INVENTION-collabDesign.Crit.upToSpeed</td>
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<td>18. PD.INVENTION-individual recognition or affirmation</td>
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<td>19. PD.INVENTION-political.strategizing</td>
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<td>24. PD.INVENTION-seeking consensus or cooperation</td>
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CHAPTER 4. CRITICAL DISCOURSE ANALYSIS OF USER-DESIGNER NEGOTIATION IN PARTICIPATORY INSTRUCTIONAL DESIGN

To be submitted to the journal: Linguistics & Education

Rema Nilakanta

Abstract

This study uses Critical Discourse Analysis (CDA) (Fairclough, 1995), a research approach from sociolinguistics and influenced by critical theory, to examine how users (Ph.D. students and faculty) working as designers (also called user-designers) use language to successfully build design specifications for their own electronic portfolio system whose main goal is to support the annual assessment of Ph.D. students’ progress. The study critically analyzes user-designer conversations from the first year of an ongoing participatory design project involving Ph.D. students and faculty in the Curriculum and Instructional Technology program at a US university. Analysis indicates a strong use of modality, cohesion, and intertextuality, which seems to have helped support a critical, democratic, and constructive environment for creative design work.

Introduction

Instructional Design (ID), a field that deals with the systematic design, development, implementation, and evaluation of instructional material in teaching and training (Gustafson & Branch, 2002), is better known for its likeness to engineering than to design practice (Smith & Ragan, 1993). ID stems from systems engineering and behavioral psychology (Molenda, 1997) and, for the most part, views design as a rational and controllable act based on behavioral and cognitive theories of learning and instruction. Critics of traditional ID have accused it of lacking in humanistic and critical perspectives (Carr-Chellman & Reigeluth, 2002; Hlynka, 2004; Reigeluth, 1997; Wilson, 2005).

This article assumes a critical stance. A critical perspective tends to problematize the subject of study in order to improve upon it through change and transformation (Nichols & Allen-Brown, 1996). A critical approach achieves its ends by challenging current practice and unearthing its underlying beliefs and assumptions. Although communication is intrinsic
to ID, (including communication among designers, communication between designers and clients), it is rarely studied. The closest ID comes to studying social interaction is in the *design* of instructional material, i.e., ID studies social interaction as the *object* of design rather than as an integral part of the design process. In contrast, this study examines the communication among user-designers who are users engaged in authentic design work while designing their own work tools. In particular, this article presents a pioneering study on the “language” of negotiation; it examines negotiation among design team members during a participatory ID project.

Negotiation is intrinsic to design activity, especially to participatory design that calls for a high degree of collaboration among different stakeholders. The activity of negotiation presupposes communication but also differs from other forms of communication such as problem solving or decision-making. It entails “two or more interdependent parties who perceive incompatible goals and engage in social interaction to reach a mutually satisfactory outcome” (Putnam & Roloff, 1992, p. 3). Negotiation is therefore a social as well as a political activity since it forces participants to engage in social interaction and employ tactics in order to go beyond their perceived differences and toward a mutually agreeable solution.

The term “political” assumes a concern with social power and its distribution among negotiating parties (Gee, 1999). Some scholars argue there exists a direct co-relation between conditions conducive to productive negotiation and perceived differences in power. Zartman & Rubin (2000) note, “contrary to received knowledge and experimentation, it appears that … perceived asymmetry [of power] is the more productive condition for negotiation, whereas perceptions of equality actually interfere with efficient processes and satisfying results” (p. 271). The authors contend the reason for this seeming paradox is that in the absence of asymmetry, “other considerations, distractions, and ideologies get in the way, making the process [of negotiation] more protracted than ever” (p. 272).

A study of negotiation therefore presupposes an investigation into power distribution and its impact on the negotiating parties. With respect to design, particularly participatory ID as is the case in this study, an examination of negotiation would imply a study of power distribution among members of the design team and its impact on individual members as well
as on the whole design team. A detailed description of study’s purpose and its value to ID scholarship is presented in the next section.

**Study Purpose, Value, and Organization**

This study aims to focus attention on ID’s communicative aspect. Specifically, the study aims to critically examine user-developer discourse (interactional talk) during the user requirements elicitation phase in the participatory design of an electronic portfolio system at an institution of higher education.

**Research Questions**

Two research questions govern the study:

1. How did users and designers negotiate their way through a successful participatory ID project? In particular, how did participants use language to negotiate power differences during user requirements phase? Or conversely, how did language help “frame” participant’s perspectives during design work?

2. What linguistic forms did user-designer negotiations assume in the participatory ID project? Or, how can language be characterized in a participatory ID project?

This study can be considered a microanalysis of my previous work (Nilakanta, 2006b) that explored the anatomy of a successful participatory ID project in an educational context. The study involved faculty and graduate students in developing design specifications for an electronic portfolio system in the Ph.D. program of Curriculum and Instructional Technology. The main purpose was to support an annual review of Ph.D. students’ progress, and secondarily to provide an alternative to the traditional preliminary examination that Ph.D. students in U.S. universities are required to pass in order to qualify to undertake doctoral research work. The study lasted one year and entailed identifying critical factors of the participatory design process. The findings highlighted five main principles: 1) *transparency* (keeping design work transparent to all members in the design group), 2) *design ethos* (invoking group’s design ethos during design work), 3) *community* (creating and maintaining a sense of community), 4) *contextual design* (embedding design in user practice), and 5) *recursive design* (allowing for continuous evaluation of design). Each of these principles presupposes negotiation to a greater or lesser extent.
This study investigates the role of language in the same design project. It employs Critical Discourse Analysis (CDA) (Fairclough, 1995; Rogers, 2004a), a research approach originating from critical studies and sociolinguistics to critically analyze language use during user-designer meetings.

**Study Value**

The study enhances current ID scholarship on two fronts. First, it tackles a topic not frequently discussed in ID, vis-à-vis, the study of communication in ID practice, and specifically, the role and importance of negotiation in ID. It explores the linguistic expression of negotiation. Second, the study introduces a new concept and research approach in ID, namely CDA. The study presents ID practitioners a meaningful case of CDA by applying its principles in an authentic context.

**Article Organization**

The remainder of this article is organized into 5 sections. The first section, *Literature Review*, presents a brief review of studies on user-developer communication, mainly in Information Systems (IS) and Human Computer Interaction (HCI), due to a paucity of such studies in ID. This section also includes a description of CDA, the analytical framework used in the study. Section two, *Research Design*, includes a description of the context and the participants, data collection methods, and steps used in analyzing the data. The third section, *Analysis and Findings*, describes and analyzes language use in two face-to-face meetings; one with student-user-designers and a faculty member as active participants and the other with only student user-designers. The analyses attempt to highlight critical instances of negotiated decision-making and study their linguistic expressions. The fourth section, *Discussion*, expands on the findings and discusses their relevance to established theories of professional practice (e.g., Schön, 1983) and negotiation (e.g., Zartman & Rubin, 2000), and the fifth and final section, *Conclusion*, synthesizes the main argument of this article.

**Literature Review**

Designer-client communication is central to ID work. In a recent review that aimed to find “what evidence there is that instructional designers are applying ID Models in their work, as well as to establish what other activities and processes they might use in their professional activities,” Kenny et al. (2005) noted that although instructional designers
follow ID models – a major focus of ID curricula in U.S. universities – they do not do so rigidly. The survey also revealed that designers’ main work consists of communicating with their clients. In fact, communication with clients was noted as the number one responsibility and challenge for designers as perceived by the designers. “The first challenge was working effectively with clients, guiding them through the design process, describing the problem to be solved, and helping them to make the right decisions based on the project’s needs” (online).

Despite such evidence, there is scant research on client-designer communication in ID. A search on ERIC using keywords “discourse analysis” and “instructional design” generated 91 hits, out of which only three were relevant to this study; these constituted studies using discourse analysis or narrative theory to guide and improve the design of educational software and online learning (Voithofer 1999, 2003) or to understand the impact of technology integration on teacher practice (Li, 2002). Literature on discourse analysis of user-designer communication in ID was almost non-existent.

However, due to the close similarity between ID and software design (Ingram & Maher, 1989), this review included user-developer communication studies in the fields of HCI and IS. These studies typically focus on the user requirement elicitation phase, which entails gathering information on users and the context of design. This is considered a crucial and the most challenging phase in the development of information systems (Bostrom, 1989; Valenti, Panti, & Cucchiarelli, 1998).

In ID, the user requirement phase is popularly known as needs analysis or needs assessment and is also considered a critical step in the development of instructional materials (Dick & Carey, 1996; Braden, 1996). A comprehensive needs analysis provides the basis for undertaking ID in the first place and helps identify the instructional problem and/or goal. “Perhaps the most critical event in the instructional design process is identifying the instructional goal. If done improperly, even elegant instruction will not serve the designer’s real purpose” (Dick & Carey, 1996, p. 15). Advocates of traditional ID seem to believe identifying goals and coming up with solutions can be handled effectively through systematic analysis of the instructional context (Braden, 1996; Dick & Carey, 1996; Merrill et al., 1996.).
However, goal identification in teaching is not always straightforward. New ways of teaching that stress authentic problem-solving and greater learner control obscure instructional contexts making problem decompositions problematic (Jonassen et al., 1997, You, 1993). In addition, instruction/teaching, as an integral part of educative practice, implicates multiple stakeholders with different and often conflicting needs and goals (Nilakanta, 2006a). Such complexity makes goal identification challenging and requires new research approaches to systematically study and uncover hidden beliefs and assumptions that impact design of instructional material.

Similar challenges exist in software design field as well. Citing earlier IS studies, Valenti et al. maintain there are three main obstacles in eliciting user requirements, namely the within, among, and between obstacles. The authors explain:

The “within” obstacles are those cognitive and behavioural [sic] limitations within the individual as for example human information processing limits, motivational aspects, and so on. The “among” obstacles are those which require a ‘referee’, i.e. those that arise when two or more users express needs that are inconsistent or that conflict either in content or priority. “Between” obstacles are those that occur between a user and a system developer including both psychological limitations and communication obstacles. (p. 51).

Regarding the “between” obstacle, Bostrom (1989) argues, the user requirements phase entails negotiating different “frames of reference” between users and developers. Each group (users and designers) “frames” the world in their own way expressing it in their own “language.” Bostrom observes, “users have domain specific knowledge and use the vocabulary of their domain, whereas developers are familiar with information requirements methodologies used to extract domain knowledge from users and use the vocabulary of systems development” (p. 281). This difference in worldviews makes the activity of eliciting user requirements a challenge. Alvarez (2002) agrees and adds, “requirements determination is considered a process fraught with conflicting, inconsistent and competing viewpoints in which users and analysts do not share a “consensual domain,” thus barring them from reaching agreements about requirements” (p. 85). This often results in failed design projects that do not address user needs (Kuhn, 1996).
IS scholars have addressed the above problem by developing a plethora of software tools to help designers elicit, formalize, and validate requirements (Valenti et al., 1998) and less frequently, by applying research approaches from other disciplines to help developers analyze user requirements and build systems more attuned to client’s needs. One such approach is known as Critical Discourse Analysis (CDA).

**Critical Discourse Analysis (CDA): The Analytical Framework**

CDA stems from the traditions of critical theory and systemic functional linguistics (Halliday, 1978). Critical theory concerns itself with the abolition of social injustice; its main aim is to critique and transform society. Systemic functional linguistics (SFL) focuses on the relationship between linguistic form (phonology, morphology, syntax, and semantics) and function of language (language in use). According to Rogers (2004b), “although it [SFL] accounts for syntactic structure of language, it places the function of language as central (what language does, and how it does it)” (p. 8).

In their comprehensive literature review of CDA, Rogers et al. (2005) argue that CDA move[s] beyond description and interpretation of the role of language in the social world, toward explaining why and how language does the work that it does. Critical discourse analysts begin with an interest in understanding, uncovering, and transforming conditions of inequality. (p. 369)

CDA thus goes beyond studying language as an expression of psychological motivations and skills of individuals impacted by their social context. It concerns itself with the study of language as social practice or as *orders of discourse* (Fairclough, 2004). According to Fairclough, an order of discourse is:

a network of social practices in its language aspect. The elements of orders of discourse are not things like nouns and sentences (elements of linguistic structures), but discourses, genres, and styles…These elements, and particular combination or articulation of these elements, select certain possibilities defined by languages and exclude others – they control linguistic variability for particular areas of social life. Thus, orders of discourse can be seen as the social organization and control of linguistic variation. (p. 227).

Fairclough’s three-tiered framework defined by: *Genre* (ways of acting), *Discourse* (ways of representing), and *Style* (ways of being) is popular among educators and linguists
interested in the study of language as social practice. The three dimensions of Genre, Discourse, and Style work at the local, institutional, as well as the societal level resulting in continuous analysis at the micro (local) and the macro (institutional and societal) level. These dimensions intersect with one another closely and simultaneously.

Fairclough’s linguistic constructs of Genre, Discourse, and Style correspond to Halliday’s (1978) constructs of Mode, Tenor, and Field, respectively in his linguistic model. Please refer to Roger’s (2004c) table in Appendix C illustrating Fairclough’s CDA framework and its relationship to Halliday’s model.

**Genre** (Halliday’s “Mode”) refers to different ways in which people act and interact through language. It addresses questions such as what are the obvious patterns in the sample and does the sample draw upon other genre? Interviews, sermons, lectures, are examples of different types of genres. Hence, when designer-client or user-designer conversations are characterized as a formal interview or an informal friendly chat, it alludes to the category of genre. Genre refers to the textual function of language and is characterized by grammatical and conversation markers such as, cohesion, repetition, politeness conventions, revoicing, parallel structure, and turn-taking. Please refer to Appendix D for Roger’s notes and tips on linguistic markers compiled from the works of leading CDA scholars.

**Discourse** (Halliday’s “Tenor”) refers to the way people represent themselves in conversation. It plays out at a higher level than Genre and addresses questions such as, what roles get actualized in the conversation, what is the information shared, how is it shared, what perspective dominates the conversation (see Appendix D)? Pronoun usage, level of formality of language, the “tenor” or tone of the conversation becomes the focus of analysis in Discourse. This level therefore, deals with the interpersonal function of language. In the context of instructional or software design, it would indicate the “tone” and “frames of reference” adopted by designers and clients during the design process.

**Style** (Halliday’s “Field”) refers to individual style of the interlocutor or the writer – the way a particular person uses language and how that represents his/her view of reality. It deals with values and ideologies. Style refers to the construct of *transitivity* or the ideational function of language. Grammatical markers include words indicating relational and action processes. In relational processes “the verb marks a relationship (being, having, becoming,
etc.) between participants [elements in clauses], and [in] action processes .. an agent acts upon a goal” (Fairclough, 1992, p. 178). Other markers are voice and nominalization techniques – using passive/active voice and converting verbs (processes) into nominals (states). The use of passive instead of active voice and nouns instead of verbs impresses upon the reader a certain relationship between the speaker and the utterance, and therefore between the interlocutors.

Thus, CDA works at different levels, moving from the concrete to more abstract levels affording a micro as well as a macro perspective on the research problem at hand. Alvarez’s (2002) study on the social interaction between users and developers is an example of the power of CDA to unearth hidden assumptions and perspectives of self and work.

Alvarez (2002) used CDA to “examine requirements analysis as a polyphonic [using multiple voices] interaction” (p. 85). She documented in the form of a case study the selection process for a new information system at a large U.S. university. Her aim was to study the negotiation of power and identity between system developers and users. The data were collected through participant observations of user requirement interviews, which resulted in 69 hours of tape recordings and field notes. Study findings showed a clash between developer’s technological frame representing the organizational view and user’s personalized frame representing the employee/worker view. It also highlighted the domination of designer perspective over user perspective. In addition, CDA helped uncover the internal conflicts experienced by women users (staff members) who “as professional information worker … are required to be detached from emotional concerns, [but] as caring (women) workers they are concerned about the well-being of their clients” (p. 102).

In spite of its effectiveness in other fields, CDA is not as popular in education (Roger, 2004b). Therefore, this study’s adoption of CDA to examine ID work, brings a new perspective to traditional research on the role of language in teaching and learning. The next section, Research Design, describes the context and methodology implemented in this study.

**Research Design**

As noted earlier under Study’s Purpose, Value, and Organization, this work provides a new look at a participatory ID process already studied comprehensively in my earlier work (Nilakanta, 2006b), which provides a detailed description of the design project referred here.
For this paper, I have provided a brief synopsis of the project below along with a description of data collection and data analysis methods.

**Context and Participants**

The context for this study involved an electronic portfolio design project in the Curriculum and Instructional Technology (CIT) Ph.D. program at a large Midwestern university in the U.S. A group of graduate students and faculty members built design specifications for an electronic portfolio system to facilitate the annual review of Ph.D. students during their degree program. The annual review process was relatively new in the program and had gone through two iterations. Both times many students had submitted portfolios, but faculty had not provided timely feedback to all the students. The main reason for this problem lay in the diversity of portfolio formats and their organization. Each portfolio was unique in format (print, digital, and/or web-based) and its structure was determined by student’s interpretation of the brief guidelines on the review process. As a result, faculty members were overwhelmed and were unable to evaluate the portfolios in an effective and timely manner. Innovations often result in such confusion (Rogers, 2003).

Around the same time, in-house funding from student computing fees became available for developing innovative campus-wide projects to promote student learning and address students’ evolving computing needs. In addition, there was appropriate technology and technical expertise available at the university level to support such innovations. A multidisciplinary group consisting of faculty, staff, and graduate assistants (including the author) from the university availed of this opportunity and proposed to build an electronic portfolio system for the university, which students could use to present artifacts (individual pieces of their work) as evidence of their learning and also help departments and colleges use this information to improve their program. The project was called *The eDoc Project*. Each team in the eDoc project was required to build design specifications for their respective portfolio theme/interface.

A CIT faculty member who became the leader of the CIT eDoc team suggested building an eDoc theme to facilitate the CIT annual review process. It would be based on clearly-defined program guidelines with the goal of making the annual review process more efficient and effective for faculty and students. There was partial agreement among faculty
members, since some questioned the value of a portfolio as an assessment tool and were also concerned with the potential for additional workload for faculty and students (personal interview, August 2006). However, a group of CIT faculty agreed to the proposal of designing a CIT eDoc theme for annual review. The CIT group thus became part of the university-wide eDoc project and this project came to be known as the CIT eDoc Project.

To be noted here is that in the beginning, the CIT eDoc design team began to draw design specifications for the prelim portfolio but later had to change course and focus on the annual review portfolio design instead. The change was based on the fact that the annual review process had been made mandatory for all CIT Ph.D. students who had not yet passed their prelims. With respect to eDoc development, this would ensure prototype testing of the annual review eDoc. On the other hand, the prelim portfolio was left to the discretion of the student’s Ph.D. committee. Students could either take the traditional prelim examination, or create a prelim portfolio, or do a combination of both. Therefore, the user group would have been smaller and prototype testing would likely have become problematic.

Inspired by research on participatory design (Schuler & Namioka, 1993) and following its principles of democratic involvement of users in design, the faculty leader of CIT eDoc in collaboration with me, her graduate assistant and author of this article, decided to engage a diverse group of end-users, i.e., CIT faculty and students, to design the CIT eDoc portfolio. It was believed that engaging end users in the design of the technology would enhance its quality and facilitate its diffusion in the doctoral community.

The CIT eDoc design team consisted of eight graduate students, one faculty representative who also served as the team leader, and the systems developer. As a CIT Ph.D. student with interest in instructional design, I, the author, became part of the design team. My role was that of a designer and project manager in this design team and I also lead the coordination of the university-wide eDoc project. I worked with my team members to develop design specifications and also took care of the daily operations of the team and the project work. Furthermore, I researched the participatory design process simultaneously as part of my dissertation. Thus, my roles included that of a designer, project manager, and a researcher.
The design work began in September 2003. The group met every week for about an hour for the first year. Meetings were held in a democratic, friendly, and professional manner. The sessions were open to the whole CIT community but were mainly attended by the core group. As the project manager, I emailed a draft agenda to the group the previous week. Each meeting started with sharing new information in the group, followed by a review of decisions taken at the previous meeting, a review and further development of CIT eDoc work in progress, and concluded by planning for the following week. Participants took turns facilitating the meetings. Within one year (by March 2004) we were able to provide design specifications for the envisioned CIT eDoc annual review portfolio to our technical expert who developed a prototype, which was successfully tested with three CIT Ph.D. students. Based on the feedback from testing, we further revised our design. While the development of CIT eDoc annual review is still ongoing, this study focuses on the first year of design and revision.

Data Collection

Data for this study was collected from a variety of sources. These were transcripts of weekly face-to-face meetings, individual interviews with CIT designers, a focus group session, archived documents emerging from the work of the design team, and my research journal on the evolving design of CIT annual review, group interactions, and changes in my understanding of portfolios in general and the participatory design process. Transcripts of weekly meetings however constitute the primary source of data for this study since I was interested in the use of language in face-to-face user-designer communication. The other sources of data were used to triangulate the findings.

I recorded and transcribed weekly meetings the same week and jotted down observational and interpretive notes to myself (Nilakanta, 2006b). The sample selected for this particular study constitutes two excerpts from two specific meetings on September 16 (Appendix A) and October 7, 2003 (Appendix B) to afford an in depth look at the negotiating process. Three points informed the selection: 1) The two passages come from weekly design team meetings and represent negotiated decision-making, which was the norm in this group (Nilakanta, 2006b), 2) The two instances of negotiation permit comparison of different stakeholders with differing status in the CIT program: the first sample (September 16, 2003)
includes the faculty member as an active participant in the conversation, while in the second sample (October 7, 2003) the faculty member is absent and the discussion involves only student designers consisting of CIT graduate students and visiting international Ph.D. students in ICT (Information and Communications Technology). 3) In addition, these two meetings represent two instances of productive negotiation (Zartman & Rubin, 2000) that gave rise to new design ideas and/or new user perspectives on their practice, which was frequent in the earlier phase of CIT eDoc design.

**Data Analysis Method**

The linguistic analysis was modeled on Rogers’ (2004d) approach to critical discourse analysis. Below is a description of steps taken to analyze data and ensure reliability.

I used the constant comparative method (Glaser & Strauss, 1967) for analyzing my data. The analysis of the first passage helped me start a codebook, which was refined with successive cycles of analysis (Appendix E). As part of achieving inter rater reliability, I had a faculty well versed in discourse analysis review my work.

In order to “unpack” the complexity of language in use, I broke down sentences into individual clauses. Hence, my unit of analysis was the clause. Each clause formed a new line and I numbered each line. During the first three cycles of analysis I analyzed each clause for its linguistic function (textual, interpersonal, and ideational) and for its genre (ways of interacting), discourse (ways of representing), and style (ways of being). I ran a frequency count on linguistic strategies undertaken by design team members across my data samples. My next step was to examine the function of these strategies. I looked for patterns that arose from the intersection of genre, discourse, and style (order of discourse), and further the intersection of orders of discourse that emerged when I compared across the data sets. This highlighted ways in which language helped team members navigate their way through design work while also attending to individual sensitivities and to each other’s role in the group (see codebook in Appendix E).

To enhance accuracy and trustworthiness of my study, I shared my findings and interpretations with participants and made changes based on their feedback and after coming to a common understanding with them.
Analysis and Findings

The main purpose of the study was to understand how design team members used language to negotiate power differences during user requirements phase of a successful participatory ID project and conversely, how language framed member’s perspectives during design work. In other words, the study focused on the co-construction of language and individual identities. In addition, it also tackled linguistic forms and linguistic variability characterizing design team members’ language during design work.

As mentioned in Data Collection, the data consisted of two excerpts that originated from two different meetings, specifically September 16 and October 7, 2003. In the following section, I discuss and compare the two passages individually based on the two research questions governing this study. Although the analysis contains relevant quotes from the respective passages, readers are advised to use a separate copy of Appendices A and B for reference as they review this section. Results from the analysis of the first passage are presented first.

Analysis of September 16, 2003 CIT eDoc Design Team Meeting (students and faculty)

The excerpt (Appendix A) selected from the September 16 meeting, the third meeting for the CIT eDoc design team, represents an ongoing discussion on the design of the CIT prelim portfolio. The discussion includes the faculty team leader (F) and three student designers (S1, S2, and S3). The conversation takes place mainly between the faculty member and student S1. The other two students emerge as “allies” of S1 in the course of the discussion and provide strategic support.

The passage resembles a debate - a characterization that portends the power struggle as team members work together. The design conversation can be broken down into four distinct phases: 1) establishing a topic, 2) debating the topic, 3) reaching a resolution, 4) creating a new topic. These phases resemble Florio-Ruane & de Tar’s (1995) dialogue model.

1) Establishing a Topic (lines 1-9)

The discussion begins with F asking student designers to visualize a prelim portfolio that has been graded as passed. Although this is part of an ongoing brainstorming session on building a useful glossary for a prelim portfolio, this particular topic concerns specifically
what happens once the prelim portfolio has been assessed. Hence, it is an attempt by F to establish a new topic – a topic that conveys a complex design idea of blending two seemingly contradictory functions, namely, of archiving the portfolio but still keeping it editable for future use.

Also to be noted in lines 1-9 is F’s use of the pronoun “you” to represent the CIT student body, which also has the involuntary effect of distancing F from her students (“You’ve got a prelim portfolio that is passed. It would be nice actually if you had some document to add to that.”). Furthermore, lines 1-9 show F in the traditional teacher role with her in control of the direction and nature of the conversation.

As part of the discussion F makes suggestions and seems to seek feedback on her idea of keeping the portfolio open and alive even after it has been assessed so that students can continue to edit it. The request for feedback is implicit (see line 3 – “It would be nice actually if you …”) in the use of the modal verb “would” and the adverb “actually.” The use of modality in clauses creates low “affinity” (Fairclough, 1992) to propositions distancing the speaker from the proposition. This has the effect of opening up the conversation for others to join in. This is seen in S1’s enthusiastic interjection (line 4). The adverb “exactly” coheres the preceding argument resulting in an “invitation-acceptance” exchange.

2) Debating the Topic

The major portion of the conversation constitutes a debate (lines 10-33). The first signs of a debate can be seen in line 10 (“But there should be a way also …”). There is an attempt to create a shift in power. The conjunction “but” indicates a disagreement with the preceding proposition. However, the tone is non-confrontational and friendly. Once again, this effect is achieved by the modal verb “should” in line 10. The modal verb usage indicates a personal belief on the part of S1 rather than an authoritative mandate and therefore seems to be less severe. It communicates S1’s belief about the role of portfolios. She believes a portfolio evolves with the individual and hence should not be archived and put away. It should remain alive and relevant. She finds support for her idea in S2 and S3, who defend the concept further under F’s continued questioning. These lines highlight two distinct frames of reference: the administrative viewpoint represented by F and the individual learner’s viewpoint represented by the students.
The conversation includes instances of reframing (lines 19, 21-22, 28-29). Reframing typically serves as a transition strategy to change the nature and direction of the talk (Sarroub, 2004). S1 attempts to redirect the argument from the administration of the prelim portfolio to its role in supporting student learning. These instances of reframing once again foreground two different discourses – the administration discourse and student discourse.

The analysis also shows a gradual change in focus/theme from the portfolio to the student. In the beginning of the excerpt, the portfolio occupies the end position of the clause representing the rheme (new information) and the student occupies the beginning of the clause and represents the theme (the given or old information) (line 2 - “you’ve got a prelim portfolio …”). The conversation then veers to the portfolio as the given, as something that the student is left with, and over which s/he has no control. In line 11, S1 attempts to personalize the portfolio by naming it as “my portfolio.” However, the attempt is not taken up by F or S2, and the portfolio regains its position as the theme of the proposition (lines 15-17 “since then it’s [the portfolio] is moving to a different purpose…”). It is not till line 19, that we see a change in direction and tone. S1 attempts to articulate her intentions clearly and firmly. She takes control of the conversation and turns the perspective around to the student (line 29, “what I’m saying is that it needs to be interwoven with my Progress…”), which seems to result in new support (S3, line 31) and eventually leads to a resolution.

3) Reaching a Resolution

The resolution seems to take place quickly soon after S3’s answer (line 31). It involves F adopting students’ suggestions and thus implicitly relinquishing her earlier position. This is followed by an explicit acceptance of student’s position (line 36). However, F still holds on to her role as the teacher or the mentor. This is evidenced by the Initiate-Response-Evaluate (IRE) discourse pattern seen in lines 30-36. IRE pattern is typically found in traditional classroom teaching where teacher initiates a response from students by posing a question, student responds, and teacher evaluates. This pattern of talk is found to suppress dialog and learning (O’Connor & Michaels, 1996).

However, in this sample, F’s evaluation can be considered a transformation of her perspectives as well as an evaluation of students’ suggestions. The transformation is seen in the shift from “you” to “we” (line 34, “Then we need another screen.”) and the fact that her
succeeding utterances (lines 39-40) seem to build on student’s suggestion of linking the prelim portfolio with the annual review portfolio that she had argued against in the beginning. Furthermore, F seems to see herself as part of the community of portfolio users (note her use of “we” instead of “you”). Although analyzing the passage alone does not indicate, but a verifiability check showed that this transformation was a conscious act that occurred as F tried to “move through different perspectives on purpose to help visualize the design in action” (member checking feedback, August 13, 2006).

4) Creating a New Topic

The resolution paves way for a new topic. Once again, this occurs gradually and seamlessly. Strengthened by unanimous support from her team members, S1 expands on her idea of a portfolio that would evolve with student’s progress in the CIT program (lines 37-38). However, F, continuing to act as a mentor, draws attention to the fact that this would change the purpose of the portfolio from an assessment to a career portfolio. The topic of different purposes of a portfolio is a new topic as seen in line 42 “Should this portfolio serve all those purposes?” As a new topic “all those purposes” occupies the end of the clause, a position meant for new information/rheme and “the portfolio” constitutes old information/the theme.

One of the outstanding features of this dialog is the dominating impact of modality. There is generous use of modal verbs (would, should, need, could, seem) and words that imply ambiguity, probability, desire, and obligation (perhaps and conditional clause). Along with modality, there is abundant use of cohesion strategies making the argument strong and clear. The next passage, a conversation between student designers only, presents a different picture.

Analysis of October 7, 2003 CIT eDoc Design Team Meeting (students only)

A critical analysis of October 7 meeting (Appendix B) indicates marked differences from the previous passage. This excerpt represents a dialog among student designers (S1, S2, S3, S4, S5, and S6) in the absence of the design team faculty member. Some of these students are same as in the previous excerpt. The meeting is facilitated by S4 and the design team is critiquing the mockup, version 5 (Figure 1), of the annual review portfolio design.
Figure 1. Graphical interface of CIT Annual Review mockup version 5.

The passage represents a critique of the artifact grid that will display a list of artifacts (pieces of student’s work) included in the portfolio. Criticisms regarding the artifact grid deal mainly with its large size and appearance. Because there were significant pauses in the dialog, these are noted in the transcript by numbers in parenthesis denoting seconds and the alignment of the beginning of the lines indicates points of interruption.

This excerpt has three distinguishing features: 1) genre ambiguity, 2) intertextuality, and 3) protracted negotiation without a clear resolution.
Genre Ambiguity

In contrast to the previous episode, this passage cannot be easily characterized as representing a specific genre. It is best described as an example of a discussion that includes brainstorming, debating, and arbitration. Moreover, the passage cannot be neatly broken down into clear phases of dialog development. It goes through stages of establishing a new topic, debating the topic, and then the conversation veers off into a new topic. In addition, participant roles fluctuate and power seems to pass back and forth between members.

The discussion has a clear starting point; S1 invokes CIT eDoc faculty member’s suggestion from an earlier meeting about applying the grid in the prelim portfolio, and proposes the artifact grid is not necessary for the annual review (lines 46-53). He presents his ideas tentatively in the beginning (note the use of “I think” in line 46. “I think when F was suggesting about this grid thing, she was more concerned about …”). His utterance implies clearly that the proposal is his interpretation of F’s idea. But his tone soon gains in authority and he states categorically that the criteria labels are not necessary. Note the absence of “I think” in line 53 (“So, in the annual review, these Novice, Advanced, Expert, wouldn’t be so necessary.”) However, the tone of authority is not absolute; it is mitigated by the use of modality (wouldn’t) and at the same time, also leaves the door open for further discussion. Thus skillful use of language helps strike a fine balance between authoritative control and democratic participation.

As soon as S1 opens the door for discussion, he is challenged by S2 (line 54). On the surface, it would seem S2 is seeking confirmation of S1’s proposal by the use of the interrogative (line 54, “So you think we won’t need the grid for the annual review?”), i.e., the function of the interrogative here is rhetorical. However, a further reading indicates S2 is actually asking S1 to reconsider his proposal, because, as lines 60-63 indicate, the idea of the grid as a self-assessment tool (and therefore requiring the evaluation labels) was known to F. This interpretation is validated when S1 recants his earlier suggestion of discarding the grid (line 55, “well, we may need the grid to show …., but not the labels.”). He yields to the idea of retaining the grid but weighs in on doing away with the labels. Once again, power is bounced back and forth rapidly between members and the language indicates a high degree of sensitivity to each other’s position in the group.
The complex use of the interrogative is again seen in line 85 (“why don’t we let our committee members decide on that?”). S1’s use of the interrogative seems to imply two functions: 1) it seems to be a polite attempt to wrap up the discussion about the artifact grid and move on with the meeting agenda, and 2) it indicates S1’s disagreement with S4 and S1’s preference for discarding the grid. Once again, the first function seems to be the most obvious, however a deeper reading foregrounds S1’s difference of opinion with S4. By letting faculty have the final say, S1 is essentially implying that the grid should be discarded (see his argument in lines 46-53).

A further comparison of the two data samples indicates decreased use of cohesion strategy (33% in the October 7 meeting as opposed to 38% in the September 16; see Appendix E). Members seem to jump from topic to topic, although related, but before wrapping up the previous one. As a result, the overriding impression of the passage is that of a vibrant dialog where members use various persuasive techniques without coming to a clear resolution. It can therefore be concluded that a decrease in cohesion strategies as well as an involved use of interrogatives seem to have contributed to the ambiguity of genre in the second sample.

**Intertextuality**

There is a high degree of intertextuality in this passage. Intertextuality is the “property texts have of being full of snatches of other texts, which may be explicitly demarcated or merged in, and which the text may assimilate, contradict, ironically echo, and so forth” (Fairclough, 1992, p. 84). Intertextuality therefore denotes the historicity of texts. It points to the fact that conversations are built upon older conversations and or presuppositions.

*Revoicing* and *Reframing* are two linguistic strategies that give rise to the intertextual nature of discourse. Revoicing is typically seen in classroom teaching. It is “a particular kind of reuttering (oral or written) of a student's contribution -- by another participant in the discussion” (O'Connor and Michaels, 1996, p. 71). Its purpose could be to reformulate what has been said for clarification or to “rebroadcast” because no one heard the originating student's utterance (p. 75). Or, the reutterance could be for “laminating … teacher's phrasing, register, and information onto the student's contribution” (p. 80). Or, it could help create a
"concomitant slot" allowing students to enter the conversation (p. 93). Revoicing typically gives “a bigger voice” (p. 71) to the speaker’s contribution, i.e., it gives power to the utterance and consequently to the speaker of the utterance. Reframing is similar to revoicing in that it is a reproduction of old information, but presented from a different perspective. Reframing was addressed earlier in the analysis of the first passage under Debating the Topic.

The feature of revoicing seems to be prominent in the second sample. S1 revoices F’s ideas (lines 50-51), S2 revoices her conversation with F (lines 60-64), S2 repeats S1 (line 54) and S3 repeats S2 (line 74). These instances of revoicing express different purposes. S1’s and S2’s goals are similar in that both invoke conversations with Dr. D as a strategy to bolster their respective stance. S1 argues in favor of discarding the artifact grid in the annual review design as per F’s suggestion and S2 argues for retaining the grid due to its relevance to learning.

S2’s repetition of S1 has been discussed at length earlier under Genre Ambiguity. Its main aim seems to be to challenge S1’s proposal. On the other hand, the final instance of revoicing where S3 repeats S2’s utterance (line 74) can be seen as an affirmative response to S2’s preceding question in line 73. It thus takes on the form of a yes-no question-and-answer exchange. To be noted here is also that S2’s question in line 73 is an example of reframing; she clarifies S3’s request for a button to activate the opening of the artifact grid. Thus, reframing and revoicing amplify the intertextual nature of discourse in the second sample.

Protracted Negotiations

As mentioned earlier, this sample is characterized by negotiations that do not seem to reach a satisfactory conclusion. Members seem to move from topic to topic. Although the overarching discussion deals with the design of the artifact grid in the annual review portfolio, there are four major topics embedded within this discussion (starting lines 46-47, 67, 81-82, and 96, respectively)

Topic 1 (lines 46-67). The first half of the sample deals with the question if the artifact grid is necessary in the annual review portfolio. Here we see further sub-topics. Initially, S1 discusses the grid as necessary in the prelim portfolio but not required in the
annual review portfolio (lines 46-53). The topic then changes to perhaps the grid can stay in the annual review portfolio but not the evaluation labels (lines 55-57).

The change in topic once again alerts us to a difference in perspective between S1 and S2 - not in their opinion about the significance of the grid per se but in their understanding of the nature of the grid. S1 sees the grid as separate from its assessment function. He sees it as a resource tool that helps students organize their artifacts and can therefore be transferred across contexts. In contrast, S2 views the grid as emerging from the practice of student assessment and considers its organizational function an integral part of assessment. Hence, she considers the grid an evaluative tool, and the levels of achievement intrinsic to its design. The difference between the two perspectives thus lies at a fundamental level rather than at the level of the utterance.

**Topic 2 (line 67).** The topic undergoes another clear switch when S3 requests a new feature in the portfolio. This falls under the general discussion of grid design, but falls further away from the main theme of the preceding discussion. It assumes the grid as part of the annual review portfolio, and calls for minor changes that include making the grid optional. S3 suggests adding a new button to activate the grid (lines 67-71).

S3’s role in this exchange is interesting; S3 seems to act as the arbitrator attempting to break the impasse between S1 and S2. She presents a solution that strikes a compromise between the two stands. However, her suggestion is not taken up by the group as a whole. S2 acknowledges her proposal (“ok” in lines 70 and 72) without taking it any further and also, there is no feedback from the group evidenced by an absence of “backchannel” conversation.

**Topic 3 (lines 81-82).** The lack of a resolution keeps the door open for further negotiation. S4 steps in and takes control of the conversation. He presents arguments in favor of retaining the artifact grid (“So, I’m thinking … perhaps this WILL be useful for the annual portfolio, because it'll be a way of discussing what your progress is.”). S4, similar to S1 uses verbs that signify cognitive activity (think, remember). However, the use of modal verbs and negated adverbs (perhaps, would, not at all) mitigates the assertive power of S1 and S4’s

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1 “Backchannel conversation” consists of utterance that contributes to a conversation without taking the speaker’s turn; it indicates attention and possibly agreement. For e.g, “that’s right” “yeah” etc.
utterances without losing their main thrust. In addition, this type of language use also succeeds in maintaining a non-threatening environment allowing others to join in the dialog.

S4’s contribution also highlights the aspect of “cultural models” (Gee, 1999) that govern human discourse. Cultural models mediate between the macro (institutional) and the micro (local) levels. They serve as inquiry tools that help us examine our beliefs and perceptions that play an integral part in the way we view and make sense of our world. Cultural models can be considered another term for frames (Alvarez, 2002; Bostrom, 1989) in designer and client discourses.

S4’s language in the group seems to be governed by the academic cultural model. In this passage S4 invokes established theoretical knowledge on socio-technical design – knowledge that belongs to the domain of software design – to mentor the design team on the local problem of designing the annual review portfolio (lines 89-94). He realizes the integration of the grid in the annual review portfolio has the potential to shape CIT community practice. S5’s affirmative interjections to S4’s suggestions highlight and help reinforce S4’s idea within the group.

**Topic 5 (line 96).** It is worth noting S4’s arguments above are not disputed explicitly. Although the design of the grid is questioned for its value to students, the main motivation for the questioning seems to be to gain a deeper understanding of the role of the grid in the portfolio rather than to discard it. This is seen in the ideas put forth by S6 (line 96) to improve the grid design. S6 suggests the artifact grid should support a consolidated view of artifacts as evidence of student progress throughout his/her study program. One could consider this an implicit acceptance of S4’s idea and hence a tacit resolution of the lengthy negotiation.

Furthermore, the fact that the group does not revisit the topic of discarding the grid after S1’s earlier attempts, points to the fact that the group considered the matter settled. It can also be interpreted as group’s tacit belief in the importance of the grid in the portfolio. Therefore, the lengthy negotiations seemed only to help strengthen design team’s earlier assumptions.

In comparison to the previous sample, this passage shares less use of cohesion, increased modality, and increased use of revoicing and reframing strategies (intertextuality).
The role played by S4 is notable; similar to F in the first passage, he reflects a different frame of reference and seems to educate the design team on the value of their evolving design to CIT community’s current practice.

Discussion

The analysis of the two passages supports theories that highlight the cognitive and political aspect of design, namely: Schön's theory of reflection-in and reflection-on-action (1983) and Zartmann & Rubin's (2000) observation on the relationship between productive negotiation and asymmetrical power relationships.

Schön (1983) theorized, through empirical observation of designers (specifically architects) at work, that practitioners (including teachers) in pursuit of professional excellence typically engaged in two kinds of reflection, reflection-in-action and reflection-on-action. Reflection-in-action implies engaging in reflection while acting on a task. It involves devising strategies to troubleshoot and complete a task. According to Schön during reflection-in-action:

The practitioner allows himself to experience surprise, puzzlement, or confusion in a situation which he finds uncertain or unique. He reflects on the phenomena before him, and on the prior understandings which have been implicit in his behavior. He carries out an experiment which serves to generate both a new understanding of the phenomena and a change in the situation, (p. 68)

Reflection-on-action describes professionals consciously reflecting on their actions as they perform a task or after the task has been completed. The focus is on actions undertaken rather than on completing the task. Designers, during this phase, tend to articulate and make links to knowledge residing outside the local context. Reflection-on-action is considered crucial to improving professional practice and has become an integral part of design curriculum. For example, design students are initiated into the practice of reflection-on-action.

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2 The genesis for the concepts of reflecton-in and reflection-on-action can be found in Argyris & Schön’s seminal work Organizational learning: A theory of action perspective (1978). The authors argued that organizations that seem to flourish under rapid technological changes are typically characterized by “double-loop learning.” Organizations that engaged in reflection-in-action experienced single loop learning and those that engaged in both types of reflection experienced double-loop learning.
action through the exercise of the "design crit." Design crit is an educational event where an expert (typically student's instructor) reviews student's work with him/her.

The analysis of the two passages indicated a prevalence of both types of reflection. Both showcased reflection-in-action since both passages involved specific tasks. A major part of the design conversation is focused on addressing the ways and means of finishing the task (reflection-in-action). However, within the span of these short passages, the conversation is elevated to a meta level representing reflection-on-action (lines 21, 28, 31, 89-90, and 94). S1's utterance in line 21 "No, no. I'm not talking about the design part" represents an example of reflection-on-action – it provides S1's analysis of the preceding conversation (line 20) and her attempt to correct the seeming misunderstanding between her view and F's views. F's previous statement in line 20 indicates her view that students in the CIT doctoral program are not required to create an annual portfolio once they have passed their prelims and therefore she does not see the value of linking the two (annual and prelim) portfolios. It thus reflects the administrative viewpoint relating to the workflow of Ph.D. student assessment in the CIT program. On the other hand, S1's suggestion of linking the annual with the prelim portfolio (line 19) "What I'm saying that it needs to be interwoven with myProgress [annual review portfolio] because it is an intermediary stage in your progress – the prelim portfolio" refers to the technical and pedagogic design of CIT eDoc. According to S1, the two portfolios together should help facilitate and showcase a student's learning during his/her entire doctoral program and hence the two portfolio themes (interfaces) should be linked together. Thus, line 21 has an overarching function – it highlights the two seemingly contradictory viewpoints and also attempts to repair the misunderstanding.

In the second passage, reflection-on-action is seen when S4 draws upon knowledge from outside of the local context in lines 89-90 ("by designing this portfolio we're also shaping somehow the way things will be done from now on") and 94 ("No, but then it would be a …it would probably …. be a .. part of practice in the future") to persuade his team members to retain the grid. Hence, reflecting on one's actions engages intentionality, which distinguishes design from other forms of inquiry such as the sciences and the arts (Nelson & Stolterman, 2003). Intentionality alludes to the need to change an existing condition, instead
of understanding and explaining it through experimentation (science) or through self expression (the arts).

With respect to the political aspect of design, the analysis supports Zartmann & Rubin's (2003) observation that perceptions of greater power asymmetry between negotiating parties result in more productive negotiations as compared to perceived symmetrical power relationships between negotiating parties. Hence, negotiations between a powerful nation and a not so powerful nation has a better chance of reaching settlement than negotiations between two countries that are perceived as equal or as near equal.

In the case of CIT eDoc design and development project, graduate students and a faculty member collaborated to design their electronic portfolio theme. It thus involved parties that traditionally enjoy different power privileges, with the faculty member possessing greater power and authority over student's academic progress. The first excerpt presented students and the faculty member negotiating the role and significance of the prelim portfolio in the CIT doctoral program. The two parties show marked difference in perspectives. The faculty member represents the administration viewpoint. At first she regards the role of a portfolio as facilitating student assessment. Since preliminary exams are typically comprehensive and considered to be summative in nature, the prelim portfolio, according to the faculty member, needs to be deactivated (or archived) once students pass their prelims successfully. However, students see the portfolio as an extension of their professional self and hence as something that should continue to evolve with them even after they pass their prelims and graduate from the university.

The dynamic between the faculty member and students mirrors, to some extent, the relationship between management and employees within a typical workplace setting. Studies have shown management and employees differ in their beliefs about work (Sachs, 1995). Management's view of work reflects an idealized perspective characterized by how the work should be done (an organizational or explicit view). These include steps that can be explicitly stated and documented in work manuals. In contrast, the employees perception of work represents the tacit or activity-oriented view, a view characterized by how work

---

3 Preliminary examinations test students on their entire program of study as an indication of their eligibility for undertaking Ph.D. research.
actually gets done (Dix et al., 2004; Kuhn, 1996; Sachs, 1995). This includes actions and processes that are often invisible, such as communicating, building and maintaining relationships, and coordinating work. And, in traditional work settings, the two views often do not merge when it comes time to design worktools. Typically, managers hire professional designers who gather information from both parties and draw their own conclusions.

In the case of CIT eDoc however, the faculty (administration) and students (users), bound by a participatory approach, were forced to confront each other's views in order to design their portfolio system together. Negotiation, in the first passage, seemed to move rapidly; members came face-to-face with their differences in perspective on the portfolio, confronted them through open debate (lines 10-30) and reached a settlement through argumentation and persuasion (lines 21-36).

In contrast, the anlaysis of the second excerpt shows a lenghty negotiation between students of equal standing (CIT Ph.D. students) that did not reach an explicit settlement. In the beginning, students appeared wedded to their local context revoicing faculty member's and their own views on the design of the annual review portfolio. S3’s attempts to arbitrate did not seem to work and an impasse ensued. This was partially resolved when S4 interjected with a meta view of the design (lines 89-90). The meta view drew upon established academic discourse on socio-technical design showcasing once again the interdiscursive4 nature of language-in-use.

Invoking established knowledge also indicated an instance of learning. It raised new questions and reflected a critical perspective. For example, students questioned the value of a portfolio that did not evolve with them and help them with their learning (line 96). Hence, although negotiations in the second passage did not reach a formal resolution, it nevertheless showcased an instance of transforming students' understanding of a portfolio. This kind of learning has been called transformative communication (Pea, 1994) where "a central activity of learning is the construction and refinement by learners of documents, problem interpretations, models, analyses, and so on, in the context of their goal-related activities." (p. 286).

4 Interdiscursivity is when we embed other discourses within our own (Fairclough, 1992).
It is also interesting to note the manner in which the grammatical resources of modality and linguistic strategies such as revoicing and reframing supported principles of democracy and community central to the design and development of CIT eDoc. As seen in *Findings and Analysis*, modality gave rise to a language of inclusion. It created a distance between the proposition and the the interlocutors, which had the effect of generating open and non-threatening spaces that encouraged others to enter and engage in productive dialog, promoting democratic participation and community building.

Attempts at revoicing also helped make CIT eDoc design work transparent to the group members. By revoicing other members' utterances, the design team was not only made aware of who said what, where, and when, but also provided an insight into personalities and resources residing in the group. In other words, it enhanced group's transactive memory (Wegner, 1986) by providing a dynamic multi-dimensional view of ideas and identities engaged in design work. Transactive memory is based on the premise that our memory cannot hold all the information and hence we store it in places outside of our memory. According to Wegner,

“...The transactive memory … is a property of a group. [It is a] constructed system, a mode of group operation that is built up over time by its individual constituents. Once in place, then, the transactive memory system can have an impact on what the group as a whole can remember, and as a result, on what individuals in the group remember and regard as correct even outside the group. In short, transactive memory derives from individuals to form a group information-processing system that eventually may return to have a profound influence upon its individual participants. (p. 191)

CIT eDoc design team members viewed and evaluated each other's contributions, which influenced their evolving perceptions of each other. For example, S4's interdiscursive contributions lead the group to look up to him as one who:

...has always been one of those kind of crystallizing voices that would systematize and kind of verbalize what was going on. And kind of summarize the discussion and add new – so I have to emphasize S4’s contribution – is kind of noticeable for me as an outsider” (Focus group session, April 20, 2004).
In other words, S4, a short-term visitor to the group, came to be looked upon as the in-house expert by his peers, as someone who had the knowledge and the skills to articulate and extend group’s thinking to new levels.

**Conclusion**

This article showcased the use of Critical Discourse Analysis (CDA) to examine the negotiation of power in a participatory ID project dealing with the design and development of an electronic portfolio system at a U.S. university. The analysis showed high degree of modality, cohesion, and intertextuality in the democratic participatory design discourse. Furthermore, it seems these features helped create an environment more conducive to dialog that was critical and constructive, and which resulted in new design ideas and new learning for the team members. While this is a preliminary hypothesis at best and needs thorough testing, it also highlights the importance of systematically studying the use of language in instructional design work to develop deeper understandings of the users and the context of design.

A critical study of client/user-designer language during the development process has the potential to help designers identify gaps between designer and user frames of references and among diverse types of users, including users with differing powers. Without a critical analysis of CIT eDoc design conversation it would have been difficult to understand how language supported the negotiation of power among team members and the realization of democratic principles under girding participatory ID. This has valuable lessons for designers and practitioners in the field of education. CDA can serve as a useful tool of inquiry in the design and development of technology-enabled environments that support rich learning.

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APPENDIX A

Transcript of September 16, 2003 CIT eDoc Design Team Meeting

| F: | 1. Imagine, now moving to your case. |
|   | 2. You've got a prelim portfolio that is passed. |
|   | 3. It would be nice actually if you had some document to add to that, |
| S1: | 4. exactly! |
| F: | 5. but also that the thing couldn't change |
|   | 6. so you say this is my prelim portfolio. |
|   | 7. And then this will go with it saying … whatever. |
|   | 8. And at the moment you don't … |
|   | 9. all you've got is a piece of paper that you passed your oral. |
| S1: | 10. But there should be a way also once,- |
|   | 11. whatever – at whatever stage my prelim portfolio has been passed, |
|   | 12. it should be - you can freeze that – that portion. |
|   | 13. This is what the committee looked at, you know. |
|   | 14. But then, since then, … |
| F: | 15. Since then, it's moving it to a different purpose. |
|   | 16. There isn't anything since then, because that IS your prelim portfolio. |
| S2: | 17. then perhaps it becomes a part of your myProgress? |
| S1: | 18. myProgress, that's right! |
|   | 19. What I'm saying is that it needs to be interwoven with myProgress because it is an intermediary stage in your progress – the prelim portfolio. |
| F: | 20. No, you don't need to do myProgress after you've done your prelims. |
| S1: | 21. No, no, what I'm saying is the design part of it. |
|   | 22. These two need to be in some sense connected. |
| F: | 23. But only backward. |
| S1: | 24. yes. |
| S2: | 25. uh, uh. |
| F: | 26. Because once you've done your prelim; |
|   | 27. you don't need to give an annual progress report. |
| S1: | 28. No, no, no, we're not talking about the administrative stuff. |
|   | 29. What I'm saying is that I should be able to access my prelim portfolio and work with the artifacts in it still. |
| F: | 30. To do what? |
| S1: | 32. yeah! |
|   | 33. If I, if I … |
| F: | 34. So then we need another screen. |
|   | 35. So, okay, people are going to CONTINUE to work with this - where's the next stage? |
|   | 36. And that's a good point, ok? |
| S1: | 37. For instance, I have ILET in my thing [portfolio].  
38. Supposing I was to continue working with ILET and doing stuff with it and even using it in my research dissertation. |
| F: | 39. Ya, but in terms of a portfolio, you then move on to the next stage, which might be a career portfolio.  
40. And when you become a member of faculty, [to] the promotion and tenure portfolio… |
| S1: | 41. That was the other – that was the other question we had.  
42. Should this portfolio, serve all those purposes? |
| F: | 43. It’s a decision for the design team.  
44. But, I would be disappointed if you weren't able to access the .... for those purposes,  
45. and one of the things that’s at the back of my mind is to talk to the alumni association .... |
| S1 | 46. S2, I think when F was suggesting about this grid thing, 47. she was more concerned about the Prelim portfolio. 48. Because in the final portfolio, your committee is interested in seeing how you covered all these criteria 49. and how is your level of covering those? 50. For e.g., I remember her saying that this particular student needs to address at least one of these criteria on an expert level. 51. And others should be advanced. |
| S2 | 52. so, you think… |
| S1 | 53. So, in the, in the annual portfolio or myProgress, these novice, advanced, expert wouldn’t be so necessary. |
| S2 | 54. So you think we won't need the grid for the annual portfolio? |
| S1 | 55. well, we may need the grid to show what criteria were addressed with what artifact, |
| S2 | 56. ok |
| S1 | 57. but not levels, I don't think it will be necessary. |

[pause – looking at the grid]

<p>| S2: 58. That's the X and the Y axis – label the X and the Y. 59. So, what do you put for that? 60. I was asking Dr. D when you do your annual review 61. um, and you say that I have this artifact and 62. that has addressed this, this, and this – 63. it's an overview of saying I'm getting along fine. 64. I have all these things under all these criteria. 65. But the question is do we need the grid for the annual or we don't need the grid for annual. 66. Because then we can take that away and put that for the prelim. |
| S3: 67. Can I just have a button for the grid 68. so that when you click on it, 69. it will come up |
| S2: 70. Ok. |
| S3: 71. But not necessarily having it. |
| S2: 72. Ok. 73. So, have it open up as a new window? |
| S3 | 74. as a new window, as a new window, 75. so that you can see this window and that window and compare. 76. Other than crowding the page so much with … |
| S2: 77. Ok. |
| S4: 78. I'm thinking .. I’m not expert in how you do stuff here, 79. not at all. 80. So, I'm thinking 81. perhaps this WILL be useful for the annual portfolio 82. because it'll be a way of discussing what your progress is |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>S5</td>
<td>83.</td>
<td>yeah, I agree</td>
</tr>
<tr>
<td>S4</td>
<td>84.</td>
<td>and, and what</td>
</tr>
<tr>
<td>S1</td>
<td>85.</td>
<td>why don't we let our committee members decide on that?</td>
</tr>
<tr>
<td>S4</td>
<td>86.</td>
<td>yeah, yeah, but there's another thing I want to –</td>
</tr>
<tr>
<td>S4</td>
<td>87.</td>
<td>yeah, you're right –</td>
</tr>
<tr>
<td>S4</td>
<td>88.</td>
<td>but another thing I just want to mention on the same issue is that,</td>
</tr>
<tr>
<td>S4</td>
<td>89.</td>
<td>uh, by designing this portfolio we're also shaping</td>
</tr>
<tr>
<td>S4</td>
<td>90.</td>
<td>somehow the way things will be done from now on.</td>
</tr>
<tr>
<td>S4</td>
<td>91.</td>
<td>If there’s a grid like this in the annual portfolio, then</td>
</tr>
<tr>
<td>S1</td>
<td>92.</td>
<td></td>
</tr>
<tr>
<td>S1</td>
<td>93.</td>
<td>it'll be consistent,</td>
</tr>
<tr>
<td>S4:</td>
<td>94.</td>
<td>No, but then it would be a (2) it would probably (1.5) be a (1) part of practice in the future that …</td>
</tr>
<tr>
<td>S5</td>
<td>95.</td>
<td>uh, uh, I agree.</td>
</tr>
<tr>
<td>S6</td>
<td>96.</td>
<td>So, this is continuous? Is that - the matrix shows your continuous progress? If it includes the progress you’ve done in two years then it’s good. But, if it only shows each year I think it [has] no function.</td>
</tr>
</tbody>
</table>

[the conversation continues about the grid implying continuity of learning – the grid remains in the annual review].

Note: (#) = pause marked in seconds
### APPENDIX C

**Relationship between Fairclough and Halliday’s Language Structure**

#### A. Halliday (1978)

<table>
<thead>
<tr>
<th>Contextual Variable</th>
<th>Metafunction (Meaning)</th>
<th>“The Work of Language”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
<td>Textual</td>
<td>Presenting messages as text in context</td>
</tr>
<tr>
<td>Tenor</td>
<td>Interpersonal</td>
<td>Enacting social relations</td>
</tr>
<tr>
<td>Field</td>
<td>Ideational</td>
<td>Representing experience</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Contextual Variable</th>
<th>Example</th>
<th>Metafunction (Meaning)</th>
<th>“The Work of Language”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genre</td>
<td>Interview, sermon, literacy lesson (turn-taking, participant structure, theme, topic control)</td>
<td>Textual</td>
<td>Ways of interacting – Presenting messages as texts in context</td>
</tr>
</tbody>
</table>
| Discourse           | • Teacher as authority  
                      | • Student as passive  
                      | • How the perspective is set forth                                                   | Interpersonal          | Ways of representing – Enacting social relations from a particular perspective        |
| Style               | Affiliation within Discourses: modality, transitivity, pronoun use     | Ideational             | Ways of being – Enacting experiences of reality                                      |

(Reproduction adapted from Rogers, 2004, p. 238)
APPENDIX D

Grammatical Markers of Genre, Discourse, and Style

Critical Discourse Analysis

*Genre, Discourse & Style*


CDA includes description, interpretation, and explanation of the relationships between genre, discourse, and style in interactions spoken or written.

**Clause:** The most crucial unit when we speak and write is the clause. A clause is made up of a verb and a set of participants. Participants are the nouns phrases that name people and things playing roles in the action, event, process, or state of affairs named by the verb. [Mary loves the course.] [Mary thinks that many other people love the course, too.]

**Genre - Ways of interacting “Mode”**

Is there an obvious way of characterizing the sample overall?

Does the sample draw upon more than one genre?

What patterns do you notice?

**Cohesion** - lexical or grammatical patterns that help text hang together across sentence boundaries to form larger units (e.g. and, the, because, it, former, latter)

What functional relations are there between the clause and the sentence?

**Parallel Structure** - Similar textual structures within the text (e.g. sentences starting with "because", I-R-E pattern)

**Repetition** - more than one mention of a lexical items

**Politeness conventions** - sets of strategies that are used to achieve a certain end (e.g. please, thank-you, excuse me, can I, would you... )

Who is using the politeness convention? To whom? For what purpose?

**Revoicing** - Repeating the voice of a person or a text; intertextuality.

What intertextuality exists in this text?

**Turn taking structure** - Number of turns taken, who speaks, how long their turn lasts. What turn taking rules are in operation? How are topics introduced, developed, established, and is topic control asymmetrical or symmetrical? How are agendas set and by whom?
Discourse - Ways of Representing "Tenor"

What are the patterns of the themes represented?
How is the information presented?
From what perspective?
What relationships are actualized through the themes presented?

Information focus - theme/rheme

Theme - The informational starting point of the clause. Old, or given information, is put in the "theme".
Rheme - The remainder of the clause. New information is stated in the rheme.

The bakery stocks wonderful biscotti.

Theme Rheme

Statements/Questions

Imperatives (command)
Interrogative (questioning)
Rhetorical Questions (hypothetical questions)
Expository Questions (question for information)
Declarative (statement)

Pronoun Use

I, you, she, one, he, it, we, you, they (singular, plural, 1st, 2nd, 3rd person)
The use of pronouns impacts the degree of contact with the text.
How do pronouns change over the course of the passage? What is the function of the pronoun being used?

Formality of vocabulary

Formal Informal language
Canine Pooch, doggy
Tolerate Stand, put up with
Motivation Will-power

Style - Ways of Being "Field"

How does the speech act represent reality?
What values and ideologies are encoded in the verbs, modals, passivization, and nominalizations?

Transitivity - Grammar of the clause that is connected to the representation of the social world.

4 types of verbs.

-Relational- Existence, state, relationships (stay, equal, compromise, contain)
What kinds of participants attract these relational descriptions? What qualities are assigned to them?
Who/what is being described?

-Material- Actions, events (doing words "run", "act", "entertain")
Who is represented as the most powerful actors in the text? Who is acting? Who is being acted upon?
Who is represented as powerful? As weak?

-Mental- Experiencer, experience (saw, thought, wondered)
Who are the experiencers? Does the writer/speaker claim to know the mental processes of other characters? Who are the actors in these processes? If the actor is not stated can he/she be easily supplied?
-Verbal- Speaking, writing, communicating (demanded, said, nominated, prayed, stated)
Who holds the floor? What impact do they have on the listener? Who does the speaking and who do they speak to?

Modality- Aspects of grammar that express obligation/permission, probability (e.g. may, might, can, could, will, should, must, need)

Passivization - allows you to leave out the actor in material processes, the speaker in verbal processes, and the experiencer in mental processes.

Rod Paige called NEA a "terrorist organization". The NEA was called a "terrorist organization".

Nominalization - Turning the verb or the adjective into a noun.
Soldiers killed 1,000 in battle. There were 1,000 killings in battle.

(Reproduction of Roger’s notes [March 30, 2006])


## APPENDIX E

*Code Book and Code Frequency Count*

<table>
<thead>
<tr>
<th>Codes</th>
<th>Sept 16</th>
<th>Oct 7</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cohesion: making argument coherent by connecting thoughts across utterances</td>
<td>15</td>
<td>11</td>
<td>26</td>
</tr>
<tr>
<td>Authoritative: showing authority – usually seen in the use of declaratives</td>
<td>6</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Disagreement or challenge: disagreeing or challenging what's been said before. Use of declaratives and can also be followed by attempts at reframing</td>
<td>5</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Distance: creating a distance between you and the proposition. Allows others to join in the conversation.</td>
<td>2</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Agreement: Agreement usually coheres utterances</td>
<td>4</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Politeness: using words to show politeness – opens up the space for free exchange of ideas.</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Reframing: trying to restate something that has been expressed before - providing a new perspective to an old problem.</td>
<td>4</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Revoice: trying to repeat something that has been expressed before by you or some one else. Gives more power to speaker’s contribution.</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>IRE: Initiate-Respond-Evaluate - exchange seen in traditional classrooms between teachers and students. Teacher initiates a response by posing a question, student responds, teacher evaluates. Such a strategy is known to discourage dialog.</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
CHAPTER 5. GENERAL CONCLUSIONS

Introduction

This dissertation tackles the rare topic of user-participation in instructional design (ID), which is also known as user-design (Carr, 1997; Carr-Chellman et al., 1998; Carr-Chellman & Savoy, 2004). The dissertation presents a comprehensive, multidimensional study on the feasibility of a new approach in ID, namely, Participatory ID. It examines this issue from different perspectives as can be seen by the three articles included in the body of the dissertation.

The first article presented a wide-ranging review of literature on user-participation in software design. It spanned multiple disciplines, namely, ID, Software Engineering, Human Computer Interaction (HCI), and Information Systems (IS). It argued for incorporating Participatory Design (PD), a form of software design pioneered in Scandinavia in the 1970s with the purpose of introducing workplace democracy, i.e., transferring power to the end-users to design their own work tools and thus develop tools that address end-users’ needs more accurately (Schuler & Namioka, 1993). PD principles of democratic technology design became well known in Europe, but failed to make a noticeable impact in the U.S., especially in the areas of higher education and corporate training (Carr-Chellman & Savoy, 2004; Carr-Chellman & Reigeluth, 2002; Muller, 1991; Reigeluth, 1997; Wilson, 2005). The literature review described the advantages and challenges of PD and drew implications of incorporating PD in ID.

The second article extended the argument for participatory ID in its comprehensive documentation and analysis of an authentic case of design of educational technology in the form of a case study. It describes the first year of a participatory ID project involving the design and development of an electronic portfolio system by a small group of faculty and graduate students in the Curriculum and Instructional Technology program at a large Midwestern U.S. university. The main purpose of the study was to identify the critical factors of participatory ID. Findings indicated two interesting concepts, besides those already reported in PD literature (such as, community building, contextual design, and recursive design) that were central to the success of this design project. These were: 1) maintaining transparency of work and 2) supporting continuous philosophical review or critical inquiry.
The analysis showed that productive teamwork was supported by keeping all members aware of work processes and resources located within and outside of the design group. This seemed to enhance group’s transactive memory (Wegner, 1986) that has been shown to be essential for well-functioning groups. Furthermore, continuous invoking and reflecting on project’s desiderata (original vision) by individual members also seemed to have helped keep the design work on track. Through constant reflection and articulation of project goals, members were able to refine their understanding of the evolving design and became more efficient in their work such that a viable prototype of an innovative electronic portfolio was developed and tested within the short span of 2 semesters.

The third article expanded the research reported in the second article by studying the participatory ID project from a linguistic angle. It analyzed the use of language during the first year of design work. Focus on the communicative aspect of ID work is rarely seen in ID scholarship. Therefore this article breaks new ground. Additionally, the article introduced a new research approach into ID called Critical Discourse Analysis (CDA) (Fairclough, 1995), which is a discourse analysis approach from sociolinguistics. It considers language as social practice and analyzes it at a level deeper than the utterance. The findings from this study were also intriguing; it showed a high use of modality, cohesion, and intertextuality in design team member discourse. Modality refers to the particular way in which language is used to encode the status of reality ascribed to or claimed by the speaker. It is typically represented by modal verbs (could, should, must, need and such). The feature of cohesion refers to the use of linguistic elements to make the discourse semantically coherent. Intertextuality refers to embedding other people’s text in text producer’s discourse.

In retrospect, the thrust of the three articles lies in its advocacy of democratic work practice, whether it is in education or in the workplace. The CIT eDoc design team was determined to be democratic; this influenced its design ethos and its conduct during design work. How much impact did this have on its community of practice is yet to be seen. In fact, each article raises questions that can be further debated, researched, and developed. Below are recommendations for further investigation.

1) The findings from Article 2, Participatory Instructional Design: Study of an emerging paradigm need to be tested thoroughly. It needs to be seen if the case of CIT eDoc
design remained a unique case or does it have wider applications. Although drawing generalization was not the primary aim of this study (see Concluding Reflections), it has set the stage for conducting verifiability tests in order to explore the transferability of these findings to new contexts (Lincoln & Guba, 1985).

2) It also needs to be seen what impact (if any) did the novice status of the CIT eDoc student designers have on the design of CIT eDoc portfolio as well as on the practice of the CIT community. One way to investigate this further would be to conduct design-based research and study seasoned designers work under similar circumstances.

3) Findings from article 3, Critical discourse analysis of user-designer negotiation in participatory instructional design are also open to further validation. Does CDA (Critical Discourse Analysis) actually help ID practitioners understand their data at a deeper level and improve the accuracy of their findings and effectiveness of their work?

4) Article 3 also provides the impetus to continue researching CDA in the context of ID and explore ways of systematizing it so that application of CDA becomes standard practice in ID.

In conclusion, the articles contribute theoretically and practically to ID discourse and therefore appeal to a diverse audience including ID scholars, educators, students, and professionals, as well as software designers interested in participatory approaches to software development. It also offers sufficient evidence of participatory ID’s feasibility in education. The next step would be to examine this evidence in greater depth, because a participatory democratic approach may be messier, but its potential to enhance our work and lives is immeasurable.

References


