EFFECTS AND CHALLENGES OF USING A REAL-JOB PROJECT APPROACH TO TEACH INSTRUCTIONAL DESIGN AND TECHNOLOGY

by

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(Under the Direction of Robert Maribe Branch)

ABSTRACT

Developing a responsive training strategy has become critical in order to keep professionals secure and competitive in a rapidly changing workplace. The current study investigated project-based learning incorporating job tasks as pedagogical and curricular strategies in an instructional design and technology certificate (IDT) program. The real-job project approach within the IDT program involved participants in the process of actually designing responsive solutions to instructional problems in their job settings. The two primary research questions were: 1) What are the effects of a project approach with the real-job characteristic on trainees' experience of learning instructional design and technology? 2) What challenges do trainees encounter during the various project stages (project initiation, project development, and subsequent workplace applications)? The study employed a mixed-method and used questionnaires, interviews, documents, and artifacts produced by the participants to answer the research questions. The study surveyed the experiences and perceptions of professionals representing more than 30 business areas and included 11 on-site face-to-face interviews representing 10 business areas. The results showed that the real-job approach is perceived as a fairly effective training model according to the self-report values of appreciation and

achievement, although participants' actual use of their class projects on the job was not common, less than 10%. Class projects served more as a template for participants' future design work when they returned to their workplaces. The participants also reported an increased appreciation for learning and a greater conceptual understanding of the instructional design process through the real-job project approach. A t-test comparing the real-job project group and the hypothetical project group favored the former group in terms of perceived appreciation, achievement, and application. While this approach allowed participants to increase their sense of ownership of learning and to initiate responsive solutions to their job settings, five elements (project vision, formative assessment, scaffolding, design community, and workplace clients) merit further consideration in order to help trainees develop more successful projects and achieve a greater impact in their workplace. Future research efforts should continue to make an experimental investigation of the authenticity factor and should explore the potential of project-based learning in the online context.

INDEX WORDS: Project-Based Learning, Authenticity, Instructional Design and Technology, Professional Development

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DEDICATION

This dissertation is dedicated to all the participants in this study and other e-learning services professionals.

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"If I have seen farther, it is by standing on the shoulders of giants."-- Sir Issac Newton

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CHAPTER 1 INTRODUCTION

Background

A department of instructional technology at a major institution of higher education in the southeastern United States of America initiated a professional development program in 2000 as part of a college-wide outreach initiative. An Instructional Design and Technology Certificate (IDT) Program was conceived to serve training professionals in a nearby metropolitan center. The goal of the IDT training program was to assist professionals in various organizations to better use the knowledge and skills of instructional design and technology in their working contexts. The training content was organized around the analysis, design, development, implementation and evaluation (ADDIE) model for training development. The pedagogical framework for the IDT certificate program was built upon project-based learning and a job task from the trainees' workplace. The participants in the IDT program included trainers, managers, human resource practitioners, and other professionals responsible for training services. The training program was offered every spring and fall semester and lasted five weekends, a total of fifty-five instructional hours each semester. Twelve training sessions have been conducted to date and more than 100 people have participated in the program. There appears to be a perception of success.

The IDT certificate program was based on creating authentic artifacts as an approach to project-based learning. My research interest is in the area of authentic project-based learning. I, as a graduate assistant, have been working closely with the program organizers, instructors, and

trainees in this certificate program for the last five sessions. This long-term engagement enabled me to observe and contemplate the design features of the training program, the organization of instructional content and activities, and trainees' experiences and responses, all of which have contributed to the impetus for this study.

Statement of Problem

Professionals are in a world of continuous change and innovation. The continuous change and innovation is also true for the field of instructional design, where professionals need to utilize emerging technologies and design principles to provide new educational solutions. Training is seen as a common means to keep today's employees secure and competitive in a rapidly changing workplace. According to Dolezalek (2004), companies within the United States of America spend an estimated amount of $51.4 billion annually on training for their employees. The amount does not include the money that non-employer-provided training employees themselves spend on their own to increase job marketability. The average annual expenditure per employee in 2003 was approximately $820, while, for the organizations with a high level of investment in learning, the average expenditure per employee was more than $2,000 (American Society for Training & Development, 2004). Meanwhile, the need for both training and trainers continues to increase according to the projection made in the latest edition of Occupational Projections and Training Data (Bureau of Labor Statistics, 2004). The number of training and development specialists is expected to increase from 209,000 to 267,000 from 2002 to 2012. This number change represents an increase of 28%, among one of the fastest growing occupations. Therefore, it is reasonable to conclude that training has been seen as an indispensable strategy for corporations and organizations to compete in this rapidly changing society.

The problem is that traditional lecture-based training approaches have a low transferability of knowledge and skills to the trainees' working place. Such perceptions are prevalent in the training field. Georgensen (1982) has asserted that only 10% of the training investment has been translated into employees' job performance. Shaw (1995, p.62) shared a similar opinion, "As much as half of [the money American corporations annually spend on formal training] is being utterly wasted." In addition to reasons such as training aimed at non-training problems, one major reason for the failure of training is its poor pedagogical design. Haskell (1998) has claimed that the traditional, industry-based methods of training are inappropriate and unworkable for fast changing, knowledge-based organizations. Haskell recommended that today's organizations must find ways to give their employees customized, thought-based, and task-extended training, instead of uniform, simple rote, and task-limited training. Although the reality is far more subtle than these claims and there are conflicting views on the role of training, the need for more effective training design is widely recognized.

Research on effective training approaches and design principles is important to meet increasing training needs and to maximize training investment value. This study proposed to examine project-based learning incorporating real-job tasks, which was used in an IDT certificate program at a major university in the southeastern United States. The real-job project approach within the IDT certificate program directly involved participants in the process of actually designing responsive solutions to instructional problems within their job settings. This study sought to investigate whether this real-job project approach serves as an effective training strategy providing customization, relevance, usefulness, engagement, and application to the workplace, and how participants interacted with their job contexts in the project process.

Rationale

Project-based learning (PBL) is a pedagogical approach organizing subject matter into a goal-oriented project, rather than presenting content as discrete pieces of information, and giving students the role of an active creator, rather than a passive receiver of information. Project-based learning uses a relatively long-term and problem-focused task to organize learning experience (Krajcik et al., 1998). Project-based learning facilitates experiential and meaningful learning and has the potential to increase the transfer of learning. More recently, project-based learning has also gained attention in organizations as a strategy responding to a knowledge-based society where knowledge management and intellectual property become more important than natural resources and skilled labor (DeFillippi, 2001). A real-job project approach provided the conceptual framework for this study. Before clarifying the real-job project approach, the conceptual and theoretical foundations of PBL are clarified first.

Concept

The project concept for constructivist learning environments has increased in popularity. A project is defined as "any temporary, organized effort that creates a unique product, service, process, or plan" (Martin & Tate, 1997, p.1). A project consists of a sequence of sub-tasks with a beginning and end, targets a specific desired outcome, and is bound by time, budget, and resources. Project-based learning is conceptualized as a pedagogical approach that organizes learning experience around a relative long-term and complex project, emphasizing both products and the process leading to the products. Some equivalent terms to project-based learning in the literature include the "project method," "project approach," and "project work." Project-based learning emphasizes learning as a process of active planning and involvement, problem solving, in-depth investigations, and learning to learn, rather than a process of passive receiving of

instructional content (Blumenfeld et al., 1991; Barron et al., 1998; Bradford, 2005; Katz & Chard, 2005). Project-based learning, a constructivist approach, is interdisciplinary, student-centered, and integrated with real applications (Moursund, 1999), and involves higher-order cognitive activities, such as analysis, synthesis, and evaluation (Thomas, 2000). The current practice of project-based learning typically involves using information technologies to a certain extent. WebQuest, for example, is a popular PBL model used in the K12 context organizing learning experiences through integrating Internet resources. The main features of project-based learning are:

1. Project-based learning is manifested by doing and knowing-in-action. Students are engaged in an active meaning-making process by externalizing and applying knowledge through doing or creating something.
2. Project-based learning generates a tangible product. All project activities are integrated into one cohesive system leading to an artifact(s). Learning-by-doing within PBL targets what Merrill (2002) called the task level, not just the operation or action level. For example, learning how to drive lends itself to learning by doing, but does not necessarily qualify as a project.
3. Project-based learning integrates an authentic problem or task which allows learners to encounter and apply major concepts and principles in a real-world context (Blumenfeld et al., 1991; Thomas, 2000). Course projects listed after an academic book chapter cannot be qualified as PBL because they do not necessitate an authentic inquiry and interdisciplinary knowledge application. Students can find answers in the chapter directly.

4. Project-based learning engages self-monitor skills, metacognition, and reflective activities during the process of creating products (Barron et al., 1998). Process is implicitly emphasized as an integral component of project-based learning. The project work done and to be done is under continual review and may undergo substantial change (Moursund, 1999). Therefore, management and metacognition skills are usually explicitly required.
5. Project-based learning integrates cognitive apprenticeship of modeling, coaching, and scaffolding, which allows novice learners to increase their ability to participate in a particular community of practice (Blumenfeld et al., 1991; Scarbrough, 2004).
6. Project-based learning enables a learner to use essential tools, instruments, devices, and computer applications, such as spreadsheets, databases, presentation tools, and authoring programs to represent their knowledge (Blumenfeld et al., 1991).
7. Project-based learning usually results in a presentation, display, exhibit, or public show of their artifacts and project experience. In some cases, the final product may be submitted to stakeholders for further assessment and decision.

The project, which is the focal point of the IDT certificate program, requires trainees to design and develop a web-based training module using essential knowledge in the field, and conduct a series of processes, such as analysis, design and development to accomplish the module. This project approach is designed to connect the training context and the workplace context, and as a result, make the training a value-added program.

Theory

Why does project-based learning work? Various theoretical perspectives have been brought to illuminate its merits and underlying framework. These perspectives include Kolb's

(1984) experiential learning cycle (Smith & Dodds, 1997), learning goals of knowledge, skills, dispositions, and feeling (Katz & Chard, 2005), the degree of child initiation (Helm & Katz, 2001; Helm, 2004), and Gardner's (1993) multiple intelligence theory (Moursund, 1999). Smith and Dodds, for example, claim that project-based learning is an effective pedagogical approach because it involves what Kolb called the four-stage cycle of learning (concrete experience, reflective observation, abstract conceptualization, and active experimentation), and accommodates different learning styles. While there are already many theoretical explanations, this study examines PBL's working mechanism from the perspective of transfer. The ultimate purpose for education and training is learning transfer. Learning in schools or training should transfer to the learners' real ability and work performance.

Learning transfer is an important education goal for any form of intentional instruction. Transfer is basically interested in how knowledge and skills learned in a certain context would be applied to another context (Detterman, 1993). Transfer could be seen as the next stage of learning, although they are highly related and mixed (Perkins & Salomon, 1988; Schoenfeld, 1999). Transfer could be further divided into near transfer and far transfer according to the similarity between old and new contexts. An example of far transfer is that a student gains an enhanced reasoning skill in writing because of training in programming, while the case that a child who has learned to tie his or her shoes could tie a peer's shoes is an example of near transfer. Although disagreements on far transfer exist, researchers generally agree that near transfer happens frequently.

The challenge becomes designing instruction that promotes a transfer. The likelihood of transfer could be increased with well-designed instruction (Perkins & Salomon, 1988). So, the fundamental question here is: whether or how project-based learning could increase transfer of

learning instructional design and technology. There are three reasons that PBL could increase transfer of learning within the IDT context.

First, the project approach creates similarity between training context and job context. Detterman (1993) contends that transfer of learning only happens when two contexts are similar. The more relevant two contexts are, the more likelihood is the transfer between training and work. The pedagogical implication of this similarity principle is that instructors should teach the target content in ways that learners will most likely use it in their jobs. Training that presents knowledge as isolated bits of information does not enable learners to retrieve such knowledge in other forms than as discrete information (Haskell, 1998). Knowledge encoded for a test will be retrieved as such. By contrast, IDT is a field of design whose major purpose is to solve real problems of performance and learning (Reeves, Herrington, & Oliver, 2004) and rejects teaching discrete bits of knowledge outside of an authentic context. The way to learn design is by actually designing with an instructional design task for a context. The project approach provides a task and a context with high similarity to real tasks and contexts just as a professional performs. The project approach also requires the same level of cognitive activity, applying knowledge and creating products, instead of decontextualized knowledge and exercise.

Second, the project approach increases the likelihood that students will realize the similarity between a training context and a real context. Similarity between two contexts is a necessary condition for transfer but not a sufficient condition. Reed (1993) claimed transfer occurs only when students realize the similarity between two contexts by illustrating his study on two similar river-crossing problems: the missionary-cannibals problem and the jealous-husbands and wife problem. In order to make transfer occur, students must realize the similarity and relevance between the training and real-world situations (Detterman, 1993; Reed, 1993). The

project approach stimulates students' consciousness of the similarity by mindfully applying knowledge to solve an authentic task. Moreover, the project approach facilitates active exploration of the similarity between training and work contexts by cultivating the student's role as an instructional designer and engineer. Novice instructional designers are more likely to realize the similarity in project-based learning designed to encourage them to think and behave like expert designers rather than passive receivers of numerous concepts and principles of instructional design models.

Third, the project approach facilitates a situated and organized knowledge structure, which is more likely to foster transfer. Discrete knowledge and experience impede retention and transfer of learning. Sternberg and Frensch (1993) contend academic knowledge that is isolated from each other and from any real-world value does not encourage a mental structure for transfer. The knowledge must be organized around problem solving and integrated into a whole system by chaining steps, concepts and examples together (Bassok & Holyoak, 1993). The project is conducted in the process of problem solving within a scenario or real context, where students attain contextualized knowledge and gain a sense of the complexity of reality (Blumenfeld et al., 1991; Land & Hannafin, 1996). Project-based learning facilitates a holistic and contextual view of knowledge.

Learning transfer tends to increase, when students are engaged in a situated and active learning process. Perkins and Salomon (1988) claimed that to maximize the likelihood of transfer, learning should "hug" realistic experience of the target performance and "bridge" discrete experience by deliberately analyzing, planning, and abstracting. The project approach incorporates both the "hug" and "bridge" mechanism. Take the IDT context as an example. The purpose of training was on-the-job use of what was taught in the certificate program. IDT

training set up a near transfer bridge that enabled participants to do a project very similar to the task in their jobs. The authentic project, both in terms of product and process, maximizes and externalizes the similarity. The project approach and the authentic task also provide a bond for various sub-fields, analysis, design, development, implementation, and evaluation. Although there are other factors affecting transfer, such as individual intelligence and working context, PBL makes transfer more likely. The project approach works for the transfer mechanism and it is expected to increase the transfer rate from training to the job context for participants in the IDT program theoretically. Empirical study on this approach is warranted.

A Real-Job Project Approach

A real-job project approach is conceptualized as project-based learning that incorporates trainees' job components into their training process. The real-job project approach within the IDT certificate program directly involves participants in the process of actually designing responsive solutions to instructional problems in their real job settings. The term "a real-job project" is introduced in the current study to reflect the integration of the authentic factor with a project approach in the instructional context. A similar term used in the literature is "a real life challenge project" (Gordon, 1998). The IDT certificate program featured real-job projects.

Numerous researchers have been considering integrating the authentic factor in instruction (Barab, Squire, & Dueber, 2000; Brown, Collins, & Duguid, 1989; Herrington, Oliver, & Reeves, 2003; Leung, 2003; Tessmer & Richey, 1997). The reason of the interest in the authentic factor is that contextualized knowledge is more likely to promote and accelerate the transfer of learning. Students who learned decontextualized knowledge can answer items on a test but may not be able to use what they learned to solve real problems. Facing this phenomenon, early pioneers like Dewey to current situated cognitivists all insist on the

importance of a real world context for guided learning and argue that knowing and learning is context dependent and sensitive. Authenticity has been considered as an important index measuring the degree of such contextual dependence, which will be further explored in the next chapter.

Integrating the “authentic factor” is especially important for the training of instructional design and technology. Instructional design and technology professionals are increasingly found in various career environments, such as higher education, business and industry, K-12 Education, government, health care, nonprofit organizations, etc. (Larson & Lockee, 2005). “Because the field of ID has become so rich and varied in terms of settings in which it is practiced, we can no longer discuss the profession without consideration of the environment of practice” (Julian, 2001, p.16). The different career settings necessitate different competencies of IDT expertise (Branch, Moore, & Sherman, 1988). Professionals need context-specific competencies about why, when and where to employ IDT concepts, rules, and principles. Therefore, to customize the preparation for the different career contexts where the novice instructional designers intend to practice instructional design is important.

How could authenticity be integrated into project-based learning? One solution is to provide a simulation of a scenario close to the real-world setting, which is called a scenario project approach here. Martínez-Monés et al. (2005) provided an example of a scenario-based project approach in a computer engineering course. Students were encouraged to design and evaluate a computing system for potential customers. Students played the role of engineers at a computer manufacturer to assist a customer in purchasing a computer system for his or her business application. Teachers played the role of the customers. Bos and Gordon (2005) provided another example of scenario project-based learning in a business course. They

simulated a company comprising audio files and documents on a course tool similar to WebCT. Students were asked to identify organizational problems in the company and generate corresponding solutions. A scenario-based project is usually well structured and reduces complexity for instructors and students.

A more authentic format to integrate context is called a real-client project approach here. This project approach is realized by building a partnership with a real world client (e.g. Barab et al., 2000; Darabi, 2005). Students work on a project by entering the clients' environment and collaborating with clients on their issues. For example, Darabi (2005) designed a real-client model in an introductory human performance technology course at the graduate school level. At the beginning, the instructor contacted the managers and supervisors in the business community and organizations who had a commitment to use performance technology within organizations. Those who agreed to be in the class for students to practice were called potential clients and were invited to the class to present their performance problems. Then, students played the role of performance consultants and worked in teams. They made connections with clients and set up visits to their host organizations. After data collection and analysis, students presented their clients with professionally packaged technical reports, also as the final class artifact. The real-client approach is an appropriate solution for students who have not been employed in the professional world but whose learning would benefit from a transfer context that the client temporarily provides. However, using the real-client approach in academic institutions could be relatively expensive and sometimes impractical. It is especially difficult for novice instructors, who do not have a large network to find clients in business and industry.

The integration of authenticity in the IDT program was achieved by a real-job project approach. Instructional content presented in a training class seldom transfers to the workplace

directly (Haskell, 1998). The failure of transfer is often not due to a lack of learning but to a lack of organizational and contextual connection. In order to increase potential transfer of learning, the design of a training program should utilize trainees' built-in context of application: their job. A real-job project approach, project-based learning incorporating trainees' job components into their training process, assumes that an individual's workplace is an important learning resource for training and that an individual's interaction with his or her work environment has a positive impact on the transfer of training to professional activity. While a job comprises several components, such as assignments, work relationship, awarding and rewarding system, etc., the IDT training program employed a project approach incorporating a job task from trainees' workplace for instructional purposes. The real-job approach fits well with the workplace training where trainees currently have their own job.

The design feature of a real-job project approach presents a unique case for PBL research. Although the training practice of job-related projects is not new (e.g. Ohio Certified Public Manger Program, http://das.ohio.gov/hrd/ocpm/), there has been remarkably little investigation of the effects and challenges associated with real-job projects. Therefore, research focused on this design feature will contribute to existing literature on project-based learning.

Importance

Four levels of benefits are expected from this study. First, the immediate benefit is to improve similar training programs. During the course of this research, the training program was cancelled and a new program is still under consideration. Considering that there is an increasing need in the training market and that instructional design is an essential approach for training development today, similar professional development programs for instructional designers will continue to grow. To examine whether the PBL model accomplishes its objectives to facilitate

meaningfulness and transfer of learning seems informative for the design of similar IDT training programs. The answer could be useful for improving the design characteristics of the training programs to better meet the needs of trainees.

Second, this study could advance the knowledge of PBL in the training context. Most PBL studies and practices have been conducted in schools; there are very few studies in the workplace. Trainees' job experience could make project design different. Project-based learning in the workplace usually starts with a real problem, requires collaboration with organizational stakeholders, and targets business benefits or real decisions; therefore, PBL takes on added seriousness because the results matter (Davis & Davis, 1998). Research on PBL in the training context will differentiate from that in the school context.

Third, this study deals with two important aspects of pedagogy in the field of instructional design and technology: project characteristic and authenticity characteristic. This study provides an account of project-based learning that sought to enhance adult learners' knowledge and skills in IDT, and to bridge the real world context with the project experience. Recent trends emphasize design principles, instead of technological aspects (e.g. Reeves, Herrington, & Oliver, 2005). Comparison research between two technologies/media is not fruitful, but research focusing on the design of instructional activity and content with the affordance of technologies would be of importance for learning. This study would be valuable from this point of view.

Fourth, the study could conventionalize PBL as a way to teach instructional design. Teaching instructional design is a requirement of almost all educational technology majors. The creation of a constructivist template such as a project approach for students to learn instructional design would be very beneficial. However, there have been relatively few studies of the effects

of teaching instructional design using a PBL model. Moreover, although project-based activities are common in an instructional design course, the project approach in the IDT context is unique in that the whole training is organized around a project and PBL is central to the training curriculum. Therefore, this research study could clarify design principles and effects of an instructional design curriculum based on a single, complex, and authentic project.

Research Questions

The purpose of this research study was to investigate the effects and challenges of the real-job project approach to teaching instructional design and technology in a training context. The research was guided by the following questions:

1) What are the effects of a real-job project approach on trainees' experience of learning instructional design and technology?
2) What challenges do trainees encounter during the various stages (project initiation, project development, and subsequent workplace applications) of real-job project-based learning?

CHAPTER 2 LITERATURE REVIEW

Overview

The purpose of this study was to investigate the use of a real-job project approach in the context of professional development on instructional design and technology. The purpose of this literature review is to place this research in the historical context of project-based learning (PBL), to rationalize the practical and scholarly importance of the research problem, to qualify the research framework, research variables, and methodological choice, and to construct a comparison foundation for data analysis. This chapter serves as a "basis of both theoretical and methodological sophistication" (Boote & Beile, 2005, p.4) in this study. Specifically, the review of the related literature is intended to answer these five questions:

1. What is the up-to-date research and practice of project-based learning?
2. What are the effects of using a project-based approach in instruction?
3. What are the challenges associated with implementing PBL?
4. How has the authentic factor been considered in designing PBL?
5. What methodologies have been employed to conduct research on PBL?

I began the process of literature review in December 2004 when I prepared for the comprehensive examinations. The main resource where I located the relevant literature was the University of Georgia Libraries and the Galileo system, including the GIL catalog, Education Abstracts Full-Text, ERIC, and ProQuest Dissertation abstract. The search key words included project-based learning, project approach, or project method. I used the Internet, especially a

search engine like Google, as the secondary resource, which was used especially at the beginning to get an overview about PBL research and practice. In addition, using the Social Sciences Citation Index (Web of Science), examining citations of some works, and consulting with colleagues also served as auxiliary sources and helped me assess of the quality of the literature. With the exception of papers to identify the historical development of PBL, most studies I reviewed here were conducted in the last decade. A review of earlier studies can be found in Thomas's (2000) paper. To focus on more up-to-date studies is justified because recent studies on PBL are more related to using information technology.

This review primarily focuses on the literature "titled" and "designed" as project-based learning. The review does not cover research under other categories, like problem-based learning, or action learning. Research studies on other approaches, such as problem-based learning, inquiry-based learning, authentic learning, and cognitive apprenticeship might share a similar research context and have some overlap with the design principles of the project approach. Actually, the overlap of these approaches is quite common. For example, Krajcik et al. (1998) overlapped project-based learning and inquiry-based learning, Barron et al. (1998) overlapped project-based learning and problem-based learning, and Martínez-Monés et al. (2005) overlapped project-based learning and case study. Therefore, a research study under the name of another category which could serve as an exemplary study on PBL might be neglected in this review (e.g. Dunlap, 2005). Meanwhile, among several themes on PBL research, like effectiveness research, research on implementation, investigation of participants' role, and intervention research, this literature review chose studies directly linked to the research questions. The following sections are organized around the above five questions.

Up-to-Date Research and Practice of Project-Based Learning

Project-based learning was first proposed in the article of "The Project Method" by Kilpatrick (1918), a professor at Columbia University. PBL was practiced by several progressive schools after then and seen as fitting in with Dewey's experiential learning and learning by doing (Diffily & Sassman, 2002; Katz & Chard, 2005). However, it is considered to have failed in the 1960s curriculum reform movement (Blumenfeld et al., 1991; Barron et al., 1998). The use of projects as a learning vehicle has gained renewed interest in the past two decades due to the development of new educational technology and the resurgence of constructivism in the 1990s. More recently, it has been embraced by organizations as a strategy for organizational learning in the knowledge-based society. For example, in 2001, the journal *Management Learning* had a special issue on PBL in the management field. In the following parts, project-based learning will be discussed with respect to three contexts: schools, organizations, and information technology.

Project-Based Learning in Schools

Project-based learning in schools, especially in K12, is usually used as a complementary part to formal curriculum so that there is no requirement to abandon a wide variety of other instructional practices and activities (Katz & Chard, 2005). PBL topics in the K12 context usually come from the natural environment, culture and history, math, and publication (Moursund, 1999) and also align with children' interests and their real lives. PBL topics in higher education are usually connected to their future job context so that students could apply knowledge and prepare for their careers. Topics could be either selected from a list prepared by instructors, or negotiated and decided by the students themselves. Besides the discipline content, research, writing, information searching, and presentation skills are usually stressed in PBL.

A typical PBL process looks like this: First, discuss or choose a project topic aligning with the curriculum standards. (For example, where does all our garbage go? (Krajcik et al., 1998)) Second, a teacher gives students instructions on accomplishing the project. (For example, each team member must speak during the presentation, which should be 5 to 10 min long (Barron et al., 1998)). Then, students work on the project and teachers facilitate the process by giving job aids, timeline, selected resources, assessment rubric, etc. Finally the project will culminate in a public show. Classmates, teachers, and even parents might be invited to the show.

	Discussion	**Field Work**	**Representation**	**Investigation**	**Display**
Phase 1: Getting Started	*Motivate students' interests and define the project topic.*				
	Reveal prior experience and scaffold questioning.	Make a preliminary visit.	Help children demonstrate what they already know.	Encourage children to interview their parents.	Announce children's ideas.
Phase 2: Developing Project	*Guide project process and sustain student's interests.*				
	Share field experience and discuss themes.	Make a real-world exploration.	Develop field sketches, notes, diagrams, drawing, etc.	Interview experts in the field.	Share new experiences and data.
Phase 3: Culminating Event	*Culminate events through public show and evaluation.*				
	Prepare the events.	Ask outside experts for evaluation.	Select the format and the medium of a public show.	Explore implications for new situations.	Conduct a classroom event.

Figure 1. Katz and Chard's PBL model in the K12 context.

Autodesk (http://www.bie.org/pbl/pblhandbook/index.php) has published a comprehensive handbook to guide school teachers to implement PBL. Here I will summarize Katz and Chard's model to illustrate PBL practice (Figure 1). In their model, a project process is organized into three phases, each phase consisting of a series of activities, like discussion, field work, representation, investigation, and display (Katz & Chard, 1989; Chard, 1998; Katz & Chard, 2000). This model is suitable for helping a teacher to generate possible activities in the K12 context, especially in early childhood education.

Project-Based Learning in Organizations

More recently, project-based learning has also gained attention in organizations as an important strategy responding to the changing relationship between knowledge and corporate work and seeking for a long-term success in the knowledge-based society (Smith & Dodds, 1997; Davenport, Delong, & Beers, 1998; Rhodes & Garrick, 2003; Scarbrough et al, 2004). PBL, within the organizational context, is defined as "the theory and practice of utilizing real-world work assignments on time-limited projects to achieve mandate performance objectives and to facilitate individual and collective learning" (DeFillippi, 2001, p.5). Two types of PBL in organizations have emerged: as a training approach toward individual performance development and as an intervention for organizational change. Unlike PBL in schools that aims for the whole development of a student, PBL in the workplace aims for both individual development and organizational change. This approach bridges theory and practice, and training and working, and usually represents action learning and life-long learning (Poell et al., 1998; Rhodes & Garrick, 2003), which is believed to enhance transfer and reduce waste in training investments. Besides fostering knowledge and skills, PBL cultivates professional roles and produces practical benefits for organizations (Smiths & Dodds, 1997). PBL in organizations is a relative new practice and there are still few research studies in that context. These few studies focus on organizational level (that is, how an organization can learn and develop through a project approach) (e.g. Scarbrough et al., 2004), rather than individual level as happens in my research context. Therefore, most of these studies were not included in this review.

Here, a workplace PBL model is summarized based on Smith and Dodds's (1997) examples of management learning. This model is applied in three phases: performing needs analysis and exercising task choice, designing and developing the project, and presenting it to

stakeholders. It is equivalent to three phases in schools: beginning, investigating, and culminating, and is roughly similar in managing and scaffolding the project. However, three features differentiating it from that of schools are: topic choosing is more realistic and serious; it requires more teamwork within the team and with outside stakeholders; and it concerns business benefits or changes for the organization. A project in organizations starts with a real problem, and targets real decisions; therefore, PBL takes on added seriousness because the results matter (Davis & Davis, 1998). PBL in the organizational context usually ends with a report, a product, or a document submitted to policy makers for further decision.

IT-assisted PBL

IT-assisted PBL refers to use information technology to support the PBL process and activities. It is a recent practice due to information technology development and has a very significant role in education, which provides many opportunities that were not possible in the past. PBL resurged again mainly because of "the creation and expansion of new educational technology tools that can support students and teachers in obtaining, analyzing, and sharing information" (Blumenfeld et al., 1991, p374). IT could play several roles in PBL: it serves as a learning environment and community, as cognitive tools scaffolding problem-solving, representation, and reflection, and as productivity tools supporting the construction of artifacts, either a multimedia presentation, video, software, or poster. IT-assisted PBL is used either in schools or organizations. It falls into two categories: a traditional PBL integrated with information technology (e.g. Barak & Dori, 2004; Lee & Tsai, 2004; Waks & Sabag, 2004; Bos & Gordon, 2005; Helic, 2005) and total online PBL (e.g. Ponta, Donzellini, & Markkanen, 2001). The most common research and practice nowadays is the first one; however, the latter type will become promising.

Moursund (1999) provided practicing teachers with a comprehensive guidance on IT-assisted PBL, including topic choosing, project planning, lesson-plan creating and project assessment. Here I will describe another common model, WebQuest, which could exemplify implementing IT-assisted PBL primarily based on Internet resources. WebQuest was coined by Bernie Dodge, a professor at San Diego State University and Tom March, a practicing teacher. WebQuest encompasses students to set up a clear task and stresses purposeful inquiry activities on the Internet (Dodge, 1997). This model combines six elements: ***introduction*** that provides background and sets procedures; the ***task*** consisting of several subtasks; ***information sources*** to accomplish the task; the ***process*** that runs though the whole task; ***guidance*** to assist learners along the process; and ***conclusion*** that includes presentation, evaluation, summary, and reflection. The final product is usually in the format of webpages. WebQuest covers constructivist characteristics, such as learner-centered, inquiry-based, authentic, and cooperative ones. A typical example is "Searching for China" created by Tom March (http://www.kn.pacbell.com/wired/China/index.html). Although WebQuest is by no means a dominant PBL model, the well-structured WebQuest is a good start for teachers to implement IT-assisted PBL in the K12 context.

Summary

Project-based learning has been widely used in the school context while it has been used less in workplace related training. Along with current interest in organizational learning, project-based learning has emerged as an important intervention for organizations to compete in the knowledge-based society. Meanwhile, the development of the Internet and computer technologies makes project-based learning more feasible. Web-related PBL has become a mainstream in the PBL practice.

This research study is located in both emerging trends, a workplace-related and web-related project approach. It links up-to-date research and practice of PBL. Therefore, results from this study will contribute to PBL literature.

Effects of Project-Based Learning

Although the idea of project-based learning is not new, significant empirical studies on the effectiveness of project-based learning are still few (Thomas, 2000; Kucharski, Rust, & Ring, 2005). The effects of PBL have been examined mainly around four aspects: knowledge (e.g. academic achievement, conceptual understanding), performance (e.g. the ratings of task and application), experience (e.g. satisfaction, motivation), and metacognition (e.g. problem solving, communication, critical thinking). The effects of PBL could be examined in terms of both general effects and differential effects for students with different traits. I will examine the general effects first.

One significant study was done by Barron et al. (1998) with 111 5th grade students on a 5-week project applying geometry concepts to architecture design (to design a playhouse for children). Three measures were used to evaluate the effectiveness of PBL: a standard test to evaluate their understanding of geometrical concepts; an individual design task to evaluate students' performance; and the quality of collaborative projects to evaluate teamwork level. Although it is only a single group study, the results of the three measures indicate substantial gains in the students' abilities to understand, apply, and communicate geometry concepts. The evidence also showed that students become more reflective, became more aware of realistic constraints, and acquired "a sense of agency"(Barron, 1998, p. 273) to take ownership, responsibility, and initiative during the project process.

A common research design to provide a justification of PBL is to make experimental comparisons between PBL and competitive instructional strategies, which is usually called pretest-posttest control group design. Barak and Dori (2004) used experimental research design to investigate the effectiveness of PBL in three undergraduate chemistry courses taught by the same instructor, including both experimental and control students. Ninety-five students carried out an individual project by doing web-based inquiry and constructing computerized molecular models, and the other 120 students in the control group only solved traditional problems. The effectiveness of PBL was evaluated using pretest to posttest gains and course final examination. The research showed the experimental group performed significantly better than the control group. A qualitative analysis of documents, interviews, and observations also showed enhanced conceptual understanding of molecular structure for the experimental group. Although the credibility of the results might be challenged, as students' participation in the experimental group was voluntary rather than random, this study, through comprehensive data collection, provides a strong argument for the effectiveness of the project approach.

Rather than compare the project approach with the traditional lecture approach, Waks and Sabag (2004) compared PBL with experimentation in engineering education. A class of 34 second-year undergraduate students were randomly divided into two groups, 14 doing projects with a computer simulation software and 20 doing lab experiments. All other activities were similar with the only difference being one group spent about 40 hours doing projects while the other group spent about 40 hours doing lab experimentation. Students using PBL were asked to select and define a task, search for information through the Internet, run concepts on the simulation software, and construct real components (e.g., car alarm, wave generation). Using test scores from the previous semester as a pretest, four posttests focused on operational and

interpretational questions showed that the project group gained a higher score than the lab group. It should be noted here that the project group, according to the description in the study, seemingly required more time after class (e.g. the entire project was documented), and was given more interaction (e.g. the criteria is negotiated through student-teacher discussion). Therefore, the statistical significant difference may result from an "unequal" comparison with these hidden inputs.

Martínez-Monés et al. (2005) developed a multiple-case-study project design for their computer architecture course. Students were encouraged to design and evaluate a computing system for potential customers. Students played the role of engineers at a computer manufacturer to assist a customer in purchasing a computer system for his or her business problem. Teachers played the role of the customers. The results showed this approach introduced both depth and breadth of concepts as required in the curriculum, increased students' attitude toward teamwork, and improved process skills, such as planning, organizing, writing, and collaborating. One interesting design feature in this study is that instead of proposing only one customer (case study) for all teams, five different customers were considered for different teams. This design feature made students share learning experience and compare solutions, and as a result, addressed a need for broad knowledge.

However, not all studies show a positive effect of PBL. For example, Ponta et al. (2001) investigated students working on a collaborative electronic system design project in an undergraduate engineering course and reported unexpectedly low communication traffic, only an average of 2.3 messages per team, although 95% of 120 participants stated preferring project work to traditional lectures. Another example indicating a possible negative effect of PBL is Cohen's (2001) study. Using a pretest and posttest design with a learning style survey which was

administered during the first month and the last month of schooling, Cohen compared students from two high schools, one a technology rich school that promotes project-based learning, the other a school that adopts the traditional curriculum. Through a one-year period, although the traditional school had a decrease in terms of students' motivation, persistence, and responsibility, the technology rich school showed a greater decrease.

Kucharski et al.'s (2005) study also showed a mixed result of PBL. Kucharski et al. evaluated a project-based science curriculum called Ecological, Futures, and Global (EFG) in an elementary school. Students were grouped according to the curriculum variables: students who were currently in the EFG curriculum, students who had previously participated in the EFG curriculum, and students who had never been in the EFG curriculum. The two dependent variables were gain scores on standard tests, and student satisfaction score. Using ANOVA as a major analysis technique reveals a significant main effect for the curriculum variable and an interaction between grade and gained score, although surprisingly it does not show a significant difference in satisfaction scores.

Just as shown in Kucharski et al.'s study that the effectiveness of PBL is modulated by grade levels, PBL yields different effects for groups with the different characteristics and further implies variations in design features (Thomas, 2000). A couple of studies have reported differential effects. Meyer, Turner, and Spencer (1997) investigated differential effects of PBL between challenge seekers, who have a tolerance for failure, and challenge avoiders, who have a higher negative affect after failure. Although the authors didn't report the effects of PBL on students' performance and knowledge, the positive effects of PBL on motivation, satisfaction, and metacogntion go to challenge seekers. Challenge seekers are inclined to exert metacogntion,

seek rational explanation of their failure, and as a result, they learn more from mistakes and maintain persistence.

Chen (2004) studied the effects of different learning styles on project-based learning in the college context. The two groups, a field dependency group (FD), who rely more on context information, and a field independency group (FID), who are able to separate relevant materials from the context, were compared on their web page devolvement project. Using only mean and standard deviation as an index, the researcher reported that FD students outperformed FID students on webpage development if working in a group format, while FID students outperformed FD students if working individually. Although it is hard to determine if the differential effect in the study is statistically significant or educational significant, the study illustrates that PBL should be examined according to different learners and instructional contexts.

In sum, project-based learning, as a participatory pedagogy, has proven to be effective generally in knowledge enhancement, skill building, motivation raising, and metacognition developing. It seems an especially successful pedagogy in the domains that are "project-oriented" or have a learning-by-doing nature, such as science education and engineering education as illustrated above. It is worth further investigating the differential effects and challenges with specific subject matter and groups of learners. I believe that instructional design is such a project-oriented subject and PBL should theoretically work well. Further investigation of using PBL for working people and in the field of instructional design will substantiate its effectiveness and clarify the design features of a project approach.

A prevalent weakness on PBL research that must be mentioned is that most researchers did not report the value (percentage of grade) assigned to the project in the overall curriculum

assessment. Whether the effects of PBL are reliable and widespread is connected to under what conditions they exist. Evaluation plays a significant condition in pulling together students' experience, performance, and motivation. Since PBL is usually blended with traditional curriculum, it takes only a certain proportion of the grade in assessment. A project assigned 10 percent and a project assigned 100 percent of the overall course assessment definitely cause different project experiences. Therefore, without this proportional index, generation and comparison of research studies on PBL are difficult.

Challenges of Project-Based Learning

Although seen as a promising, potential, and innovative pedagogy, project-based learning, as Blumenfeld et al. (1991) pointed out, does not itself guarantee effectiveness. PBL presents challenges for students, teachers, and institutions. Here, I will only focus on the challenges that could be addressed by design features, while other challenges associated with school policy, class management, teachers' role change etc. are outside of the realm of instructional design. The following sections are organized around six challenges. Having noticed that research studies on PBL do not adhere to a robust research agenda and are not "scientifically" continuous and cumulative, I organized these challenges categorically, rather than chronologically.

Challenge 1: Balance between breadth and depth of knowledge.

A project approach demands increased workload for students, such as information searching, experiment designing, report writing, as compared to traditional approaches. Although completing a complex project has been proven to promote deep understanding of concepts (e.g. Barak & Dori, 2004), this pedagogy tends to focus on a restricted set of concepts whereas curricula require a broad range of concepts (Martinez-Mones et al., 2005). Given that the

instructional time is limited, the balance between the depth and the breath of knowledge as mandated by curriculum standards has to be considered. One way to cover the breadth of knowledge is to integrate a project approach with systematic instruction (Katz & Chard, 2000). For example, a curriculum could be set to have an appropriate proportion between a project model and a lecture model. Another way is through careful design of projects so that students could tap different concepts in the curriculum. For example, Martinez-Mones et al. (2005) proposed a multiple-case study project design in a computer architecture course to give students opportunities to share knowledge and compare solutions among different teams.

Challenge 2: Keep students on the right track.

In doing a project, students need to complete a series of complex activities by identifying driving questions, locating relevant information, designing valid solutions, operating instruments, creating documents, etc. Students are expected to work toward intended goals. However, students are not experts and do not have sufficient knowledge and specific skills to perform in a fashion as experts would do for their projects (Barron, 1998). Students can easily leave the right track as designed by instructors and pursue peripheral questions. Therefore, design features should be considered to keep students on the right track. CTGV (e.g. Barron, 1998), for example, often used a video-based anchor at the beginning of project to introduce project ideas and help students focus on goal. Using scaffolding techniques is another way to keep students on the right track. Land and Zembal-Saul (2003), for example, used a progress portfolio, basically a pre-structured template with driving questions, to support the process of scientific inquiry.

Challenge 3: Do a project with understanding, rather than following procedures.

The complexity of a project can increase the likelihood of simply following procedures rather than experiencing significant cognitive activity (Barron et al., 1998). A pitfall of PBL is that students may be engaged in an activity for sake of doing, but not understand what they are doing. Krajcik et al. (1998) investigated students who participated in project-based learning in middle school for the first time. They found that students failed to focus on the scientific merit of projects and fail to conduct the systematic data collection and analysis that were warranted by the science subject. Petrosino (1998) also illustrated that students learned little from the hands-on activity of doing a traditional rocket project without a reflection and revision process. By simply following a procedure to accomplish the project, students did not show more fundamental knowledge of physics, such as what makes a better rocket? Therefore, it is crucial to engage students in meaningful investigation.

Barron et al. (1998) illustrated some design principles that may lead to doing a project with understanding. These principles include appropriate goals, scaffolds, opportunities for formative assessment and revision, and social organization. Land and Barbara (2004) also illustrated a strategy to avoid topic "drifts" or idea simplification for doing PBL in an information rich environment: progressing from data-driven to goal-driven approaches. They found students who chose goal-driven strategies generated a more coherent project than students who chose data-driven strategies

Challenge 4: Take challenges and learn from mistakes.

As mentioned earlier, because of insufficient background knowledge, students tend to have unsuccessful experiences with challenging and complex projects. Meyer et al. (1997) studied students' attitude toward risk taking and reactions to the outcomes of the project in a mathematic class. Fourteen fifth and sixth graders worked on kite projects with the intention to

understand, integrate, and apply principles of geometry and of aerodynamics. Using surveys, the researchers identified two types of students, challenge avoiders and challenge seekers. Challenge avoiders were inclined to meet assessment standards, choose superficial goals, and follow the procedure. They tried to avoid failure of learning and did not want to take a learning opportunity by doing a challenging project. Challenge seekers, on the contrary, could learn more because they have a high tolerance for failure and take a learning goal orientation, which make them more likely to experience "well-being" (Boekaerts, 1993) and "flow" (Csikszentmihalyi, 1996, , 1991) during a complex and challenging project. Therefore, project-based learning should build in safeguards for most students to take risks and develop a constructive view of error.

Challenge 5: Facilitate effective collaboration.

Collaboration is a common format in project-based learning and has many pedagogical functions. However, collaboration is not always successful. This was illustrated by very low communication traffic in Ponta et al.'s (2001) study. Frank, Lavy and Elata (2003) also reported students in PBL experienced chaotic teamwork and conflicts and did not know how to resolve them. Teamwork is not just having some people together, but initiating a process. Students must be trained to work in a team. Project-based learning should integrate such a component for students to work together.

Moreover, collaboration is also affected by community culture. There has been an increase in distributed project-based learning recently. A few papers (e.g. Gregoire & Lafepierre, 2004) have described using computer networks as a solution to provide interactions at all levels. However, Ponta et al. (2001) disclosed a big challenge: a variety of localized curricula, textbooks, schedules, working language and students at different stages of progress made a

distributed project approach difficult. Design features should address barriers brought by different community cultures.

Challenge 6: Give students a sense of authenticity.

Because project-based learning usually starts with letting students choose a relevant problem or task, it is believed to have the inherent characteristic of authenticity. However, allowing students to choose their own problems does not necessarily lead to an authentic project (Savery & Duffy, 1995). As Barab, Squire, and Dueber (2000) argued, authenticity lies in "the learner-perceived relations between the practices they are carrying out and the use value of these practices" (p. 38). Authenticity represents an important and often neglected factor in project-based learning. How to design the feature of authenticity seems neglected in the literature. Although some researchers on authentic learning offered useful ideas on design principles and criteria (e.g. Herrington et al., 2003), few empirical studies on PBL have investigated the effects and challenges of this factor. I will discuss authenticity as a significant design issue in the next section.

In sum, for PBL to be an effective instructional approach, the challenges associated with it should be considered and design features should be clarified. Such challenges vary with the subject matter, students, and project formats. In my research context, a real job project is a significant design feature, and how it affects and challenges teaching and learning is worth investigating.

Authenticity and Its Application in Project-Based Learning

Project-based learning is generally considered as having an authentic characteristic in itself (Blumenfeld et al., 1991; Thomas, 2000). However, few empirical studies on project-based learning have investigated the effects and challenges introduced by this characteristic. Gordon

(1998) and Gonzale and Nelson (2005) provide thoughtful ideas and have inspired this study to investigate authenticity as one important design characteristic in project-based learning. This section reviews the concept of authenticity and discusses how the different degrees of authenticity may contribute to learning.

Authentic learning has recently gained renewed interests in the field of education. The basic reason educators are interested in "authenticity" or "real-world characteristic" is that there is a separation between the academic world and the real world in conventional pedagogy (Brown, Collins, & Duguid, 1989; CTGV, 1990; Herrington & Oliver, 2000; Gulikers, Bastiaens, & Kirschner, 2004), where knowledge is seen as decontextualized and self-sufficient. Correspondingly, learning is seen as a process of simple knowledge (or facts) acquisition and rote memorization. As a result, a student can answer items on a test but may not be able to use what he or she has learned to solve real problems. Facing such issues, from early pioneers like Dewey to current situated cognitivists all insist on the importance of a real world context and argued that knowing and learning are context dependent and sensitive. Authenticity has been considered as an important characteristic or "construct" contributing to effective learning and as an approach connecting between theory and practice. However, authenticity is still an ambiguous term and open to interpretation in the field (Petraglia, 1998a; Barab et al., 2000; Herrington et al., 2003; Gulikers et al., 2004). Different researchers refer to different components and levels of authenticity, which lead to a weak shared frame of authentic learning research and practice. Therefore, what constitutes "authenticity" in the instructional context needs to be examined systematically.

Dimensions of Authenticity

According to Webster's third new international dictionary (1993), authenticity is "the quality of being authentic" or "the quality of being authoritative, valid, true, real, or genuine"(p.146). Given our interests in the instructional usage, authenticity here refers to the degree of an instructional component's dependence on a specific real-world setting. In other words, authenticity is an index of proximity or similarity between a task, context, activity, or materials in instruction and their real-world parallels. Authenticity measures the resemblance between an instructional component and its corresponding component in the real world. An instructional component has an authentic characteristic if an instructional component is related to a unique temporal or spatial setting. The example of high school students who are going to their living area to study local bird species distribution has high authenticity between the instructional context and real-world context. Asking novice instructional designers to solve an instructional problem from the real classroom has an authentic characteristic in terms of task. Asking a medical student to learn to diagnose common symptoms in clinics has an authentic characteristic in terms of both context and task. Then, what if a medical student learns to diagnose a patient through electronic simulation software, we know this simulation has a kind of authenticity, but it is neither real context nor real task. Therefore, authenticity is a multifaceted concept and it is necessary to deconstruct this concept.

The concept of authenticity should be identified through three dimensions: its degrees, components, and subjectivity. All of these dimensions should be considered in instructional design. First, authenticity represents a degree on a continuum (see Figure 2). Authenticity is somewhere between two extremes: on one side, the real world where we live or ordinary practices take place; on the other side, the academic world consisting of symbols representing

real-world phenomenon and operations based on these symbols. If a learning context is closer to the real-world side, we call it more authentic or realistic. Actually, most authentic learning contexts are not located on the extreme side of reality, but on a point approaching reality, in contrast to the academic world. For example, a computer simulation is often seen as an authentic context (e.g. CTGV, 1990; Mayer, Mautone, & Prothero, 2002; Gulikers, Bastiaens, & Martens, 2005). For any intentional guided learning, an authentic context is not on the extreme side, but a point somewhere close to reality.

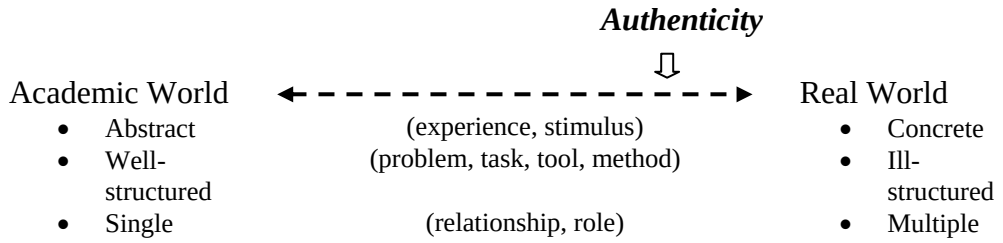

Figure 2. Real world-academic world continuum and authenticity in instruction.

Second, authenticity has several components. The authenticity is an index to measure proximity between an instructional component and its corresponding real-world component. The component could be a task, material, activity, tool, etc. Authenticity includes at least three components: factual authenticity stressing real objects and data, procedure authenticity stressing real performing process, and task authenticity stressing the similarity to real-world tasks (CTGV, 1990; Barab et al., 2000). Gulikers et al. (2004) provided a more holistic framework of authenticity, consisting of task (what do you have to do?), physical context (where do you work?), social context (with whom do you work?), assessment result (what is the result?), and criteria (how do you judge what you have done?). They concluded that task, its result (or product), and criteria are the most important indices of authenticity whereas physical and social contexts are not significant in the learners' perceptions. So, as far as instructional design is

concerned, a real-world context must be task-authentic, product-authentic, and criteria-authentic, and less time and money may be spent on designing a physical and social context -- simulation of high fidelity.

Third, authenticity is also a subjective index, and what is important in the instructional context is the "perceived" authenticity (Petraglia, 1998a, 1998b). Just as a constructivist believes that knowledge is constructed, authenticity is also constructed depending on a learner's experience and interaction with the environment. Learners with different ages, experiences, and roles may view authenticity differently. For example, an adult may think that children playing their self-dramatized games is not authentic, though psychologists already pointed out that play is an important authentic activity for children both cognitively and emotionally (Leontiev, 1981). Similarly, a child won't be interested in learning interpersonal or social skills, though an adult would think it is highly authentic in the business world. "What we know to be real is not known in any objective sense, but is believed to be real" (Petraglia, 1998a, p58); therefore, the real world is a "constructive real world".

In sum, the value of authenticity for instructional purposes is where knowledge and skills will be used to solve real life problems consistent with community practices. Authenticity of a specific learning context varies in terms of different degrees, components, and may be perceived differently.

Real World -Academic World Continuum

Authenticity for an instructional purpose, as clarified above, is a dynamical point on the continuum, from highly realistic to highly abstract (see Figure 2). The closer the context is to real life or professional life, the more authentic it is for a target learner. The further the context is from real life, the more academic it is. Imagine a context where a student learns $E=m*c^2$ through

a lecture and a context where an apprentice learns a craft in a rural village. Each is an example of highly academic and highly authentic contexts respectively. Then, consider the context where a novice student learns how to diagnose engine malfunction through a computer simulation program. It is a kind of authenticity, but not a total realism.

Before clarifying different threshold levels of authenticity that contribute to learning, we have to briefly explain the roles each side of the continuum plays in knowing and learning. On one end of the continuum is “the real world.” Early in the last century, the importance of real-world contexts had already been well clarified by Dewey, and crystallized into learning by doing and experiential learning. Transfer is least likely to occur if learning is not situated in a real-world context. Knowledge and skills not only come from real-world practices, but also should be applied back as tools to real-world practices. As far as pedagogy is concerned, when a student learns a concept, he or she must be supported with a real context unless he or she already owns background experience, and in order to make the concept transfer, it must be applied back to a real context.

On the opposite end of the continuum is “the academic world.” The academic world, consisting of abstract knowledge, is human pride and human power by which human beings distinguish themselves from all other species. Such a world is developed during human practice to solve real-world problems, through an abstracting or decontextualizing process, a basic human capability and source of wisdom. Without abstracting or decontextualizing capability, we won’t have theory, $E=m*c^2$, or technologies. The academic world has three features: mode of representation, economy, and power (Bruner, 1966). The academic world is filled with symbolic, abstract, and logical representations like Ohm's law or Newton’s laws of motion. Economy means only the least amount of information needed to achieve comprehension and to accomplish

operations mentally. It is more economical to depict the relationship between current, voltage, and resistance by the formula R=U/I than to put a series of numbers into a table to summarize a vast set of observations. Power refers to generative value to different contexts. When diagnosing an electronic problem, we still can use abstract knowledge like R=U/I learned fifteen years ago, although we do not have episodic memory about events fifteen years ago.

Several researchers have explored degrees of authenticity from different angles, some of them almost forgotten by current scholars on the research of authentic learning. First let's go back to Dale's classic work, cone of experience.

1. Abstract and Concrete Levels of Experience

In the early history of the educational technology field (then audio-visual instruction), researchers like Hoban and Dale have already examined how experience comes and how different experiences contribute to learning. Hoban and Dale hold a similar position that the value of a certain experience is a function of its degree of authenticity. Here, we will use Dale's (1946) cone of experience to illustrate degrees of the "real world." The cone of experience consists of nine levels of learning experiences and could be divided into three general categories from the bottom to the top: experiences by practicing (direct experiences, contrived experiences, and dramatized participation), experiences by observing (demonstrations, field trips, exhibits, television & movie, and radio & recordings & still pictures), and experiences from symbolic operations (visual and verbal symbols). From the bottom to the top of the cone, it changes from concreteness to abstractness: the lower the level of the cone is, the more realistic it is. The lowest level is a total situation and the highest level is verbalism called by Hoban et al. (1937).

At the bottom category, students learn through in-person participating and learning by doing. Students gain the most direct, concrete, and rich experiences. However, a drawback of

such learning is that non-essential phenomenon may distract students' attention, and its feasibility is constrained by time and space. For example, traveling along the Amazon river offers an excellent opportunity for a student to learn biological diversity through authentic interactions with the ecology system; however, the student's attention may be easily distracted by an exotic flower and a weird animal, and as a result, the student may not center on essential concepts like food chain. Moreover, traveling along the Amazon is constrained by time, funding, and feasibility.

At the top category, including both spoken and written language, students learn from textbooks or lectures. This kind of learning is least authentic. All phenomena in reality have been represented by abstract concepts and rules. Advantages of this least authentic learning are high efficiency of information delivery, low cognitive load, and focused essential concepts. However, these concepts and rules may not reflect the vivid and complete phenomenon and may lead to ambiguity. Imagine if students learn ecological diversity through classroom lectures. Each student will potentially generate a very different understanding.

The middle category consists of audio-visual experiences. Learning based on these mediated experiences is a kind of authentic learning, which has the advantages of the other two categories. These audio-visual experiences could support simulation of real world and provide concrete experience compared to the top category, and compared to the bottom category, could help learners focus on essential concepts and rules underlying phenomena and go beyond the constraints of time and space. A video about the Amazon would have benefits such as compression of a long time period and huge space and revisiting a scenario when necessary. The video could also help students center on essential concepts like the food chain through purposefully shooting and editing. The middle category bridges the gap between authentic

experience and symbolic representations (Miller & Burton, 1994) and helps a novice learner "commute" between two sides of the continuum.

The cone of experience illustrated that the value of learning experiences is a function of their degrees of authenticity. However, it is not without a problem, an issue that should be pointed out here. A real-world context should be assessed according to learners' mental activity, rather than external stimulus. Although, generally, the more authentic the learning context is externally, the more authentic it is mentally; however, they do not always match. A well-prepared lecture-style presentation, though a didactic format, may provoke students' "real-world" imagination; while a field trip, though an experiential format, may not always facilitate authentic learning if it is poorly aligned with instructional conditions, such as learning objectives or students' backgrounds. In addition, the same format of delivery media could generate different degrees of authenticity. For example, when learning through pictures, a real engine photograph or an engine diagram brings different degrees of authenticity, even though the later one is less authentic yet is more essence-focused. Therefore, the inner mental activities rather than external formats are a much more important index for authenticity.

2. Inner Mental Representation Levels

Bruner (1966) classified three mental operations of knowing and learning: enactive, iconic, and symbolic representations. Enactive representation refers to using actions and manipulations with real objects (e.g. learning driving a car). Iconic representation operates with images and graphics without defining them fully (e.g. imagining car movement). Symbolic representation is governed by symbols, rules, and principles (e.g. $s=1/2gt^2$). Generally Bruner's representational levels and their contributions to learning fit in with Dale's cone of experience and could be superimposed on the cone of experience (Heinich et al., 1996). Bruner's reflects

authentic levels mentally and seems more accurate; however, it is hard to detect and measure mental activities in practice.

Both Dale's cone of experience and Bruner's modes of representation could do well on clarifying authentic degrees of learning activities for K12 education, but have a problem with job- or career-oriented training. First, authentic learning toward a career is not just interacting with real contexts and real tasks, but trying to behave, think, and perform like a professional in communities of practice. Learning is a process of both knowledge manipulation and role being. Second, in the knowledge-based society, most professional life actually consists of abstract symbols and operations based on them. Abstract work has become ordinary practices. For example, a doctoral student should learn how to write research papers by engaging into an apprentice-style relationship with his or her professor. Writing here is very academic yet still very real. In this sense, the experience- or mentality-based authenticity could not explain authentic degrees of communities of practice. Another measurement of authenticity is needed.

3. Ordinary-Practice-based Degrees of Authenticity

Situated cognition defines authenticity as "the ordinary practices of the culture" (Brown et al., 1989, p34). The ordinary practice of a career field is socially structured and negotiated within a realistic and "noise" environment, unlike most school activities filled with well-defined, context-free, and fixed connotations. So, another way to determine the authentic level of an authentic learning context is based on its distance to the ordinary practice of the targeted career field.

Gordon (1998) distinguished three project approaches according to the degrees of authenticity: academic challenge project, scenario challenge project, and real-life challenge project. The academic project approach transforms existing subject matters to a task format,

which is familiar to teachers and students in traditional educational environments. For example, in an introductory educational technology class, students are asked to develop a multimedia presentation representing the history of educational technology and providing information that exemplifies major themes. The academic project is directly organized around the subject area and is an entry point into authentic learning with its major goal to promote understanding of subject content.

A scenario project increases the authenticity of the learning context. Students are asked to perform a real life role in the context of a scenario (reality based or fictional). The scenario project simulates some elements of the real world and integrates targeted curricular material. For example, in an instructional design course, a student is instructed to help a science teacher who had difficulty in teaching Ohm's Law by applying instructional design knowledge. In a scenario project, students apply knowledge and skills needed for success beyond school, see themselves as real-life roles in communities of practice, and gain a sense of complexity in the real world.

A real-life challenge project is a project in need of a real solution in the real world context. Students are involved directly and deeply in the real world and have a tangible impact in their communities. Students have a great opportunity to apply knowledge and to understand the validity of knowledge in the real world. A real-life project provides powerful authentic experiences, but usually takes months, even years, to accomplish. Besides design features, the success of the real life project approach is also constrained by resources, time, and money.

While real life projects may be the ultimate authentic experience, they are usually out of reach for most teachers due to over-complexity and expensive costs. Therefore, scenario projects, which retain approximations of real world context, are more feasible for students to

enjoy the same level of engagement, meaningfulness, and complexity. In the literature, most PBL practices (e.g. Bos & Gordon, 2005) are at the level of scenario projects.

Gonzales and Nelson (2005) also illustrated degrees of authenticity toward the workplace. They designed three levels of project-based learning according to its distance from the real world practice for computer science students: “local projects,” “community projects,” and “enterprise projects.” “Local projects” refer to developing real applications based on the needs in the school, say, developing a website for an instructor. For “community projects,” students develop computer applications for nonprofit or charitable organizations. “Enterprise projects” are much more authentic projects in which students deal with real clients such as IBM and Microsoft. Students assume real roles and develop projects observing industry policies and conventions.

If the learning project is closer to the ordinary practice of a field, the more responsibility a student assumes, and the more complexity and “noise” a student encounters. In a local-level project, more scaffolding from instructors is provided so that a student could solve problems at his or her capability and capture major concepts and principles more quickly. In an enterprise-level project, there are more ill-structured activities, more various roles, and more responsibilities. Students exercise higher-order thinking, gain the deepest sense of complex reality, and are exposed to industry conventions to the maximum. Generally speaking, the authenticity and complexity of a project should gradually increase as students gain much more necessary knowledge and skills (Gonzales & Nelson, 2005). These learning projects illustrate different degrees of authenticity when designing authentic learning toward a career or workplace.

In sum, PBL could be designed according to its distance to communities of practice. A degree of authenticity is proportional to the increasing participation in communities of practice.

In this study, the focus is on real life projects. A trainee in the IDT program comes with a real problem, takes a real role, and develops a real solution. It has a higher degree of authenticity than that of a scenario project which usually takes place in schools and prepares students for the workplace. Studying effects and challenges of incorporating such a real-job task in project-based learning is needed.

Methodology to Conduct Research on Project-Based Learning

The purpose of this section is to identify major methods, techniques, and variables used for PBL research and their fitting research goals. The three major methods for PBL research are empirical-quantitative, descriptive-qualitative, and design-based methods. Although other methods exist and some studies used mixed methods, these three methods are fundamental to attack research questions on the effects and challenges of PBL.

Empirical-quantitative methodology usually uses experimental design and variance analysis to measure the effectiveness of PBL. Students in project-based learning are grouped as an experimental group, and students in another pedagogical group serve as a contrast group. The common comparison is between PBL and the traditional lecture-based model. For example, Kucharski et al. (2005) illustrated a very straightforward method using standardized tests as a measure to compare the PBL curriculum with the traditional curriculum in the K12 context. Using ANOVA as the major analysis technique revealed a significant difference of gained scores between different pedagogical approaches. While most studies compared PBL with the traditional lecture model, Waks and Sabag (2004) compared the PBL approach with lab experimentation in the college context. Students' grade from the previous semester was used as a pretest score and was found to be statistically equivalent for both groups. Using four post-tests, and MANOVA as an analysis technique, Waks and Sabag found that students who did a project

on designing electronic systems in a simulation software outperformed students who did lab experimentation. Although the benefits of PBL should exceed gain on achievement tests, using them as a measure represents the most straightforward way.

Besides achievement tests, a more accurate measurement of PBL effects should also consider students' performance, motivation, and experience. For example, Barak and Dori (2004) measured both test scores and attitudes before the experiment and after the experiment. Covariance analysis (ANCOVA) reveals that project-based learning has statistically significant effects on test scores and attitudes in learning chemistry.

Quantitative methods are also used to divide a class into groups to investigate differential effects. For example, Meyer et al. (1997) used a survey and a correlation analysis to identify patterns between students' self-reported tolerance for failure and their learning goals, self-efficacy, and strategy use. They then identified two groups called challenge seekers and challenge avoiders. Based on this division, they investigated how challenge seekers and challenge avoiders experienced mathematic project-based learning differently.

Descriptive-qualitative methodology is another common methodology in PBL research, including interviews, observations, and document analysis, which usually results in the method of case study. This methodology is effective with a goal to develop a thorough and multifaceted description of the PBL experience and process, such as investigation procedure (e.g. Krajcik et al, 1998), usage of a specific tool (e.g. Susan & Barbara, 2000; Erstad, 2002), or implementation (e.g. Frank et al., 2003). This methodology is commonly used in organizational learning contexts (e.g. Bresnen, Goussevskaia, and Swan, 2004; Scarbrough et al., 2004).

Krajcik et al. (1998) conducted an intensive qualitative study with 8 students in two middle school science classrooms, which includes 60 hours of videotaped observations of each

class, five interviews with each student, and analysis of various artifacts (assignments, laboratory notebooks, tests, and reports). Collected data were first classified according to five inquiry stages: asking questions, planning and designing investigations, constructing apparatus and implementing experiment, interpret data and drawing conclusion, and presenting finds. Then these data were further divided into three evidence categories: inquiry activity and self-regulation on activity, interactions and workload distribution, and motivation. Finally, comparison across the cases was conducted to determine commonalities and differences of each student's inquiry process. Case studies create a vivid picture about what students do and what the difficulties of project-based learning are. This study provides a very good example of using a qualitative method to investigate PBL activities and experiences.

Land and Barbara's (2000) study illustrates a qualitative study dealing with aspects of PBL in the Internet environment. Nine participants from an introductory educational technology class at the college level were asked to integrate information from the Internet into their projects. Multiple data collection techniques were used. Videotaped observations were used to track information searching decisions, documents and final artifact were collected as measures of project coherence. Surveys were distributed to collect participants' self-reports of learning experience and knowledge of the Internet. One technique worth noting in their study is that think-aloud protocol was used to verbalize participants thinking activity. Data were first collated according to three research questions: strategy use, knowledge sources, and coherence of project ideas. Then categories were classified as instances of similar processes or operations. For instance, the first research question (what strategies do learners use to guide their information seeking?) was divided into two distinct categories: use of data-driven strategies, and use of goal-driven strategies. Through an iterative process of coding and categorizing, themes and patterns

were initiated. This study also illustrates that the qualitative method is an effective way to describe and interpret students' experience in project-based learning.

Some PBL studies employed design-based methodology with a major goal of intervention. A classical example of using design-based research is a study conducted by Barron and his colleagues at CTGV. Although a project approach has the characteristic of "learning by doing" and is located in a philosophy of education as "process of living and not a preparation for future living" (Dewey, 1974, p.430), a big challenge is that students may just simply follow the procedure specified by instructors and do a project for the sake of doing it. For the goal of "doing with understanding," Barron et al. (1998) identified four design principles and experimented with these principles (called a SMART model) in fifth-grade geometry classes: 1. Defining appropriate goals; 2. Providing scaffolds; 3. Encouraging formative assessment and revision; and 4. Constructing social participation. The project was triggered by a video-based anchor to help students establish a scenario in the real world, followed by designing a scenario project (e.g., designing a playhouse in the study). Using a single group and mixed-methods, three measures of standards-based geometry test, performance assessment, and collaboration indicated a positive effect of PBL on understanding, applying, and communicating ability. These design principles also proved to be effective in building "a sense of agency" (Barron et al., 1998, p. 273) to take ownership, responsibility, and initiative in the project process and increase awareness of realistic measurements and real world constraints.

Design research commonly appears in IT-assisted PBL in order to take advantage of information technology (e.g. Collis, 1997, Ponta et al., 2001; Land & Zembal-Saul, 2003; Helic et al., 2005; Martínez-Monés et al., 2005). Ponta et al. (2001) described NetPro, an online PBL environment, for an undergraduate course on electronic systems design. To address the issue of

distributed learning among multiple institutions, three components (projects deliverables center, special interest groups, and inter-institutional projects) were designed to support knowledge sharing, feedback, project management, and team communication. Technically, NetPro is based on a database application and user-specific web interfaces. Once again, it is a scenario-based PBL where students play with circuit simulators. The results of questionnaires from 120 participants revealed a very high preference (95%) for PBL, although team communication traffic was unexpectedly low, only an average of 2.3 messages per team.

Bos and Gordon's (2005) study must be mentioned as a design research because the research gives an example of using a relatively feasible and low-cost technique, creatively using an existing course tool (similar to WebCT) to realize PBL. In order to reduce the cost of conducting real-world projects yet provide a certain level of complexity and realness, Bos and Gordon (2005) designed a simulation as project-based learning environment, TUC (a simulated company), for undergraduate students in business to do a consulting project. TUC consists of 40-videotaped interview with fictional employees and 24 documents about company information in formats of Word, Excel, Powerpoint, and PDF files. Students' tasks were to identify problems in TUC and prescribed feasible solutions as consultants. The prepared interviews and documents were gradually presented as the students requested data. Although the videotaped interviews would not allow students to ask additional questions as in the real context, document analysis and course evaluation revealed that students were engaged in the higher order skills of analysis, synthesis, and critical thinking, and the PBL experience was challenging and rewarding.

Although the methodology of design research requires intensive collaboration among researchers, designers, and stakeholders, and creates a "tension in role division between development and research" (van den Akker, 1999, p.11), design research is believed to be a

promising methodology for research in fields like instructional design and technology (Reeves et al., 2005). Given that online learning will continue to increase and current online learning is still dominated by a “transmission” pedagogy, the research on participatory learning pedagogy, like PBL, as an alterative format to course authoring and delivery formats such as WebCT or Blackboard, will prosper.

In sum, each methodology has its strength and suitable research goals. Generally, research on the effectiveness of PBL was conducted more quantitatively, on implementation more qualitatively, and on interventions more design-based. Common data collection techniques include tests, surveys (including course evaluations at the end of semester), artifacts, interviews and observations, and, if in IT-assisted PBL, electronic tracking records (e.g., Bos & Gordon, 2005). The primary variables in PBL research include knowledge gains, performance, motivation, satisfaction, and metacognition. Common data analysis techniques are variance analysis in a quantitative study, and in qualitative study, coding and classifying according to project progress (project beginning, developing, presenting), and evidence categories, and then examining and comparing similarities, differences, frequencies, or causal relationships. Mixed-methods are commonly adopted in PBL research to provide the whole picture and to triangulate the findings.

Chapter Summary

Project-based learning, as a participatory pedagogy, has both practical and theoretical importance, especially in the current trends of emphasizing rich information technology environments, student-centered learning, and organizational learning. Research on pedagogical design has shown a more promising result than media comparison research which has yielded “no significance differences” and has generated an ongoing debate in the field (e.g. Clark, 1983;

Kozma, 1991; Reeves et al., 2005). Project-based learning is promising in that it emphasizes design features of instructional contents and activities. PBL seems more effective in "project-oriented" fields, such as science education and engineering education. Instructional design is one such "project-oriented" field. Therefore, a project approach should be useful theoretically.

Globally, social science research has been critiqued for lacking a robust and cumulative agenda (Reynolds, 1971; Berliner, 2002). Similarly, PBL research has lacked a robust and consistent model that has given way to somewhat excessive variety of research and practice (Thomas, 2000). Differences between instances of PBL may outweigh their similarities, and make it difficult to construct generalizations of effectiveness and challenges across different contexts. Therefore, results and conclusions from PBL research have to be seriously examined according to the instructional contexts.

Based on the literature review, five major points are summarized below:

1. Most published research on PBL has occurred in school settings, but very little can be found in training settings. There is increased awareness of using a project approach in the workplace context. Research on PBL toward the workplace is promising.
2. Primary effects of PBL include gains in participants' knowledge, performance, motivation, and metacognition. Some indirect effects include professionalism, role modeling, and practical workplace benefits. Most research studies have shown that PBL is an effective pedagogy in "project-oriented" subjects.
3. PBL does not itself guarantee effective teaching and learning. Specific consideration on design features should be given to balance the breadth and the depth of knowledge, to keep students on the intended progress, to promote meaningful work, to help students

take challenges and learn from errors, to facilitate effective collaboration, and to cultivate perceived authenticity.

4. Methodologically, effect size and data assumptions are rarely reported in PBL research, which makes generalization difficult. Moreover, researchers seldom report the value of doing a project in the overall course assessment, which also makes generalization and comparison difficult.
5. Most project-based learning is organized around a “constructed” or scenario project, which simulates some components in the real world. Research on real-job based PBL is still rare. How different degrees of authenticity influence teaching and learning is worth investigating.

The literature review on PBL was used to inform the researcher of the research design for the current study. A pilot study was also carried out to further improve and refine the research framework and methodology before actual data collection. The research design and the findings from the pilot study are reported in the next chapter.

CHAPTER 3 METHODOLOGY

Overview

The preceding literature review reveals that project-based learning is pedagogically sound for students to learn process-oriented domains like instructional design, and indicates that research on PBL in the training context is important. Studying differential effects and challenges of project-based learning incorporating a job task could inform the pedagogical value and design principles of a real-job project approach.

This chapter describes the research design, context, participants, materials, data collection, data analysis, and validity and reliability issues. Prior to actual data collection, a pilot study was conducted to test and validate research design. The results from the pilot study were included and were used to improve the design of the final study.

Research Design

First, the researcher will propose both an ideal and a practical design for the research goals in this study. An ideal design is a research design under ideal conditions as the researcher envisions it. A practical design is a compromise research design given the constraints of reality and the nature of dissertation study. With the intention to study the effects and challenges of a highly authentic (versus scenario) project approach, the ideal research design is a pretest-posttest-stability-test control group design. As shown in Figure 3, three groups, a real-job project group, a scenario project, and a no-project group, could be measured in terms of performance, knowledge, authenticity, and satisfaction. Trainees should be administered a pre-test before

participating in the training on knowledge and motivation, a post-test immediately after training, and a stability test several months after the training. Data analysis should be a multivariate analysis including pre-test as covariance. This ideal design would make the research a strong empirical study of a real-job project approach.

Outcome variables / *Design characteristics*	**Appreciation**	**Achievement**	**Application**	**Authenticity**
Real-job project				
Scenario project				
Non project				

Figure 3. An ideal pretest-posttest-stability-test control group design.

Project Stages	**Project Initiation**	**Project Development**	**Afterwards**
Experiences & Challenges	How does a trainee generate a real-job related task?	How do trainees negotiate their job contexts into the project?	To what extent is the training project applied back to the workplace?

Figure 4. Challenges associated with the real-job project.

However, practical constraints made such an ideal research design hardly feasible. Although some participants did choose to do a hypothetical project, it was not a randomized experiment. That is, the hypothetical and real-job groups as named in this study actually had the same intervention. Conducting a performance and/or knowledge test before, during, or after the training program was likewise unrealistic. To that end, the research here was done under the same treatment and depended largely on self-reported data.

This study employed a mixed-methods research design that combined surveys, semi-structured interviews, archival documents, and artifacts. A mixed-methods approach that includes making pragmatic knowledge claims, using both emerging and predetermined approaches, and collecting both quantitative and qualitative data has been argued as practically appropriate in social science (Creswell, 2003). Much of the extant PBL research (e.g., Bos &

Gordon, 2005) has also illustrated the viability of mixed methods. The purpose of the study was to investigate if and how the specific pedagogical design worked in terms of participants' satisfaction, achievement, and application. Mixed-methods was a match for the dual goals of this research study: (1) accountability (if something works); and, (2) exploration (why something is) to inform further interventions. Two aspects of investigation, the outcomes of the project approach (more quantitative) as well as the process (more qualitative), sought to help establish a rich and comprehensive picture of the actual impact of the pedagogical design within the IDT certificate program. A quantitative look has advantages in easily reaching more participants and communicating findings with numeric values to audiences in succinct and compelling formats. Quantitative inquiry has recently gained renewed emphasis in education as a major scientifically-based research strategy to increase accountability since the *No Child Left Behind Act* (NCLB) passed. However, the quantitative inquiry is not always appropriate to capture rich and complex aspects of socially constructed phenomena. In contrast, a qualitative inquiry could often capture key dynamics, social interactions, and unexpected effects that purely quantitative approaches often do not (Shank, 2002). A qualitative look has advantages in informing why an intervention works and how it can be improved. Therefore, choosing mixed-methods as a methodological framework was an appropriate choice considering the research goals this study targeted.

Specifically, this study took a multi-phase, sequential mixed-methods format (See Figure 7). The study started with comprehensive surveying and then followed up with interviews of participants to probe emerging findings in more depth. The quantitative phases and qualitative phases of data collection created a cycle that ended in a member check. Also, it is important to note that the IDT program was cancelled during the course of the investigation. Thus, the latter two phases took place after participants returned to their workplace.

The perceived effects of the real-job project approach include four indices: appreciation, achievement, application, and authenticity as shown in Figure 3. The first three indices have been well established in PBL research, and the last index is included as a significant design feature in this study.

- The index of "**appreciation**" points to the degree of satisfaction to this project approach as revealed in self-reports. This index refers to participants' affective reactions to a particular learning activity. This index has been commonly adopted for evaluation studies (e.g., Kilpatrick's four level evaluation, Philip's five level model), and recently has been emphasized as the value aspects of motivation (e.g., Brophy, 1999).
- The index of "**achievement"** measures the degree of the accomplishment of cognitive aspects generated by the project approach in the training program. This index refers to expectancy aspects measured by attainment of specific goals (Brophy, 1999). The accomplishment of cognitive aspects includes knowledge, skills, performance gained in the program, such as trainees' recognition and comprehension of specific facts, concepts, and procedural patterns regarding instructional design and technology. Such achievement is conventionally measured by a written test or project evaluation in the PBL research. Given the impracticality of administrating written tests in this study, achievement here is solely measured through trainees' self-reports, feedback, and artifacts.
- The index of "**application**" designates trainees' actual use of the project in the workplace. Application of the project is a very unique characteristic in PBL because PBL is intended to produce tangible products and, as a result, produces real life/workplace impacts. It has to be noted that application here refers to use of the project in the training setting in the real world, and therefore does not totally equal the application concept in

Bloom's taxonomy of learning which refers to the demonstration of applying knowledge and skills to solve problems. This index is measured through their self-report on the workplace application of the actual projects.

- The index of "**authenticity**" here measures the degree of connection between training experience and work experience. Perceived authenticity is measured by trainees' self-reports in the questionnaire.

The term "**challenges**" within the context of this study refers to both barriers to and opportunity for participants accomplishing their real-job projects, which potentially inform ongoing pedagogical design. The challenges will be investigated according to the stages of project progress, a strategy commonly used in PBL qualitative studies (e.g., Krajcik et al., 1998; Land & Barbara, 2000). The framework to investigate challenges associated with the real job design characteristic is illustrated in Figure 4. Although this study was based on a single-group, non-experimental design, I hope the study will serve as a basis for a follow-up ideal research design in my future career.

Description of Research Context

IDT Training Program

This study took place in the context of an Instructional Design and Technology certificate program jointly provided by a continuing education center and an instructional technology department at a southeastern Research I university. This training program met five times, every other weekend over a ten-week period, twelve hours each weekend, for a total of 60 program hours. The program was designed for professionals whose current or future job responsibilities involved designing training within an organization. The certificate program was offered every

spring and fall semester with a small class size of approximately 10 participants. Since 2000, twelve training sessions were conducted and more than 100 people participated in the program.

In order to help professionals in various organizations effectively apply the knowledge and skills of IDT, design considerations included blending authentic learning, project-based learning, and the nature of instructional design. Specifically, the pedagogical characteristics underlying the training program included the following:

a) The certificate program offered trainees the opportunity to choose an authentic project that is meaningful to trainees. The training was not a technical skills oriented program, but rather was intended to prepare trainees to effectively address and manage their training efforts. Trainees were required to develop an authentic project related to their real-life working contexts so that they could apply the knowledge and skills they learned. This characteristic allowed the trainee to solve a real problem by hands-on learning.

b) The training was organized following the framework of the ADDIE model. ADDIE is a generic model of instructional design, which consists of five phases of Analysis, Design, Development, Implementation, and Evaluation. It is a well-known model for developing new training programs. Both the IDT program and the project were built around this model to give trainees a sense of workflow. This characteristic ensured that different sessions and learning tasks were organic, connected, and the framework laid out a core basis for the expected expertise.

c) Instructors in the training program presented theories from the academic world as well as stories from the real world. Another distinguishing characteristic of the IDT training program was the diversity of instructors. They included both faculty members from the university who conduct academic research and professionals in corporations who apply

knowledge of instructional design and technology in the field. Including various speakers from the field allowed trainees to be familiar with IDT applications in-action and therefore facilitated their own problem-solving skills.

Project-Based Learning in the Certificate Program

The project approach is designed to integrate students' learning experiences of a broad array of instructional design and technology topics and to bridge trainees' work experience with training experience. The process of project-based learning follows through the ADDIE model. Each student is required to work on his or her individual project from their job contexts although collaborative learning is encouraged.

The training sessions are organized to support the project progress although no instructor is directly responsible for the project. Each session covers a different topic in the field of instructional design and technology. The topics covered are illustrated in Figure 5.

Topics in the IDT certificate program
1. Introduction to the field and the theory of instructional system design
2. Analysis: needs analysis, task analysis; trainee analysis; performance analysis
3. Design: create the blueprint, storyboarding, tool choices
4. Development: message design; development tools; studio experience
5. Implementation: E-learning issues, case studies
6. Evaluation: usability testing; evaluation plan and tools
7. Others: adult learning; project management; training proposal

Figure 5. Substantive course topics.

During the first week, trainees were introduced to the IDT training program and informed by the program chair that the training is organized around a real world project. They were invited to begin thinking about a software tool to learn, like Authorware, Dreamweaver, Captivate, or Flash (the choice is subject to change from semester to semester). The rest of this week was to introduce trainees to the field of IDT, the ADDIE model, and instructional analysis.

The focus of the second week was mostly about analysis including an analysis workshop, case studies of instructional design, adult learning theory, and project management. Trainees worked on their own training issues as class exercises, and heard real stories from industry and business. The adult learning session helped them be aware of adult learner' characteristics and apply instructional principles for adult learners. The project management session helped them manage a typical project management plan.

The third week was mainly about design and evaluation. The goal for this week was for materials to be produced on screen, like the color issue, font issue, and sequence issues, and trainees began to work on a storyboard for their ready-to-go product. Evaluation planning, tools, and usability testing were also covered during this week, although the evaluation plan was not required in the final deliverable.

The fourth week mostly focused on development. Trainees worked in a computer lab, learned software tools, and developed online-prototypes. The class was broken up into groups based on the tools they had chosen to learn. Each group had an instructor to lead them through their self-instructional software book. They were located in the same computer lab, but generally trainees who worked on the same tool sat close to each other. From Friday to Saturday, instructors moved on to more advanced functions to help trainees develop their projects. Some student volunteers in the instructional technology department also came to help trainees with their tool learning.

During the fifth weekend, trainees spent most of their time on their project work in the lab. A session about trends in the e-learning industry and a session on training proposal writing were scheduled as well. On Saturday morning, a project showcase was scheduled and each trainee presented on his or her own e-learning product for around 15 minutes. The presentation

served as the culminating activity of the project. After that, a graduation luncheon was served and the certificate was presented.

One feature in this project-based learning was its relatively low requirement of teaching transition and time commitment for instructors. The multiple presenters focused on their individual topics and taught similarly as they did with other classes. It did not require instructors to change their teaching practices. The past research has shown that the most difficult part of implementing project-based learning is that PBL requires teachers to change or modify their practice a lot (Thomas, 2000), but most teachers cannot accommodate themselves to this practice easily. For example, Rosenfeld, Scherz, Breiner, and Carmeli (1998) reported that teachers experienced high "cognitive load" and uncertainty during a PBL course, and as a result, neglected essential contents in the curriculum. The strength of the IDT project approach was its easy implementation. Yet, its operational simplicity might potentially pose a threat to quality outcomes because of the low connection between presentation and project.

Participants

The participants for this research study were trainees who had participated in the IDT training program and had returned to their jobs at the time of research. Most participants in the IDT program were trainers responsible for providing training and learning services within an organization. Changing workplaces necessitated those trainees to get trained in instructional design and technology, especially in web-based training. Various workplaces include higher education, government, public service (e.g., library), computer technology corporations, telecommunication, law firms, manufacturing, airlines, and consulting corporate. All participants were sent to an e-mail to solicit the participation in the online survey. Forty-three participants, about thirty-three percent of the individuals, filled out the survey. A total of 22 trainees accepted

the interview request. The selection of interviewees was limited to participants who completed the IDT program in its last three years (2003-2005) so that their experiences were still fresh in their memory. Interviews continued until redundancy was achieved. In the end, eleven participants were interviewed and their projects were reviewed as well.

A great challenge in this study was to recruit enough participants and to conduct a lengthy interview. IDT participants were professional adults and it was unlikely that they would spend much time on this research study. They were also distributed geographically, which makes extensive observation and interviews impractical. Moreover, some of them had already changed their job, and their early contact information was no longer valid.

Data Collection

This study employed online questionnaires as a primary method of data-collection. The researcher developed a web-based survey using Microsoft Access as the database engine and Active Server pages on the front end to collect data from the distributed participants. The survey was conducted over a three-month period (February - April 2006). First, an e-mail was sent to every alumnus to solicit his or her participation in the online survey. To ensure a large sample size, the solicitation e-mail was sent by the program chair on behalf of the researcher. Quite a few alumni had already changed their jobs and their contact information was no longer valid: nearly 50 e-mails were returned due to invalid e-mail addresses. To recruit as many respondents as possible, alumni with invalid emails were then sent a letter by mail. However, more than 20 letters were still returned. All in all, the total number of responses was 43, representing 33% of all alumni in the IDT program. At the end of the survey, participants were asked if they would like to participate in an interview. Participants could choose to participate by entering their names and e-mail addresses. Twenty-two participants volunteered for interviews. Upon

completion of the survey, survey data was entered into SPSS software. A descriptive analysis was conducted on each item and a t-test on the difference between the real-job group and the hypothetical group. Responses to open-ended questions were analyzed inductively, looking for themes within major categories.

The feature of survey design is “to generalize from a sample to a population so that inferences can be made about some characteristic, attitude, or behavior of this population” with the advantage of its economic and rapid way to collect large amounts of data from geographically widespread participants (Creswell, 2003, p154). In this study, a big challenge was recruiting research participants, not only because they were busy working adults, but also because they were broadly distributed. Therefore, participant recruitment and data collection techniques have to be strategic and flexible and place minimal burden on respondents. The survey design incorporating online technology was an appropriate strategy to cope with the challenge of data collection.

The complete questionnaire and its raw data have been included in Appendix A and D. The final version of the survey underwent several revisions: a pilot study, peer debriefing, and committee member checks. The questionnaire consisted of both Likert-type and open-ended questions. The items in the questionnaire included the following: choice of project, trainees’ entry levels in terms of computer expertise and instructional design expertise, and three self-report values (appreciation of the project approach, achievement through the project, and application of the projects). Items also asked about different aspects of the project experience and barriers trainees faced during the project. The open-ended questions asked about reasons preventing further applications and recommendations for improvement of the approach.

Items in the questionnaire are explained in detail as follows: Question 1 asked about the nature of the participant's project. The choice should be either a job-related project or a hypothetical project for the class only. Questions 2 and 3 addressed the participant's entry level of instructional design and technology. The entry level was measured in two aspects, instructional design and computer technology. Questions 3, 4, and 8 provided an overall view of the participant's perspectives regarding project-based learning in the IDT training. Question 3 asked about the participant's appreciation of the project approach. Question 4 addressed the participant's achievement gains through the project approach. Question 8 asked participants about the extent to which they had applied their projects afterwards. This study used these three dimensions, appreciation, achievement, and application, as important indices to measure the effects of authenticity within the project approach. Questions 6a-6j addressed the participant's perspectives and experiences with different aspects of project-based learning (project initiation, development, afterwards) in the IDT training. Questions 7a-7g asked about perceived barriers during their projects. Finally, two open-ended questions asked about the reasons why the project could be applied and not applied, and what changes participants wanted to see in this project approach to ensure a more effective program.

In addition to the survey data, it is important to develop a rich understanding of perceptions, experiences, and challenges from participants' perspective. The interview data was employed to provide a rich description. Interviews were conducted in April through September, 2006. To enhance interactions, richness, and accuracy, all interviews were conducted on-site, face-to-face, and audio-taped. Each interview followed the semi-structured interview protocol (Appendix B) and lasted average one hour in length. Interview questions were used to further explore issues that emerged from the survey and to help develop a rich-description of

participants' project experiences. I occasionally deviated from the protocol in order to ask the participant to elaborate on their responses. After the interview, a brief tour around the participant's workplace was usually taken. The site visit was to ensure more accurate understanding of participants' workplace.

Recruiting interviewees was easier than I expected. A total of 22 trainees accepted the interview request. Eleven participants were interviewed as representatives of a variety of workplaces, as well as representing differing entry levels. Interviews continued until redundancy was achieved. Follow-up e-mail communications were used to ask each participant to elaborate on issues that emerged from the transcripts and confirm whether the individual narrative description captured his/her experience. For those who agreed to an interview but were not interviewed, an e-mail was sent to acknowledge their acceptance and to request any project experience and application stories.

I also collected a copy of or a link to their web-based projects from participants if possible. Program evaluation archives were also copied from the training program organizer. These data could reveal participants' experiences when they were in the training program. A matrix (See Figure 6) is used to illustrate the relationship between specific questions and the data collection methods used in this study.

Mixed-Methods	1.1 Appreciation	1.2 Achievement	1.3 Application	1.4 Authenticity	2.1 Project Initiation	2.2 Project development	2.3 Project afterwards
Online questionnaires	*	*	*	*	*	*	*
Interviews	*	*	*	*	*	*	*
Document (mainly feedback) analysis	*	*			*	*	
Artifacts analysis		*	*				

Figure 6. Data collection matrix.

The whole research procedure timeline has been illustrated in Figure 7. Total data sets during the course of research include 43 questionnaires, 8 students' presentations in the final showcase, 11 semi-structured site interviews, 20 students' projects, and 6 sessions' formative evaluations (distributed at the end of each weekend during the program sessions), and 2 sessions' summative evaluations (distributed at the end of the program by the program administrator). This dissertation was primarily based on the data sets collected through phase 3 and phase 4.

Phases	***Timeline***	***Research Activities***	***Participants***
Preparation	Sept. 2003-March 2005	Engagement, observation, conversation, and reflection as a graduate assistant	Participants in four sessions
Phase 1: Quantitative	Pilot Study: March 2005	Paper questionnaire in one spring session	8 participants in 2005 spring session
Phase 2: Qualitative	November 2005	Archive on participants' showcase	10 participants in 2005 fall session
Phase 3: Quantitative	Feb.-April 2006	Online questionnaire, recruitment through emails and letters.	43 participants from 2000-2005, covering 12 sessions and representing approximately 30 business settings.
Phase 4: Qualitative	April-Sept. 2006	Site visit and face-to-face semi-structured interview	11 participants from 2003 -2005 representing 10 business areas.
Member check	Sept. 2006 – Nov. 2006	Ask for confirmation, explanation, and elaboration during analysis	22 participants through e-mail

Figure 7. The research process for this study.

Data Analysis

The researcher conducted data analysis between May and November 2006. Survey data in the Access database was exported to SPSS software for descriptive analysis on each item. The researcher then categorized the perceived values and challenges of project approach in terms of three indices, appreciation, achievement, and application, and three progressive project stages. A t-test on the difference between the real-job group and the hypothetical group was also conducted.

Inductive analysis was used to explore the interview data. Inductive/thematic analysis is a primary qualitative inquiry method oriented toward discovering themes, patterns, and interrelationships among data (Strauss & Corbin, 1988; Shank, 2002; Patton, 2002). It usually starts with exploration and confirmation of individual cases and ends with cross-case synthesis of themes and patterns (Patton, 2002). The major steps for my data analysis of interviews included the following: 1). When the interview was concluded, I transcribed the audiotape and organized interview transcripts according to each individual participant. 2). I conducted open coding and searched for events. I placed labels in the margins of the paper (in the electronic version, I put labels inside text using a bold font). I also highlighted “in vivo codes,” words used by interviewees, to remind myself about significant phenomena. 3). I developed a descriptive narrative for each participant (more like a case story). I also incorporated other data sources such as individual’s documents and artifacts when appropriate. At this point, I shared the narrative story with the participant for confirmation and further elaboration to ensure that the story accurately captured the participant’s experience and thoughts. 4) I developed themes that cut across individual experiences. This step is a high-level examination of data across narratives for both differences and similarities. 5). I summarized and formed explanatory theories. Of course, it

is not easy to draw a clear line between each step since the whole analysis is an integrative activity. It was not unusual for me to make connections while discovering and defining codes. It was also very common for me to develop a hypothetical theme when I was coding. In addition, writing memos was a continuous process across each stage.

Document analysis attempted to investigate trainees' interest toward this real job project, levels of engagement, major learning points, and difficulties they had when working on the project. Because these documents were initially designed as feedback and evaluation for the training program, not specifically for this research study, they served as supplementary data sources in this study.

Artifact analysis attempted to evaluate the instructional design knowledge and performance in trainees' final products according to training objectives. Because of the property restriction and the length of time that elapsed, most of the original projects were not acquirable for the researcher. Ten projects were evaluated using the rubric in Appendix C by the researcher himself and the program chair during the last showcase. These products were rated in terms of instructional analysis, instructional sequence design, visual presentation, functionality, and originality. The focus of this analysis was to substantiate trainees' performance and to assess how well they used IDT knowledge and skills to solve real problems.

Although data analysis was conducted according to different data sources, in reality, it was more in a recursive process of assembling, interpreting, and making meaning (Wolcott, 1994). It happened before, during, and after its collection. For example, I had already developed some rough story based on the existing documents and projects before I conducted interviews. Survey analysis and interview analysis also mutually informed each other.

Pilot Study

A pilot study was conducted in the spring 2005 training session, including a total of 8 participants. This pilot study serves as a preliminary investigation of trainees' experience with project-based learning. Based on data from the pilot study, the survey questionnaire and interview protocol were refined according to issues and patterns that emerged. The pilot study validated the researcher's intention of research on real job project-based learning as well as revealed some weakness in research design, which then resulted in adjustments.

The pilot study showed that PBL is a potential good training model according to perceived value reported by participants. Most IDT participants perceived a high overall-value of the project approach (Mean=8.0, SD=1.9), reported overall high motivation doing projects (Mean=7.9, SD=1.8), and acknowledged that their projects were highly relevant to their workplace (Mean=9, SD=1.7) on the 10-point scale. These adult participants appreciated the connection between the learning project and their real job experience. A participant depicted the real job project approach as a "solution for real world training issues." Further, because trainees worked on different projects for their job contexts, peer interaction was perceived as a significant experience of the training. Peer interaction allowed trainees to compare solutions in different contexts and, as a result, provided an important learning opportunity. So, both Likert scale questions and open-ended comments substantiated that the trainees developed an appreciation for the real-job project approach, and perceived it as an appropriate approach for working adults.

The pilot study supports the researcher's assumption that contexts of school and training differentiate project-based learning. First, from various organizations, trainees had more diverse entry levels and expectations for the training program. Participants rated quite differently on their entry level of computer expertise (ranges from 3 to 10) and training expertise (ranges from 2 to

10) on the 10-point scale. They also rated quite differently on the potential impact on their workplace performance with a range from 4 to 10 on the 10-point scale.

Second, because of different backgrounds, trainees have different needs for the training program. Participants perceived values of some topics, like project management, training proposal, evaluation, and real stories, quite differently. The topic is valuable only when participants feel they can use it for their projects and work. For example, several real story sessions presented by professionals from IDT corporations were scheduled to help trainees gain a sense of IDT projects in the real world. However, not all trainees felt that the real story sessions reflected the "real world" for their project and job experiences. Some felt that stories were not applicable and just learned lots of new terms. What they liked was how the real world stories could help their projects, and be applied back to their job. A typical response was: "This rating would be higher if we given more tasks-oriented training vs having so many presentations from industry individuals". Therefore, these adult trainees showed a strong pragmatic position that topics and presentations should inform and support their own project and job.

Third, in contrast to the literature (e.g. Blumenfeld et al., 1991) that students have difficulty initiating a valid topic in the K-12 context, trainees reported no difficulty initiating a project topic at the beginning. Average rating on the item, "I could easily generate a project topic" is 4.4 (SD=0.7). Trainees' adult characteristic and job background may differentiate their project experience from those in the K-12 context.

The pilot study also reveals some issues regarding project-based learning in this certificate program. Several themes that participants would like to have more pedagogy considerations in this project-based learning are:

Although the project approach met their expectation, trainees need more scaffolding during the whole project process. Some typical responses were: “Need much more formal sessions on the project;” “more exercise while doing project;” “more information to accomplish project, more explanation of process to do project;” “more hands-on activities”. These responses confirm previous studies that show that the project approach does not itself guarantee effectiveness (Blumenfeld et al., 1991). Because different instructors came and went, trainees were not sure what assignments were essential and what assignments they should do in the each weekend. For those trainees, they need a clearer picture about what role each session plays for their project and how the output of a previous session becomes the input of a later session.

Related to the previous issue, trainees need assessments on their sub-projects on the way to accomplish the whole project. Participants felt that there was no one to critique their assignments; therefore, they were not sure if they were progressing in the right direction. Assessment is a way to move forward of learning. As Gibbs (1992) pointed out, learning outcome largely depends on assessment and how a learner interprets the assessment. An implication for this training context is that formative evaluation is a way to lead to a successful project.

Another frustration for the trainees was their trying to learn tools within the time constraints of the semester. Time constraints of learning tools were a feeling for most participants except few who had high expertise in computing. Several participants remarked that they had not had adequate time for mastering tools. They would like to have had more training and assistance on tool using. For example, “would like to have an optional weekend for software;” “being more familiar with software.” Having a better concept of functions and

affordances provided by tools could facilitate trainees' design and development of a project, especially at the beginning of project generation.

The pilot study also helped reveal issues in research instruments not previously considered during the data collection process. For example, one of the questions in the survey reflected the researcher's own subjectivities (What is your learning style as you were tested in the adult learning session?). Actually, different adult learning sessions have different instructors and different activities. Some participants did not have a self-test on learning styles. Therefore, I deleted this item in my final version of the survey and abandoned the inclusion of differential effects on learning styles in the research.

Still some items were found to be insufficient to answer the effects of the real-job design feature. For example, "how would you describe the relevance of the project to your job?" and "how the format of project-based learning is similar to my work procedure in my workplace?" Answers to these questions only indicate the proximity between training and job contexts, but they do not answer trainees' dynamic process between training and job contexts for their project. Therefore, the survey and interview protocol both were added as new items on whether trainees negotiate, communicate, or collaborate with their colleagues, employers, or stakeholders regarding this project. Similarly, the item on whether trainees apply knowledge and skills learned in their workplace does not mean whether their final products will be used or expanded after the certificate program. Therefore, the item could not reflect business benefits of this real job project approach, which is believed to be an important characteristic of project-based learning in the organizational context (Smiths & Dodds, 1997). So the consequences of their products in the certificate program were investigated in both survey and interview protocol.

Finally, some participants responded that thirty questions and many text items in the survey questionnaire were too demanding and caused them fatigue. So, the items are limited to 25 questions in the current questionnaire. The researcher substantively reduced numbers of open-ended questions and moved some of them to the interview protocol. These changes were needed given that the participants are professionals and have other time commitments.

Validity and Reliability

Validity is a measure of accuracy, that is, whether the research results match the measurement objectives and can be generalized in another situation (Leedy, 1997). Common strategies to increase validity of a research include member checks, peer debriefing, triangulation of methods and data sources, long-term and repeated observation, participatory research, and biases examination (Patton, 2002; Merriam 1998). This study used three strategies to enhance its validity: member checks, prolonged engagement, and bias examination. First, committee members and researcher's colleagues serve as experts to review the research design, instruments, and procedures for this research. The artifact rating rubric, interview protocol, and questionnaires were refined based upon member checks. Second, the researcher, also as a graduate assistant, has observed the IDT program for a long period, becoming familiar with the pedagogy design, training procedures, and research context. Although observation was not a type of data in this study, this experience definitely helps construct valid measurements. Third, examination of a researcher' assumptions could also play a significant role to avoid consistently biased measurement.

I had been teaching instructional design and technology courses at a Chinese university for several years before I came to the United States. I am a strong advocate of participatory pedagogy, such as project-based learning, in the field of instructional design and technology.

This position leads me to a strong belief that this study is valuable and will benefit my future career; however, I realize that my participants may not have such pedagogical tendency. My experiences may make me interpret data toward my own value system and fail to recognize the different underlying factors.

The researcher's cultural identity could also possibly introduce measurement bias. Although I have been in United States for several years, my experiences are primary as a student in the university and are very limited in the context of industry and business where the participants were working. Lack of the familiarity with participants' job contexts may have led me to overlook some potential issues and factors related to effects and challenges of project-based learning incorporating a real job task. To overcome this barrier, I investigated participants' company websites before I interviewed them.

Reliability is a measure of consistency, whether different measurement yield similar results (Leedy, 1997). Three strategies have been used to establish reliability, including triangulation of methods, recruitment of participants from different sessions, and thick description of research context. Multiple data collection techniques, survey, interview, and documents, were employed to gather data. The researcher examined the consistency of findings from participants at different programs. A rich and thick description of research contexts and participants was produced to strengthen the reliability of the study. Moreover, the researcher checked consistency of interpretation by sending back participants an interpretation of interview.

In summary, this study enhances its validity and reliability through a variety of procedures. Those procedures include expert review, peer debriefing, long-term engagement in the research context, triangulation of multiple methods and data sources, rich and thick

description of participants and their contexts, and examinations of researcher's own assumptions and biases.

Chapter Summary

The researcher took a pragmatic research design in light of the research context. The researcher was keenly aware of participants' time schedules and time constraints. The primary data were comprised of participants' perceived values and challenges of a real job project approach. The process of data analysis consisted of triangulation of different data sources and peer reviews to enhance reliability and validity of this study. A pilot study was first conducted to validate and improve the proposed research design of this study. The results of the final study are presented in the next chapter.

CHAPTER 4 RESULTS

Overview

This study investigated the effects and challenges of a real-job project approach in an instructional design and technology training program. Using questionnaires and interviews as major research tools, the study surveyed 43 professionals who graduated from the program in more than 30 business and industry areas and 11 professionals were interviewed representing 10 different organizations.

In this chapter the findings are organized according to two major data sources: questionnaires and interviews. The questionnaire was used to provide more quantitative data, and the interview was a means of documenting the participants' lived project experiences. They both provided different aspects of a specific approach in a specific context to reflect a holistic view of project-based learning. They also served as a triangulation mechanism to validate the data and findings. Other data sources, such as previous evaluation documents, product evaluations, feedback, showcase, and observation notes were also integrated when applicable.

Survey Findings

The sample population consisted of 43 past trainees, representing one-third of the population across 12 fall and spring sessions from 2000 to 2005. These trainees represent more than 30 different organizations such as higher education institutions, government, public service agencies (e.g. library), telecommunications industry, law firms, airlines, manufacturers,

corporate consulting firms, independent contractors, etc. Approximately 65% (n=28) of survey participants came from the most recent three years. Sixty-five percent of participants (n=28) chose a job-related project for their training, and 35% of participants chose to do a hypothetical project. The demographics of entry levels in terms of computer expertise and instructional design present a spread-out pattern (see Figure 8). Participants rated themselves quite differently on their entry levels of computer expertise and instructional design expertise (ranging from 1 to 10) on the 10-point scale. The spread-out pattern of entry levels indicated the diversity of participants from various organizations and backgrounds. Trainees felt they were more skillful in technology use than in instructional design. Most trainees reported a higher entry level of expertise with computers as compared to instructional design. In contrast, more than 60% of participants reported that they had a lower entry level of instructional design.

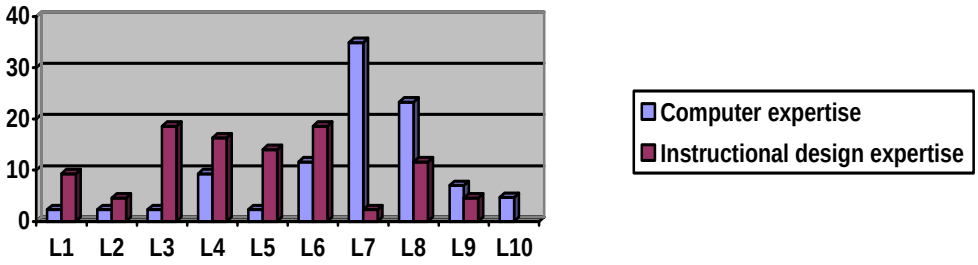

Figure 8. Participants' entry levels, L1 representing a novice level and L10 representing an expert level.

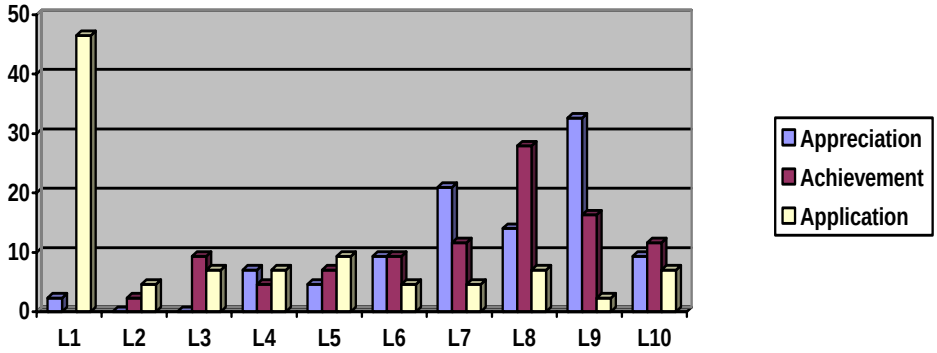

Figure 9. Self-reports on appreciation, achievement, and application, L1 representing the lowest level and L10 the highest level.

The results of the survey show that the real-job project approach in the IDT context was perceived as a fairly effective training model according to the self-report values of appreciation and achievement, although the full application of their projects seemed far from ideal. Most IDT participants perceived a fairly high overall-value of the project experience (*M*=7.53, *SD*=1.96), and reported a fairly high achievement value by doing projects (*M*=7.09, *SD*=2.22) on the 10-point scale (see Figure 9). Such perceived values were also confirmed by both novice level and experienced professionals,

> I feel that the IDT certificate program is a great start to my career. I have only been an ID for 3 months, and this helped me understand the overall concept. I appreciate the opportunity you gave us during this certification. [Novice professional]

> I enjoyed the program immensely. Because I've been in the interactive industry so long -- 15-20 years -- much of what I learned on-the-job was not taught in formal classroom settings. It was good to learn the foundations and apply it to the details that I already knew and had been practicing for years. [Experienced professional]

However, the application rate of projects in the workplace is still far from the expected (*M*=3.58, *SD*=3.07). Only three participants in the sample population reported full application of their projects in the workplace. In contrast, nearly half the participants (*n*=20) reported they were unable to use their projects developed in the class at any level. While the authentic project-based approach allows participants to initiate responsive solutions to their job settings, both pedagogical and non-pedagogical mechanisms are needed to support a greater level of applications.

An examination of effects along the project process also indicated perceived benefits with this approach. During their projects, participants reported several favorable experiences with the choice of a project (*M*=4.61, *SD*=.83), motivation with the project (*M*=4.30, *SD*=.89), enjoyment of project development (*M*=4.07, *SD*=1.01), knowledge integration (*M*=4.10, *SD*=.76) on a 5-point scale. These values have small standard deviation, which means people generally are in

close agreement with regards to these experiences. Especially the choice to develop a job-related project was highly appreciated; more than 75% of the participants viewed the choice as a positive factor in the training program. As described by one participant, “I enjoyed the IDT session and feel that having a project of our choice to work on is extremely helpful!” While more than 70% of the students reported interactions with classmates were beneficial (*M*=3.98, *SD*=1.17 on a 5-point scale), there is no significant evidence that interactions with their workplace colleagues were extensive (*M*=2.51, *SD* =1.41); half of the participants reported that interactions with their colleagues either did not exist or contributed little to their projects.

Trainees rated a little bit low on items related to satisfaction with final projects, usefulness of knowledge and skills, and impact on performance than other items, with *M* =3.70 (*SD*=1.12), 3.98 (*SD*=1.14), and 3.53 (*SD* =1.03) respectively. The standard deviation on these items also seems larger than for other items, which may indicate that these experiences are quite case-dependent. The self-report values on different aspects of the project confirm earlier overall results that trainees generally valued the project approach, but perceived a low level of application and connection between training and workplace.

In terms of barriers encountered by participants, insufficient time was viewed as a strong barrier (*M*= 2.83, *SD* =1.41), followed by lack of technical support (*M*=1.86, *SD*=1.07), lack of support from the workplace (*M*=1.73, *SD*=1.00), and not having a clear project idea and direction, *M*=1.71 (*SD*= .97) and 1.69 (*SD*= .92) respectively (see Table 1). These barriers were later confirmed by the open-ended questions and interview data.

Table 1. Barriers with project development.

Barriers during the project	**NB**	**LB**	**MB**	**HB**	**VB**	Mean	SD
Insufficient time	23.8%	23.8%	9.5%	31.0%	11.9%	*2.83*	*1.41*
Lack of technical support	47.6%	33.3%	7.1%	9.5%	2.4%	*1.86*	*1.07*
Lack of support from the workplace	53.0%	29.3%	9.8%	4.9%	2.4%	*1.73*	*1.00*
Lack of a good project idea	57.1%	21.4%	14.3%	7.1%		*1.71*	*.97*
Lack of clear directions	54.8%	28.6%	9.5%	7.1%		*1.69*	*.92*

Since participants chose to do either a real-job project or a hypothetical project, a t-test was used to detect potential differences between those who chose to do a real-job project and those who chose to do a hypothetical project. As expected, trainees who chose to do a job-related project had a significantly higher rate of application after the training than trainees who did a hypothetical project ($t(41)=2.52$, $p=0.02$). Although the real-job group and the hypothetical group differed in their ratings on appreciation and achievement, neither are statistically significant, $t(41)=1.50$, $p=.14$, and $t(41)=.34$, $p=.74$ respectively (see Table 2).

With regards to aspects of project experience, two groups differed on the items of Q6a (my project was directly related to my job) ($t(18)=4.00$, $p=.00$), Q6b (I valued being given a choice of doing a project related to my workplace) ($t(14)=2.29$, $p=.04$), Q6h (knowledge and skills learned were applicable to the workplace) ($t(41)=2.58$, $p=.01$), and Q6i (I am satisfied with the final product) ($t(41)=2.22$, $p=.03$), which indicates that the real-job group valued the choice of the project more, was more satisfied with their final products, and was better able to apply learned knowledge and skills. There is a difference on all other items as well, although it is not statistically different. The evidence that the two groups differ illustrates that an authentic project raises trainees' appreciation, application, and achievement to higher levels. The t-test on barrier items indicates no significant difference, which means both groups had an equal need for time and scaffolding. Additionally, the groups were not statistically different in terms of their entry levels, which may indicate that choosing a job-related or hypothetical project is not correlated to entry levels.

In order to examine the effects of authenticity on a deeper level, participants were re-grouped according to both their initial choice (item Q1) and application after the training (item Q8). According to Q8, the degree of application was divided into high-level and low-level of

application with a mid-point of 5. Participants who chose a job-related project and had a high-level application were grouped into a high-authentic group and the rest of the participants were grouped into a low-authentic group. If participants could use the product in the real work situation, it meant a higher level of authenticity or connection between workplace and training projects. A T-test comparing the high and low authentic groups showed statistical differences in terms of overall self-reported appreciation ($t(41)=3.60$, $p=.00$), overall self-reported achievement ($t(41)=2.15$, $p=.04$), the value of the choice ($t(35)=.2.33$, $p=.03$), applicable to workplace ($t(39)=5.3$, $p=.00$), and the satisfaction of final products ($t(41)=2.85$, $p=.00$) (see Table 3). As a result of the group recoding, items with no significant differences previously now become significant. The two groups differ in Q6c (doing the project was an enjoyable experience) ($t(41)=2.47$, $p=.02$), Q6d (my motivation was high while doing the project) ($t(41)=2.40$, $p=.02$), and Q6j (my project had a positive impact on my job performance) ($t(41)=2.97$, $p=.01$). The findings from recoding might indicate that higher authenticity is related to engagement and motivation for their projects and has a potential to facilitate the learning transfer. There is no difference on items Q2 (entry level of computer expertise), Q3 (entry level of instructional design), and Q7 (perceived barriers during project), which means both groups are homogenously distributed in terms of entry levels and the need for time and scaffolding.

Table 2. Means and Standard Deviations for two groups.

Group	Appreciation		Achievement		Application		N
	M	*SD*	*M*	*SD*	*M*	*SD*	
Real-job	7.86	1.90	7.18	2.23	4.39	3.11	28
Hypothetical	6.93	1.98	6.93	2.28	2.07	2.40	15
Total	7.53	1.96	7.09	2.22	3.58	3.07	43

Table 3. Means and Standard Deviations for re-coding groups.

Group	Appreciation		Achievement		N
	M	*SD*	*M*	*SD*	
High Authenticity	8.69	.95	8.15	1.82	13
Low Authenticity	7.03	2.08	6.63	2.25	30
Total	7.53	1.96	7.09	2.22	43

Students' final products in one session were assessed by the program chair and the researcher during their showcase in the last session. The rubric was used to assess the quality of the product in terms of instructional analysis, instructional sequence design, visual presentation, functionality, and originality. The scores on each component were calculated and compared. The artifact analysis indicated that participants basically accomplished the training objectives, an average of 22 points on a 25-point scale. They demonstrated a command on a valid analysis on instructional problem (M=4.65, SD=.49) and a design of an appropriate sequence (M=4.60, SD=.60). The scores on artful presentation and overall originality seemed a little bit lower than those of other components, 4.25 and 4.15 respectively. The overall weakness on artful presentation and originality is possibly because the training was accomplished in a short term and quite a few of participants were at the entry level.

Table 4. Ten Artifacts Assessment in One Session.

Components	Mean	SD
Instructional problem analysis	*4.65*	*.49*
Instructional sequence design	*4.60*	*.60*
Visual presentation	*4.25*	*.64*
Technical functionality	*4.40*	*.68*
Originality	*4.15*	*.75*
Total	*22.05*	*2.61*

As pointed out earlier, the application rate was much lower than expected. The full adoption of the project was only 9.3%. Nearly 40% of participants applied the project in the form of conceptual or skill level, such as "I did use the design analysis document" or "the software and project type will be used. The actual project will not be used." The reasons that prevented trainees from applying their projects at an intensive level include:

1. The nature of the hypothetical project. Hypothetical projects had a lower possibility of application; trainees who did not expect the project to be used in the workplace chose a non-job-

related project. Quite a few trainees chose to do a hypothetical project, which “was just for fun.” Typical responses were:

> I chose to do a 'fun' project rather than one that would actually be used in the workplace. I have since, however, completed projects for my workplace using the concepts discussed in the program.
>
> I worked in Flash, which I have never worked in before. And I did a project that I found to be fun and motivating. It's not important that it was not applicable to my work. It was helpful to me in that I quite often design Flash training pieces, but am not the creator of them.

Other reasons why participants chose a hypothetical project included unforeseen needs in the workplace. As one participant commented:

> There wasn't an expectation that my IDT Project was needed in the workplace. The project was just something I had to do as part of my course work.

Still others considered confidential issues:

> I did not create a project that would describe confidential work, but one that was parallel in form and unrelated in topic.

2. Trainees’ job change. Another reason leading to a low application rate was the trainees’ job changes due to promotion, transfer, layoff, merger, etc. Specific comments from participants included:

> I changed jobs soon after completing the IDT certificate.
>
> I left the job where the project was to be used and took the project material with me.
>
> Had to switch to a different job due to merger - wasn't involved in instructional design, then left the training world in 2001.

3. Workplace constraints. Trainees’ work environments also limited the usage of their projects, such as a quickly changing workplace, different development tools, corporations’ readiness for e-learning, etc. Specific comments from participants included:

> Very dynamic work environment resulting in short life of any given project.

> A year or so after completing my project our campus made student web space available as a networked drive so the need to use WS_FTP diminished. It is now only needed if students wish to upload files from home. I am hoping to revise my original project and put it back into use in the near future.
>
> The project was based on content that I had already developed for another deliverable. My company does not yet offer e-learning to our customers.
>
> I used my project and design analysis document as a guide for an independent contract job. The contract and project was very successful because of skills I learned in IDT. Ultimately I realized my project would not use e-learning because the customer was not ready however I did use the design analysis document that I learned in IDT course.
>
> It was not applicable in the job that I had at the time.

Among these constraints, the quickly changing and diverse nature of tools in the workplace posed a challenge for choosing an appropriate tool(s) for the IDT training. When the tool used in the training did not match the tool in the workplace this lead to a lower level of application, which is also confirmed with on-site interviews conducted later on. Typical comments included:

> I chose Flash and that just wasn't what I should have used. We don't use this as a tool at work.
>
> I wanted to use software not readily supported for my project.
>
> My issue was my desire to use Toolbook (work related software) and I found little support for it during my project.

4. Pedagogical constraints. An inappropriately developed project during the training was unlikely to be applied to a great extent. Some trainees' efforts failed because their projects did not appropriately target the needs in the workplace due to limited experience. Participants described what they would do differently if they had known what they were doing or what was needed in the workplace.

> I couldn't think of a decent project. Now, however, I have placed IT Orientation and Laptop Orientation in NET using Lectora and Breeze.

> Now, in retrospect, compared to what I am doing now in Instructional Design the project had little value and I would have selected to do something different had I been in the ISD role prior to coming to the certification.
>
> Still have to find the time to figure out how to link in an example that learners need to see, and to meet/work with our IT folks to determine how to deploy the module.

To help trainees, especially novices, envisioning IDT projects in the workplace might be a way to guarantee a useful and valid project. The purpose of envisioning is to strengthen the connection between workplace and training. Trainees' needs for seeing connections were also confirmed with their feedback on guest speakers:

> All speakers were very knowledgeable; however, they need to adjust their presentations to how each subject applies to students and/or our jobs.
>
> He [the guest speaker] showed super final products but it would have been more helpful to me to see how it was developed from start to finish—like his story boards and project timeline… things like that.

Besides a lack of meaningful links to the workplace, some projects lacked applicability due to their inappropriate scope and size. They were either too small to be useful or too large to be accomplished:

> It was too limited in scope. Simply introduced the topic and then began with two questions.
>
> I utilized some functionalities in my current job, but the output was not enough to complete once the session was complete.

Insufficient development time and/or scaffolding also resulted in immature projects. Participants frequently reported the time constraint with the learning tools, especially tools with a high learning curve, like Flash. Participants complained about a lack of lab time and scaffolding for the project work:

> My project was never completed. I wanted to do a Flash project--- the course advertised an opportunity to develop a flash project... the class spent too much time on the basics of adult ed and teaching rather than time in the lab for project work... then when we finally

> got to the project work-- the Flash teacher did not have enough expertise or time to really help us.
>
> I wanted to develop something for work but the class did not provide enough instruction in Flash to make it possible.

Pedagogical constraints might be worth more attention since they could be addressed through a pedagogical design perspective. Trainees' projects could be more appropriately planned and developed, and as a result, could increase their possibility of application and further extension afterwards.

5. Tool constraints. Finally, the characteristics of development tools also had an impact on the progress and quality of the projects and as a result prevented further application. As mentioned earlier, Flash has a high learning curve. Some trainees had difficulties developing a polished project or prototype given the short period of the training program. As observed by one participant, some trainees gave up on Flash which they had initially selected.

> In the end even though I was truly a novice student in the Flash class-- I was the only one who even tried to show their project in Flash. The other students in the Flash section-- gave up and used other media to present "great final products" like in Lectora or something like that-- which we were not taught but they had access to these programs from their jobs.

Another example, Captivate, introduced a conflict with Internet speed and therefore was not considered a good choice for an ideal application. As one participant complained, "Captivate is soooooo slooooooooow that my project isn't useful on the Web."

In sum, choice of project, participants job changes, workplace constraints, pedagogical constraints, and tool constraints are five primary reasons preventing intensive application of trainees' projects. Although the design of the real-job approach should give consideration to all of these factors, the most practical solution is to overcome pedagogical constraints within the training context.

According to the data, perceptions and suggestions for improvements can be categorized into five categories:

1. Build the vision for projects at an early stage. For example, program organizers and instructors need to facilitate the planning of projects, including topic initiation, project process, and connection to the IDT job. Some specific comments included:

> Many people are indecisive or unaware of a good "problem" to use as a project. Better balance between IDT concepts (the ADDIE model) and other factors of putting together a project - with emphasis on how to plan a project.
>
> I think helping everyone understand that what they are doing in IDT is really cross functional project management and that they should have a good project management system in place before they even start needs analysis and the ADDIE process to be able to track all pieces of the project.
>
> Did not give enough explanation of processes to do project.
>
> Explain the project and the goals of the project earlier on in the program so that people can start thinking about it and planning for it.
>
> Need much more formal sessions for the project – many hit & miss.

Strategies to build the vision from participants' responses include providing "more exemplary projects at the beginning" and contrast examples, "demo[nstrating] upfront of sample learning products made w/ each type of s/w," and "allow[ing] past graduates to come back for a refresher."

To help trainees make the right choice with the development tools is also important. Many participants complained of the difficulty to match the tool with the project. Some typical comments included:

> Didn't know enough about the software to make an intelligent choice beforehand.
>
> I feel the program would be more beneficial if the students started their project the first or second week of the program. Give the students the choices of what computer program for their project. If there is a website that they can go for trial use of each of the computer program, then they can let us know what program they want to use.

> Comparisons of common tools (Flash, Dreamweaver, Captivate, RoboHelp, etc.) used to develop instructional programs such as; skill levels, learning curves, advantages and disadvantages of each tool, integrating different tools to produce the final result, etc.

2. Define project structure and integrate formative assessment at every milestone. Besides a good vision and the right choice of tools, participants need to have a project timeline, and check points are necessary to ensure the quality of the project. The whole project could be divided into organically related sub-projects and the output of the early stages will be part of the input at the later stages.

> It seems to be a little difficult to draw connections of the content [presentations] between each. Would be helpful to have an outline or some objectives to tie everything together.

> more small, iterative steps(mini-projects) building to final project.

> I am still a little unclear of any intermediate deliverable surrounding the final project.

Meanwhile, participants need formative assessment and feedback for their intermediate deliverables. Participants felt that there was nobody to critique their assignments, and therefore were not sure if they were on the right track.

> A CHECK Point along the way.

> More time for review with instructors. During class we were developing our project and had clear instructions with a deadline but when we came to class with our completed assignments, the instructor did not go over it with us.

> Require documentation throughout the whole process. All approved projects input in a pipeline and managed through the project management shop.

IDT projects in the program actually followed the ADDIE framework, and intermediate deliverables were the documentation for each stage. ADDIE deliverables were implicitly a part of instructional design but were not explicitly required and assessed for the project, which made the trainees, especially the novices, confused during their project journey. Providing procedural

scaffolding and giving feedback for intermediate deliverables will guarantee a more successful project.

3. Gear presentations and activities toward trainees' projects and potential applications. Professionals from business fields introduced various end products and practices, which helped trainees widen their horizons. However, trainees would like to know more about the process of design and development, rather than just the end product itself. As participants commented:

> All speakers were very knowledgeable; however, they need to adjust their presentations to how each subject applies to the students and/or our jobs.
>
> Recommend speakers talking less about their business and more about how we can apply skills.
>
> Some of the business professionals focused more on their product and not on how they erected the product.

Trainees would also like to have more hands-on activities which are related to or inform their projects in each session:

> I would like more hands on exercise.
>
> As they go through the IDT program with each lecture, use part of the weekend to practice what they learned in lecture as it relates to their project(for example-project management, storyboarding).
>
> As a class we needed more opportunity to participate and discuss how what we learn can be applied back on the job.
>
> More instruction on storyboarding.

Given the fact that many speakers presented in the training, more coordination in term of the trainees' project, rather than just the content itself, would make the projects a more collaborative effort. The individual instructor for each class could include activities and discussions responsive to the trainees' projects.

4. Overcome time constraints and provide technology scaffolding. Having insufficient time for projects was a major challenge for participants, mostly because of the challenge to master computer tools. As the participants commented,

> Not enough time learning software.
> I would have liked more computer time to work on my project & get assistance before final weekend.

> Would even be willing to come an extra weekend to learn specific computer program.

> While I was lucky and had time outside of class to work on my project, I am sure that there were others whose work environments were not as flexible with their time. Therefore, perhaps a couple more hours of classroom time for project completion could be beneficial for some.

More technology scaffolding is seen as a major way to facilitate the development process:

> I felt that more lab time was needed to complete the project. It may have helped to have more training/teaching assistants in the lab while working on the projects. I had never used Flash or Dreamweaver before and I was trying to learn the software while designing a program. It was a little difficult but I managed. I would have liked more time to learn the software and more time to work on the project with more assistants in the room.

> would be to have some extra support for less self-motivated and/or technically skilled students. Learning new software and creating a project with it was a welcome challenge for me, but some individuals panic at the idea of creating a project using software that they are unfamiliar with.

However, scaffolding consists of more than just providing help. It needs to be a learning opportunity and needs to be challenging and promoting the learners cognitive process. Just fixing a problem for trainees does not develop their expertise in the long term. As explained by a participant:

> I didn't feel that we learned Flash but that the students helping in the lab simply fixed any “bugs” for us.

Along with scaffolding, the time constraints could also be overcome by adjusting the lab schedule or making use of a group project. Some specific comments include:

> More time allocated, perhaps earlier in the schedule.
>
> Get to the lab sooner! Also, I was very impressed with how my colleagues used the software, but there was no time to get coaching from them. Some of them were much more skilled than I at figuring out what the software would do, and using it to best advantage.
>
> It might be good to work on a project as a group. You don't get enough technical training to really be savvy in creating slick IDT projects - - and that is what the business is looking for.

5. Explore an explicit mechanism for interactions between training and the workplace.

Some participants commented on the need to strengthen the connection between training and workplace, “the more you can tie the class into the learner's work environment, the better.” Inviting a project client from the trainee’s workplace might increase involvement and interaction and, as a result, foster a more responsive project:

> I would have the participant select a sponsor at the workplace to act as a catalyst to the project during the certification and an advocate for the employee as they take on additional tasks at the workplace.
>
> And there is also a need to understand prioritization of projects and to communicate the prioritization process to clients to set the right expectation for delivery.

Although few participants proposed inviting a client for their project, this suggestion seems valid given the fact that more than half of participants thought there was only limited workplace interaction and involvement. The client could be asked to review the trainees’ documents and/or sign the approval documentation. A client model paired with the real-job project approach might facilitate a deeper level application.

Interview/ Document Analysis/ Artifacts Analysis Findings

To investigate the effects and challenges of a pedagogical approach is complex in that any approach must be localized in a specific context with complex entities, such as the subject area, participants, instructors, curriculum structures, etc. Without a complex view of educational

context, research is prone to result in immature generalizations and unpromising applications. So, besides some numerical values for the approach, this study also aims to gain more context-dependent data to describe, analyze, and interpret the complexity of the multiple and competing understandings of this approach and its enactments by certificate-seeking instructional design professionals. How does the approach work for them? How might it be made otherwise? Interviews were used to gain the participants' rich experiences and to further explore some issues and patterns emerging from the survey and document analysis, such as project envisioning, scaffolding, formative assessment, interactions, real-story sessions, workplace application, etc. These qualitative findings are presented in two parts: individual narratives and cross-narrative themes.

Because this study covered a vast data sets and a wide swath of participants' experiences, it was necessary to find an effective way to represent the findings and organize the description, analysis, and interpretation. Wolcott (1994) suggested separating the description of the data and the interpretation of the data for research accuracy. So for this part it is more based on presenting descriptive data or recording verbatim comments so that researchers can make their own interpretations later. Both steps were data based with less interpretation, which are presented in this chapter. In the next chapter, more interpretations and triangulations of these findings are presented.

Individual Narratives

In this part, I presented data as individual descriptions which derived from interviews, documents, and artifacts, and which use a more or less standard set of variables informed by PBL. It was a more individual and one dimensional story of the project. Each participant (case) is described as a unique experience of project experience, working background, and IDT training

experience. Analysis proceeds by examining phenomenon, dividing it into its constituent parts (project initiation, project development, afterwards), and then identifying the relationships among the parts and their relationship to the whole real-job project experience. I reconstruct a narrative to demonstrate a think description based on four variables: 1. Background like participants' prior knowledge and experience and current job; 2. Participants' project experience following the ADDIE process; 3. Workplace application in terms of both project and knowledge learned; 4. Perceptions on further improvement and emerging needs from workplace.

Alex

Alex was a staff development manger responsible for hundreds of staff in a public library system. His job mainly dealt with the new hiring process, custom service training, and the library catalog tutorials like electronic searching skills. When he attended the IDT class in Fall 2003, he had been a librarian for 13 years and had 5 years of experience in training. Although having worked as a trainer, he was "new to IDT as a formal process for developing learning" and expected to "become a more serious learning professional." He did not know about the ADDIE model when he came to the program. After the program, he believed that the IDT training helped him become a better trainer and designer, because he now "formalizes what I [he] doing informally before." Reflecting on "what are you doing differently as result of the training," he found he spent "more time doing needs analysis before creating training" and "more time afterwards making sure that what we [they] try to meet the goal." He also thought that the training helped him think through problems "more objectively and more analytically."

He enjoyed the real-job project approach because it allowed him to develop something useful. "If I spend all that time working on it that would be something I will use." His project was to develop an online "shelving/sorting test" as part of the hiring process. Previously, the shelving test used a magnetic board and tiny little books, and the administrator measured the

accuracy of sorting as an overall rating for a prospective employee. When asked to choose a project in training, he came up with using Flash to create an online version of the shelving test, so that it would automate the testing process. When he checked the idea with the colleagues in his workplace, they were excited and gave him the “green light” to do that. Since the hard copy version is already working there, he did not need more involvement or communications from his colleagues with regards to developing the testing tool. In addition, he did not need to do much analysis and design since the magnet board had been working well conceptually. The major task for him was to apply it to a new format, and although he was highly motivated and determined with this project, it proved to be a hard process. The challenging aspects for him were limited time and learning Flash. He estimated spending about seventy to eighty hours designing graphics of different little books and putting the project together. Although he enjoyed learning new technology tools, mastering Flash, a steep learning curve tool, was very challenging for him. During the development process, he wished he had received more checkpoints, feedback, and scaffolding.

At the end of IDT training, his project was prototyped and contained all the content needed, although he still had some functionality issues. He contracted a Flash person on an hourly basis to deal with the issues like visual appearance and object movements. The testing product was then used for testing the qualifications of volunteers for shelving jobs right away. His project has been used extensively for the last several years. He was proud of his project since it met a direct need in his organization, automating the testing process without physical things to re-arrange books. He felt happy that all efforts had been utilized in the workplace. The users of the product were also satisfied, especially for younger people who preferred working on a computer to a hard copy version, although some minor issues were reported such as language on

instruction, font size, etc. He also distributed his Flash source file to other affiliates so that other colleagues could modify the testing tool according to the local need. He has not touched Flash often since that project. He now mainly uses Captivate to develop some help tutorials for users of the catalog system; however, he thinks that Flash provides some functions that Captivate otherwise could not provide in his specific IDT product.

For him, the training was his “real formal education” in IDT. He thought the exposure to the formal structure of ADDIE was very helpful for a novice like him, although some sessions were too advanced and some instructors “assumed [students have] a higher level of knowledge than some of us had.” He liked using the word “exposure” to express his appreciation with the training. He was satisfied with the training experience and claimed that “anybody who worked in my [his] department should have this kind of exposure.”

When asked “what are some emerging needs from your workplace?” He responded “decentralizing.” He stated there was a need for staff in different branches to take advantage of learning remotely, without having to drive to class at the central point. He also experienced a need for soft skills training. The profession was changing and customers nowadays enjoyed more self-service and asked less about hard skills, such as the reference question. In order to be relevant to the community, staff now worked on the soft skills more, such as custom service skills, interaction skills, etc. However, to train staff on these soft skills electronically is a much greater challenge than that of hard skills.

To summarize, Alex developed a successful project, which met the organizational needs and was used extensively in the workplace. He enjoyed the real-job project approach because of its usefulness and relevance. He was highly motivated and determined to do his project although

he needed more time, formative assessment, and scaffolding. IDT training provided him, as a novice designer, a foundation and allowed him to develop training more systematically.

Carl

Carl worked for a large legal services firm as an instructional designer/project manager where his team was responsible for training more than eight hundred staff. Prior to entering the firm, he was a public school teacher. He had worked in the field of training for years and designed a couple of instructor-led courses. His current job responsibility includes developing orientations and testing instruments for new hires employees, such as testing candidates on typing or Excel skills, and training courses and tutorials, such as using demonstration software Camtasia to create movies to show how the conference rooms work. He took IDT training in spring 2005 with a primary goal for a certificate to increase his credibility. At the same time, he wished to get a solid foundation of ADDIE and create online learning modules through the training.

Carl's IDT project used Flash to create an online litigation support package for new hire training. He did plan to make it work for his job, but it turned out to be impractical because the project developed during the training was very small and his company didn't use Flash, which made further extension impossible.

At the beginning of the project, Carl felt confusion over which development tool to select. He felt like "it was just kind of a shot in the dark to pick one and go with it." He thought more demonstrations on different authoring tools with examples would be helpful. He chose Flash to develop a demonstration, but soon he found it was unpleasant and disapproved because "Flash stuff is too programmy." He neither further developed the project nor used Flash skills after graduating from the program because his workplace used other products like Tutor Pro for the legal industry, not Flash.

Interactions with his colleagues regarding his IDT project were very limited, although he did try to develop a decent product to show his colleagues, but finally he could not make the project work. He saw interactions with classmates as the best part of the training. Interactions with classmates provided not only “a bond with others in the industry” but also a comparison among what/how people were using IDT.

Project-based learning was considered a valid instructional approach to integrate various topics, but an inappropriate tool choice made the project experience less valued. He believed that Flash was too generic and “programmy” for him, and industry-geared products like Lectora would be more beneficial. He also assumed that a group project might make a more real and scale-appropriate IDT project and enable more interactions.

Various topics covered in the IDT training were seen as very useful. He said, “Everything that we did, I think, we needed.” He kept his notebook at hand in his office. He agreed that the knowledge learned was applicable by saying “there is not a day that goes by that I don’t think, ‘I should be doing this, or should be doing that.’” He believed the IDT principles helped him make more sense of the training and IDT training increased his awareness level of effective teaching and learning. As a result of the training, he went from “more haphazard” to “more organized.” Because of the increased use of the storyboarding nature of software like Camtasia, he asserted that the storyboarding session should be strengthened to meet current needs. He thought most guest speakers from the business field presented very valuable stories; however, he didn’t like the “sales” presentations though, because the presenters were “very much trying to sell us on.” He expected to see the connection between the end-product and instructional design process and to see how the IDT principles were used, not the end-product itself.

Although Carl agreed the knowledge learned was applicable to his workplace, he found in real business that they did not do exactly what the IDT principles informed. They did not do a systematic instructional design because of time constraints. Any training project needs "to be hurry, hurry, and hurry." They could not afford time to do analysis and evaluation except the first level evaluation, the participants' reactions to training. In the ADDIE framework, they basically focused on DDI, although he thought they should do a needs assessment because the training designer was not trained as a paralegal, and do an evaluation to see how the trainees were using what they had learned in the workplace. When asked how they did with analysis before they created a course, he described a "guess" routine:

> Create a course on this particular software and we don't have the chance to go and ask the people, you know, a needs assessment. We don't do that. We just take our best guess at what we think they're gonna use.

In his workplace, Carl saw two emerging needs that could become topics for future IDT training. First, an extra session or course for distance learning or online learning could be included in the program. Carl's workplace had a need for distance learning as it had several distributed offices nationally. Second, he wished there could be a topic on "learning management systems." They were in a need of a solution to track the audience's learning, such as who completed what and how they scored.

To summarize, Carl was a veteran trainer for a legal firm and his major motivation to take IDT training was for credibility. Carl planned to develop a workable project but could not make it true because of the "programmy" development tool and the small scale end-product. He considered the project approach less valuable because of his failed efforts. The IDT certificate program increased his awareness of training and enabled him to inspect training more

systematically, although his job was mainly confined to the DDI pattern. He saw distance learning and learning management systems as emerging needs from his workplace.

Daisy

Daisy was a content developer and instructional designer in a global computer technology corporation. She earned a bachelor's degree in English and a master's degree in technical writing. She believed that her background helped her job because "writing is design anyway." Prior to taking the IDT training, she started her job as a content developer in 1998 and more recently, she worked more with instructional design. Although she had participated in developing several classroom-based and web-based courses such as new hire training, sellers training, and technical hardware training, she felt she lacked expertise in the instructional design aspect. Her manager also thought it would be valuable for content developers to get trained in instructional design, so the manager supported her and two other colleagues to attend the IDT training program in spring 2004. Her expectations for the IDT training were to increase the knowledge in instructional design, to learn about current trends, and to "gain more evidence and 'ammunition' to justify doing an extensive and thorough analysis for my projects."

Daisy's class project, how to design a courseware for a corporate sales force, was not an actual project in her workplace. However, she used some existing information in the workplace and was happy with the job-related choice. She also presented the project to her manager as evidence that she had completed a useful project in the training class. She used the profile information regarding their corporation sellers such as skill sets, demographics, and connectivity issues to help and inform her next project. Since the sales force is always changing, the profile information could not be used on an ongoing basis.

Seeing some of her classmates doing an inappropriate hypothetical project like making ice-cream or a project based on a bad problem, she assumed that assigning participants projects

would be better than letting participants make their own choice. As she said, “Even if the assigned projects vary by complexity or subject matter, at least they would take the guesswork and time devoted to deciding what to do out of the equation” and therefore, could be more efficient to exercise limited time and essential skills.

In terms of tool choosing, Daisy decided not to be too adventurous when seeing the brief lab times. As she said, “I very much wanted to learn Flash during the program. However, after seeing that we only really had 2 brief lab times devoted to this, I took the easier route, or the more familiar route of Dreamweaver.” Learning Dreamweaver was not a big challenge for her, since she was already using it for another project in her workplace. After graduation, she did not use Dreamweaver any more, but mostly used a tool developed by her own corporation, knowledge/content producer.

Although she thought that the project approach was worthwhile, Daisy hoped that she would receive more reviews, feedback, and discussions on her class project. As she described,

> I remember we were asked to choose a project, Dreamweaver or Flash. But that's it. Then we worked on it in lab. So no one really helped you along your development of the project to see if you are on the right track or not. You could go and ask this kind of thing before or after the class, but I don't think there is any check point.
>
> We were given assignments like completing an analysis document. I was working hard on it, wrote it up, and yet it was not called for in this class. I did all of this work, and nobody needs to look at it or anything. So I think there should be more kind of assessment. Instructors should at least look at this document and give feedback on it.

She observed that the lack of check points made her classmates less self-regulated on their projects. “It tends to make people lax if they know nobody will ask for it, see it, and

question about it. They may not do it." She also thought that activities were needed to practice essential skills, such as a mini-project of a small team of 3 or 4, which "would give students an opportunity to do a full practice analysis and deliverable before launching out on their own individual projects."

Her motivation during the training was generally high. She enjoyed most of the topics and especially the topic of learning styles. She was once invited to make a learning styles presentation for a leadership workshop in another organization. She thought that the guest speakers' real examples were beneficial. Particularly, she enjoyed one presentation because the speaker told real stories "phenomenally follow[ing] the ADDIE model, from the beginning to the end." Interaction with other classmates was also appreciated because it provided a sharing basis of different perspectives.

When it comes to application of the ADDIE framework, she responded "I have used some of that to some degree." Although it was all good in theory, her job did not follow the full framework and its application depended more on work division. Her group mainly focused on DD (design and development), and more development than design because often the clients or the managers tried to design what they wanted by themselves. Analysis, for example, was usually done before the project began. As she said, "When you are placed on the project, the clients might have their own analysis and your job is just to confirm the requirements." Similarly, evaluation went to other teams like the learning effectiveness and measurement group, so often she did not know the results of the training that developed. But after the IDT program, she did mention to her manager that they needed to have some evaluation data because she was aware of the importance of evaluation for the job.

Her team project at the time of interview involved more global working and conference calls with colleagues all over the world. Common training strategies she used included lecturing, cases, scenarios, role-playing, and coaching. When asked to think about emerging topics in her job, she nominated script writing for various media and for a global audience, accessibility design and assistive learning devices, and reusable templates and design patterns as emerging topics in her job.

To summarize, Daisy was happy to choose a job-related project, although its usage was limited to profile information only. She wished to see more checkpoints, reviews, and discussions for assignments along the project. She specified that scripting writing, accessibility, and design for templates be topics for future training.

Jane

Jane was a learning service manager in a pharmacy college within a university. Her daily job included advertisement and coordination of her programs, instructors and e-learning materials. She had a master's degree in adult education and had previous experience with HTML, PowerPoint and WebCT. Not long before Jane attended the IDT program in fall 2005, her department started a distance learning program regarding pharmaceutical and biomedical regulatory affairs as part of a university outreach service. There was a substantial need to educate regulatory affairs professionals related to the manufacturing and testing of pharmaceuticals, medical devices, biotechnology, nutritional products, cosmetics and veterinary products for local companies. Seeing the potential of new media to extend their learning service, Jane decided to get further training on web-based learning. She found out about the IDT program and talked to the director in her workplace. The director, anticipating incorporating what she learned into the outreach program, was very supportive and paid her for the training. At the same time she took another distance learning certificate program.

Jane came to the IDT program with questions and issues from her job. Her project was to develop a Captivate demo introducing pharmaceutical and biomedical regulatory affairs to prospective students. She found that many people misunderstand their regulatory affairs program with a clinical pharmacy program. “There was definitely a learning gap in people who don’t really know what regulatory affair is,” she said. So when she was asked to determine a class project related to her job, she quickly decided to do the regulatory affair topic. She jokingly referred to her project as “an informal show” which served as a marketing tool and an explanation tool for the outreach program.

Jane started working on her project immediately after the first week in the IDT program. Because she is not a regulatory affairs professional, she communicated with subject matter experts in her program to gain their content input. She used PowerPoint to outline the presentation. She taught herself Captivate before other trainees had the class on it. Her project, approximately a 14-minute demo, was accomplished at the end of the training. After having her director review it, she published it on the department website. The audiences visited the online demo and left her positive feedback, which catalyzed her interest to develop more Captivate products based on this prototype. She was also happy to learn that her captivate demo was experimented on mobile devices such as PDA and cell phones to see how it worked.

Jane loved the real-job project approach because of its immediate application. As she said, “I would have been frustrated if it was a project we work on just for class, because it would mean that I couldn’t immediately apply the new skills.” The project also “helped to put things into perspective, in sort of frames, that you need to be thinking about how the adult learners learn, you need to be practicing the principles of that project management, and then you have actual technology software that let you do all these.” Her workplace program was state funded,

which also raised her satisfaction and motivation with the project. As she expressed, “I could cap my project as a reference to them as a funding source for our received money.”

Jane appreciated the “social interaction” with classmates as a valuable basis to share experience, to discuss a problem, and to learn how peers solved problems. However, she felt a lack of “honest feedback” from peers and thought that the program chair needed to establish a more critical and constructive feedback mechanism. During the project and her job, the most difficult aspect for her was interacting with subject matter experts, rather than technical aspects. Most instructors were accustomed to the traditional classroom format and to transform their thinking for online learning was challenging. She also reported that the Captivate file was too large in size and posted a storage issue for the WebCT space.

As the result of the training, Jane felt she “learned a lot from this program and was able to apply this knowledge to my current position.” Major components she thought very useful included project management, adult learning, and technical skills. Compared to the distance learning program she was simultaneously taking, she thought that the IDT program “gives me the skills on how to use the software; what kind of things I need to take into account when I am developing the program; what is a good way to design the program in the courses.” The knowledge learned helped her manage the whole program, not just content models. As she said, “I found myself thinking in the project management sort of way.” The training allowed her to exercise more than “just technical skills, but also the skills in adult education and project management skills.” She demonstrated her IDT certificate and kept her class notebook in the office because she “refer[ed] back to my notebook often.”

Enjoying most field stories though, she rated one e-learning session was worthless because it was too technical and could not be related to her job setting. She, as a program

coordinator, was also aware of the importance of project management to facilitate more concentrated and effective efforts on high value activities and therefore, wished she could spend more time on project-management, both conceptually and hands-on. “Truly I would see more emphasis on project management, the concept part of it and as well as actual hands-on activities with the Microsoft Project, instead of simply hearing about project management. And that is too expensive to use the Excel spreadsheet or something else, to do hands-on project management kinds of things.”

Overall, Jane was very satisfied with the IDT training and felt the training helped her learning service job. Her project, marketing and addressing the misconception or regulatory affairs program, was successfully accomplished during the training program and implemented in the workplace. She reflected that technical skills, adult learning, and project management were the paramount gains in training. She regarded the interaction with subject matter experts as the most challenging aspect when repurposing instructor-led coursework to e-learning platforms.

Bill

Bill had more than thirty years’ experience in the training industry. He worked for a data processing cooperative which provided billing/accounting solutions to electric cooperatives and municipal utility providers. The team he led took charge of the development of online help systems for the company’s browser-based applications. Prior to his current job, he had worked as a technical writer, instructional designer, and trainer for various organizations. Bill also registered his own business as an independent contractor on training and technical documentation a decade ago when he noticed the distinctive features of writing and publishing in the technology era. He hoped that his business would take off someday. Having already practiced the ADDIE model and various tools, Bill decided to take the IDT training program to get the certificate for credibility. He also wanted to keep learning as he became older.

Bill's class project was to develop a tutorial for the company's utility billing software. The tutorial, regarding what the help system was and how it should be used, was intended for a training environment rather than a help environment. He did not use the tutorial directly in the workplace because of the current work priority on the help system. However, he expected to do more training presentations and tutorials on their software in the future. He burned his project on a CD-Rom and showed it in his workplace as a direction and as an example of what the company could do with tutorials.

Bill was self-motivated to do a good project and "to have fun with it." As he said, "It was high motivation behind it. I wasn't trying to outdo anybody but I was gonna do what I do." At the beginning, he had a clear vision for his project, "I knew about how to use the ADDIE model for both documentation and training, so it's so highly flexible for me to work toward anywhere as far as the planning." He started to plan right after the task was given on the first week. He adapted one of their existing tutorials to the project. Not all details needed to follow the ADDIE model since he felt "enough experience where I'm just going and doing it." He spent two days on storyboarding the entire tutorial with PowerPoint, which he thought was a very suitable storyboarding tool. Still not satisfied with the design, he decided to create a character so that it looked like an instructor came in and was presenting. Then he imported the storyboard into Captivate, the tool he was already familiar with, and polished the finals from there. His final project show in the class proved to be very impressive.

He was proud of his professional ADDIE document as well, "I think I was the only one in the class that actually had the ADDIE model." He regarded the project approach as a medium to help trainees develop situated solutions. To reach a valid solution, he thought that the training should reach "a better balance between ADDIE concepts and other factors of putting together a

project." He believed that "planning is the most critical" and therefore, the program "needs to emphasize on the planning portion of it."

Bill also believed that project initiation should focus on deciding on appropriate development tools. It would be helpful to provide comparisons of tools available for instructional development according to skill levels, learning curves, and advantages and disadvantages. As he said, "I'd really like to see a matrix in the course of different tools that are available, say, like, Captivate, Robohelp, PowerPoint, you know, whatever." Additionally, he thought that the guest speakers should help trainees to see how they get their end products, not just the product show, because of the application nature of the instruction design.

He was satisfied with the training. "Overall, I felt that the course was a success. After 30 years in technical communications I learned a few things…I learned quite a bit from it, small little things that I didn't realize or had forgotten in the past," he said. He believed the help system is still a sort of training and therefore, the knowledge learned is useful. He provided lots of help to his peers in the program and looked forward to sharing his experience in the future program, "I look forward to coming back and sharing some of my experiences, you know. But I was never asked."

Since the software is updated routinely, his team is busy updating the support documents and help system. Subject matter experts for him are customer service staff and software developers. His analysis is more focused on task analysis, instead of audience analysis, since the audience is fixed. He needs to identify operational procedures of applications from a programmer's perspective, and then screen shoot and record the dialogs with tools like Robohelp or Captivate. He also needs to ensure the consistency with wording and phrasing of the help system because of different writers. As he said, "the ideal help system needs to look like one

person wrote the entire thing." His team follows Microsoft standards for their technical documentation.

Planning templates was Bill's major task. He once tried to let his team use the ADDIE model for the job, but "it ended up taking longer." So he decided to plan the structure by himself first and then give templates to team members to develop the content. As he said, "So essentially they're turning into content developers rather than designers." There was no formal evaluation in a help system. The evaluation for him was whether or not the users were able to get successfully through that form and complete the record. As he commented jokingly, "the only way that we have of judging that is if the calculations come out right and your bill is right."

Designing motivation for the help system is one emerging need in his job. As he explained, "Today, it's not like sitting down and reading *War and Peace*. They need to be entertained, so we're trying to make the help system as engaging as possible and give them some control over it." He also thought it is important "by doing a context sensitive approach" so that users can get the answer quickly.

In sum, Bill accomplished both an exemplary tutorial product and a complete ADDIE document during the IDT training. He did not use his project directly but presented it to his colleagues as a direction for their future business. He would like to see more emphasis on planning, tool choice matrix, and applications during the training.

Kelly

Kelly worked as a corporate headquarters curriculum developer in a large wireless network company. Before entering the IDT program in 2005, she had just transferred to the training development department. Her manager, an earlier IDT program participant, recommended the program to her and sponsored her participation. Her goals for IDT were to gain a better understanding of instructional design and to be able to create both online learning

modules and f2f presentations. She had an associate's degree in interior design, and she believed that that background reinforced her to examine her job with a designer's eye.

The project she did in the IDT class was fictitious because she was new to the job position then, although she used some of the existing documents and screens in the workplace. Her project, an online interactive training tutorial on work flow manager, was fabricated to "quick train" customer service representatives who are online and receiving customer calls like purchasing a new cell phone or a service. The tutorial attached to the system was to inform representatives of changes and steps. As she said, "It's almost like a step action table with screen shots in it."

When she started her project, as a novice in the industry, she did not know what she was supposed to do. "It was really fuzzy," she said. She talked to her classmates as well as coworkers in the workplace for an idea. It was only in the last three sessions that she began to understand what she was learning and the project started coming together. Because of its fictitious nature, the design of the project was "just pulling from everywhere" to fit the class requirements. As she said, "based on what the criteria was, I just filled in the blanks." After the IDT training, she utilized some functionalities in her job, but the project itself was not adequate to be used.

Kelly thought that the IDT training has given her a foundation to grow. As she reflected, "It helps me start out this career and development…I have only been an ID for 3 months, and this helps me understand the overall concept." She was much clearer about project management and relationships between developmental steps. The breadth of the training was sufficient for her because it covered "everything that I need for my job today." The project helped her understand the potential value of the tool, as she realized that "Captivate is a great tool for communicating a system enhancement." She later pushed her workplace to start using Captivate as a development

tool. As a result of her training, she started doing more online training than paper based ones. The online format made it much easier for updating and distributing new enhancements and changes. After acquiring more hands on experience in her workplace, she planned to go back to school for a bachelor's degree in instructional design.

However, the IDT training did not provide her with enough depth despite its apparent breadth. She felt that the training should spend more time helping participants understand instructional design. She also wished to learn the tool more. As she commented, "I chose Captivate and I learned very little about the tool to assist me in my current role." Additionally, she felt that some guest speakers "were selling more of what they do or their product instead of teaching us what they do and how they do it." She wanted more opportunities "having us do more hands on trials and working on some simulations than us just sitting and listening to them for four hours or something."

Kelly's job primarily focused on design and development. When the IT department launched a new system or enhancement, they would pass the analysis document with expected end-results to her team. So analysis was usually provided by the IT department when she was assigned a project. She mapped out its deliverables based on the new updates for customer services employees. Then she created storyboards and worked on the products. She would then conduct a quality check to ensure the elements, such as verbiage, step sequence, and captured screens worked accurately. Her manager and the project owner would also review her products. She then officially delivered the products to branch trainers, her counterparts, in distributed areas. Branch trainers might customize the products for their areas although the basic content would remain same. As she explained it, she would "get on a platform to train the trainers and then they go out and train everybody else." The running time of the products she developed

varied from hours to minutes in duration. For a new system launching, it took hours and needed a f2f class or conference call. For small enhancements or changes, she might only need to deliver a Captivate file via e-mail and request trainers to review the Captivate file.

Her motivation curve for projects was typical in designing work. She explained that her motivation during her projects was internal and usually got higher by the end of the project. As she said, “I wanna see a good end product, and I wanna see my users learn from what I have.” “At the beginning, it’s long and it’s tedious. At the end when I see that it’s about to end, that’s when my creative juices start flowing. And that’s when I go back through my project and may redo something because I’m pumped.” This motivational change during the design work could be harnessed for better learning.

In sum, the IDT program and its project provided Kelly with a foundation to grow. She looked forward to getting further professional development in the future. As a novice, she initially had difficulty to envision the whole project. She wished that more in-depth activities on understanding IDT concepts and utilizing the tool could be offered.

Dave

Dave was in his fifties. He spent the early part of his career in the US army and then entered the telecom industry. He had an academic background in applied behavioral science and human resource management. At the time of the interview in 2006, he was a home trainer working for a telephone company, providing contact center solutions. Not long before he took the IDT training in September 2003, he was laid off from a large cable network company where he was a training manager and where he had registered for the IDT certificate program. His goals for the training were to learn IDT fundamentals and to be more competitive in job searching.

When he was asked to develop a project for the training, his initial thought was to create a sales curriculum for his previous workplace. But given the fact of his unemployment, he

decided to choose a project that would allow him to learn more about software of which he already had some knowledge. Based on his hobby, he came up with designing a mini lesson on fly-fishing. Not comfortable with other tools, he chose Dreamweaver because he had some experience with FrontPage, a similar tool. His motivation for the project was high because he knew he was learning something. However, he felt that if he had a job and created a job-related project, his motivation "would be even much higher, because I am creating something that I can take that to my company and see it put it into use."

He conducted a needs analysis by sending a 10 item questionnaire regarding fly-fishing to his friends and got a very good response rate of approximately 80%. Then he took one need, how to select a fly rod, from feedback and started planning the mini course. He used Course-Builder, an integrated plug-in in Dreamweaver, to create the assessment which included only three illustrative question items because of a limited amount of time. He never used the project after it was completed. He sent the link to some of his friends, but did not receive any feedback.

Dave had some difficulty when learning the software. The course then used a new version of the software and the software book was on the previous version. The mismatch introduced much confusion. Like many other participants, he was frequently struggling with the picture positioning issue. As he said, "When you put a picture one place, it doesn't always show up where it's supposed to be in. You put a picture in this area of the software, when you look at it in the browser it end up-it could be somewhere else." He wished for extra time to learn the tool. He bought the whole Macromedia suite after the training so he could continue practicing and playing with it. He used Dreamweaver later on to develop a couple of business webpage.

Dave felt that he learned a lot through the program and it helped him find two jobs thereafter. The important gains for him included the IDT basics, project management, the

software skills, testing criteria, and the reusability concept. The training provided him with the formalized processes and validated his earlier practice. As he reflected,

> I've been doing this for fifteen years or so but I've never had any formal training on creating a curriculum. So what IDT did for me was take the basics and confirm that what I had been doing in the past was pretty much correct and got me thinking about design in a different way…The part that I was doing wrong was, I would create the whole course and then I'd go back and create the test. You're creating of your assessment comes before you plan how to train. And your assessment's created off your analysis.

Dave thought that the project approach provided a way for participants to build a foundation. As he said, "It builds in stages, the concepts doing your analyses, doing your gap analysis, planning your project, creating your assessment, putting a project plan together, creating your storyboard, etc. So now you've got that basis, you've got that foundation." However, given the fact that design and technology are two separate pieces in most businesses, he proposed a paired project format:

> In an extremely strong e-learning program, the instructional designers don't create any of the technology pieces. They break it up. Everything up to the line of where the technology starts is done by the instructional designer. …So a nice way is to let us create the projects and then have people who are trying to learn the technology to develop. Each one—each person is assigned a student who's learning the technology, learning Flash, learning Dreamweaver. So we transfer to them our plan, we have them put it together in the technology piece, which gives them experience because that's what they're gonna see in the real world.

For Dave, the weakest component in the training was the storyboarding because the teaching “was not very applicable.” After the training, he bought a storyboarding book to learn storyboarding and developed his own Excel template. He also suggested that the program narrow the various topics down to “the very specifics that most people are going to use,” and “allow past graduates to come back for a refresher” to stimulate a more useful project.

When interviewed, he requested a copy of the class notebook because he often needed it as a work reference. He felt sad hearing the program was cancelled because he believed there was a great need in the industry. He thought poor marketing had reduced the number of potential participants. As he commented, “If the friend of mine hadn’t told me that, I would never know this exist.”

In sum, Dave chose a hypothetical project because of unemployment. He would have been more excited if he had created a project for the workplace and seen its potential benefits. He thought the training had made him competent in job searching and provided him a different way of thinking about the design of training.

Pearl

Pearl worked in a leading government agency dedicating to public health and safety. Her job responsibilities included training public health laboratorians and assessing applications for continuing education. She earned a master’s degree in public health. Although Pearl had taken a short instructional design course and developed some PowerPoint training presentations prior to the IDT training, she felt she was still at a novice level in both instructional design and computer technology. Her dual goals for the IDT training were to learn more about instructional design and acquire more techniques for developing training products. After the training, she participated in another Flash workshop and was looking for an opportunity to gain a master’s degree in instructional design.

Pearl developed a training tutorial project for public health laboratorians on how to clean a microscope. The project was based on the PowerPoint slides she already had for her earlier project in the workplace. Initially she planned to choose another topic but she changed because she did not have any graphics for that topic. Determining an appropriate topic was unsettling for her. As she said, “Even though I was working on one project already at work, I wish I had an idea of what would be good for a Flash project or a Dreamweaver project.” She thought the program should offer a complete tool introduction session, including a survey on industry uses of the tools, and ways a learner can use them for a project. She also recommended that inviting stakeholders in the workplace to review the project would facilitate a successful project in the five-weekend program.

She requested on advice on tool choice. Her colleague recommended that she learn Dreamweaver for the training. Unfortunately, she found later in the workplace that there was no Dreamweaver to use. Since she already had existing PowerPoint materials, she did not spend much effort on analysis and design. However, she was frustrated with learning Dreamweaver, such as positioning, alignment, hyperlink issues, etc. Appreciative of the real job approach, Pearl was, however, not satisfied with her end product. She felt that there was insufficient time to gain enough Dreamweaver skills and to develop a good project. She strongly recommended starting computer program sessions earlier. “I feel the program would be more beneficial if the students started their project the first or second week of the program,” she said. Pearl had not been able to use her project yet at the time of the interview. She expected to use it in a coming project.

As for guest speakers, she shared a similar opinion with other participants. “I think that was a lot of frustration is that they [guest speakers] may talk but they wouldn't show us how they

did it," she said. She wished that the guest speakers could expand on their design and development process, instead of describing concepts and end products only.

Despite unsatisfactory results with her end product, she felt that she learned instructional design procedures. As she said,

> It helped me understand the procedures that we need to go through to do it… When I'm putting the workshop together-workshop in a box together, understanding the components and why certain things are done a certain way in terms of designing and implementing it and everything.

However, because of her major responsibility of assessing training proposals, instead of instructional design, the training has not brought in a whole lot of applications. She was expecting to use more instructional design concepts in future IDT focused projects.

When asked about how the project experience could be more effective, she provided several reflections. First, a mini-practice on different types of software would facilitate participants' ability to choose the right choice of tools for their project. As she said, "If there is a website that they can go for trial use of each of the computer program, then they can let users know what program they want to use." Second, just-in-time feedback on the project was beneficial. As she said, "Also it would have been nice to have a faculty person to contact to talk about the project and see if I was on the right track." Finally, she thought a hands-on practice after each learning episode along the ADDIE process was essential for a successful project. As she expressed,

> It would be good that when you talk about, like the first part of analysis, then let us do part of our project that deals with analysis. Which you did, but I mean like-and stuff like design. Like somebody comes in and talks about design and the step of going through

> designing, then like the next day or whatever, let us practice that on the computer. So it's like reinforcing it but kind of wading towards.

As she compared the IDT course to an introductory instructional design course she had taken at the same time in her workplace, she believed that the IDT training should include more supportive practices:

> We worked in groups and used someone's project and went through the various parts of the ADDIE model as much as we could in 2 days... My suggestion is after you find out their background, put them in similar groups and give them a class project for the groups to work on from analysis to evaluation. This way they can get hands on experience in the class and use it for their projects. I enjoyed the classes and learned more in those that we had some activities, instead of sitting in lecture for 7 hours.

To summarize, Pearl, a novice participant, reported a positive experience with the training program, although she was frustrated with mastering the tool and unsatisfied with her final product. The application of the knowledge and skills learned into her workplace was constrained by her job responsibilities and the availability of the tool. She highlighted intensive hands-on practice, just-in-time project review, and earlier computer skills training as paramount considerations in project-based learning.

Mary

Mary was a project manager for technology skills development in a healthcare advocacy company. She had been in her training position for less than a year prior to the IDT program. Her company saw instructional design as a primer for the position and sent her and another colleague to the IDT program in fall 2005. Her goal for the training was to learn more about "the general learning landscape." She believed that her previous work experience primed her well for the

training. As she said, “a little bit of field work just get your feet wet to understand what you’re looking at or what you’re doing.”

Mary developed a project to train an audience on how to accept a meeting invitation using the Microsoft Outlook application. She initially planned to develop a corporate map for sales employees but gave it up later. The needs analysis for the project was based on her experience rather than a formal needs analysis survey. She used to send out many invitations for a meeting, but she found only very few correct responses. The project was very brief, specific, and had no audio narratives, so it did not require much effort. She did not practice any project documentation either, although she deemed it would be valuable. Because of the program schedule, motivation during the project fluctuated between attached and detached. As she explained, “Since we’re all full time employees, and the distance between the weekends, so motivation is sort of gets the flow of motivated, not motivated.”

She initially chose Flash as a tool but ended up using Captivate to develop the tutorial because of the steep learning curve of Flash. As she said, “Captivate was great, you know, I learned that on my own and just did it, but Flash, I worked with the instructor and still I need more.” After returning to the workplace, she developed a much more complete and polished project utilizing the audio capabilities and she felt better about it. She thought that Captivate provided a good solution to self-paced training and she planned to use it to develop training tutorials for her company’s software.

She believed that the project approach was critical for her learning and the project served as a template for later projects. The project approach was “absolutely critical because first of all it gives you a focus. And you have a goal. You learn the structure and you apply it to your project … It teaches you how to do it so when you come back to your regular job you can just

repeat it…I don't think you could do it any other way." She suggested allowing more time for project review with the instructors.

She viewed her project more as a learning piece and did not expect to use it in the workplace. However, she definitely applied the software skills and the project type. She explained,

> Specifically the project I made in class I don't really use but having learned how to do it. I apply it to different new projects. So it was sort of a learning piece and serve as a template. And I've also shown other people in the company how to use it, so the tool is being used by more than just me.

The IDT program provided her, as a new beginner, with a broad overview. As she appraised, "There was so much subject covered. It's like a master's program all crammed into." The program covered most of her job needs, although she mentioned that emerging technologies like PodCasting might be included as new learning solutions in the future program. Specifically, she appreciated the understanding she gained of the learning objective and evaluation. For instance, she reported that, "I really had no understanding of evaluation before the class … Now you wanna make sure back in the workplace they're applying what you've trained them on." She thought that classmates shared a good relationship and helped each other especially with technology learning. Guest speakers also helped her see "what they were doing and how they're using the structure in specific contexts." She learned usability test from one guest speaker and was expecting to conduct usability tests before rolling out their new software.

Mary, as a project manager/coordinator, was responsible for technical skills development for Microsoft applications and the company's proprietary software. She would set up the classes, hire the instructors (subject matter experts), invite students to attend the meetings, send out the

homework, and follow up with the surveys and the exams. The ADDIE model learned in the training had helped her “make sure the structure is in place.” Before the training, her strategy was more like “just sort of guess at it.” After the training, she was able to apply the structure and followed the instructional design process. She felt that the quality of her job is “just completely better after the whole class.” As she explained,

> Our training gave me the framework to apply to these projects. Had I not had that training I wouldn’t know what to do. The ADDIE tool has helped me understand in my development. If I start off with an idea or a need then I just follow those steps. And that really keeps me in line and keeps me in order.

Of course, she also experienced challenging aspects in her job like persuading coworkers about non-training issues and motivating trainees to apply what they had learned in training. As she described,

> Sometimes they’re not meeting their productivity because of the work environment. It has nothing to do with training but they just blindly say let training do it, you know. So, there’s the issue getting those people to buy into the fact that it’s not a training issue but it’s an operations issue.
>
> That second level evaluation, following up and making sure that what we’ve taught them is really sticking, is hard sometimes when you’re in a business… It's just a little more complex because they may not come and use Excel for another month or two and they will have forgotten. So how to build in that practice piece is sort of difficult.

In sum, Mary thought that the IDT training provided her with a broad knowledge base. She did a simple Captivate project in the class, but developed a more complete one after the

training. She believed that the project approach provided a focus, a goal, a structure, and an application to learning, and suggested more review opportunities during project-based learning.

Betty

Betty was a curriculum developer in a learning center of a large network communications company providing data transfer, security, and conferencing services. Prior to the IDT program, she had worked in that position for several years and had intermediate expertise in both computer technology and instructional design. Her goal for IDT training was to "polish instructional design skills and learn Captivate to create web-based training modules."

Her IDT class project, a web-based training module, was to help managers use account management software to process business documents. She was clear about the scope and direction of her project from the very beginning. Her company had been rolling out the new software in different divisions over the past three years, which posed a challenge, logistically, to arrange trainers for this repetitive, widely-dispersed training. Betty saw the web-based training, opposed to a more traditional route of instructor led training, as the right tool to meet this need. She shared her idea with the managers in the sales group and was approved and encouraged to initiate the project.

She was glad to find out that Captivate was the right tool for her project. As she explained, "I really like Captivate. I think that Captivate was built for doing simulations on applications like this." She invited a colleague to help her with the simulation part and recoding the audio pieces. The reason she wanted to request the colleague's help was because the colleague was part of the sales trainer group and she believed that "with the 'rules' trainers, having his voice on here will really draw the managers in more than just having them listen to me." She labeled her e-learning module as "a just-in-time, a pre-work module, or a refresher

course" for managers. It was basically informational and procedural training using Captivate's simulation functions.

Her product was "just being implemented/accepted" at the time of her interview. She enjoyed learning Captivate and saw a great benefit in using it for experiential simulation. As she said, "It can be used seven by twenty four that way" and "what I learned in the class will allow me to implement more modules and free up some delivery hours for the trainers to conduct other classes." She showed the Captivate product to her boss who was originally opposed to web-based training. To her delight, after viewing that project, her boss changed his viewpoint and started to accept the web-based format as a potential solution for training.

Three aspects viewed very helpful for her learning and project were the learning community comprised of various participants, guest speakers from industry, and the block arrangement of project time. The learning community was perceived as highly positive for her training. As she said,

> I especially enjoyed interacting with other learners. It allowed us to form bonds among everybody … Everyone came from different places and so you were able to-it wasn't just the instructors of what we were doing or seeing but they were saying that we were getting ideas…Because I think…just knowing that someone else is doing that and you kind of fed off of, 'Oh you just did that, how did you do that', rather than having to flip through the book, was extremely helpful too.

Guest speakers were also very beneficial, although she thought that some of them should use more work related terms instead of theory-related terms. As she responded, "I especially enjoyed instructors from the work force. Their knowledge and suggestions were extremely helpful. For example, we have implemented an Impact Map to project sign-off." Additionally,

she thought that the block arrangement of time for working on projects like a studio was also extremely helpful. She said, “Having that whole weekend for the project was really nice to have it concentrated like that, because you didn't go through the ramp up period of having to go back into Captivate and relearn.”

Of course, she did have some frustrating experiences with Captivate, like other participants. As she said, “When I did the second column, the first time everything dropped down one section. When I retyped it they all appeared under column one.” Similarly, she also experienced a problem with scoring in her Captivate product. “I get the same thing you guys (other participants) do with these scoring things, so I think that’s just an issue.”

She thought the IDT program was a “well run class.” Although Betty had been in her position for a long time, the IDT training refreshed her memory and added “a little more excitement.” For example, the training helped her realize the objective-oriented exam process, as she said, “matching your objectives to what your exam questions are.” She decided to re-design the course evaluation in her workplace. She also found that analysis sheets provided by an instructor were helpful for her job because the company had become more diverse and there were a lot of new employees. She was also happy that her training fit right into the transitional stage of reorganization. Her group had focused more on live meetings as an approach to training prior to the IDT training, and was transforming to web-based training as people within the organization wanted to have more web-based training. As she said, “So it was kind of—timeline was absolutely perfect to take this course, have this project be a part of the course. It fit right in.” Regarding the transformation, she said, “I think it's not so much the technology that's difficult. It’s the mindset of you have to think differently about how you are going to develop it.”

In sum, Betty was satisfied with the project experience overall and loved the software tool she used. Her project was a result of interaction between her colleagues and her training program. She thought experts from the business/industry opened participants' eyes and she felt real-world stories were helpful.

Tyler

Tyler was employed in the same telecommunications company as Betty. He had worked in a K-12 setting as a teacher and then in a business setting as a training developer. Prior to the IDT program in fall 2005, he already had a great deal of expertise in computer technology and was fairly confident in his instructional design expertise. His goal for the IDT program was to extend his existing training experience and educational background. He was unemployed when he started the IDT training. In the middle of the IDT training program, his classmate Betty gave him a job lead in her workplace and he then quickly got the job.

Because of unemployment, he did not select a job-related project; instead, he did a project for his mother's business. The project was to develop a tutorial on helping customers utilize the functions of the e-commerce site to "decrease customer 'drops' and increase orders." Tyler found out many new customers dropped out due to not knowing how to accomplish an online transaction. The following excerpt demonstrates the need for his project:

> There really is a big sector of people out there who are still new to online shopping. We got phone calls and all the emails and when you call these people back to help them out, they'll tell you the same story, 'Hey I like the product but I don't know how to buy it because I'm new to the internet.' … Then you're on the phone for 30-40 minutes with these people telling them about every single step which is great if it's the customer's first and I don't mind doing that. But after a while 40 minutes per call it starts, you know, getting into eating the profits.

To keep those potential customers and avoid having to respond to repeated requests, Tyler decided to use the web-based tutorial as a solution. Tyler was not much challenged by his project because he already had a broad knowledge of web-based training, documentation, and tools like Flash and Dreamweaver. He did have a few technical challenges with Captivate because "something supposed to do did not do." He used Flash to develop some elements which were difficult to accomplish in Captivate. He did not include test items at the end of his tutorial because he thought that a valid evaluation in his context was to measure business results and return on investment. As he said, "it's more of a tutorial type of situation, so we're really open to level four, or level five which is more money coming in."

He saw his class project as a prototype to help users navigate through the website and introduce its features. Based on the module developed in the IDT class, he decided to eventually develop a series of modules to assist customers through the whole online purchasing process, like modifying items in the shopping cart or tracking their orders. Although the project could potentially impact his mother's business, his motivation for the project, during the training, was more for fun than a work requirement. As he said, "it was just fun to be able to do something that had nothing attached, no consequences attached to it, really." Tyler believed that the project approach was helpful for learning because it "allowed us to take what we've learned on those various weekends, actually put it together, and demonstrate what we can do with it."

Although Tyler had an educational background, the IDT training was perceived as beneficial because it functioned as a refresher and exhibited a formal process for him. As he said, "I got a lot of things out of it, like I said, I knew but I had forgotten about. … To see some of the technology that I worked with, that I never understood how it worked through the whole process, so that was neat to see that." However, because of the nature of his job, he did not apply all that

he learned. Unlike Betty, Tyler did not do the analysis and implement pieces. His job primarily focused on DDE. As he explained,

> With our group the trainers [technicians] have the knowledge and so it's my job to get the knowledge out of them onto paper. And it's some heavy duty technologies like Voice-over-IP. So these are subjects that they're experts in it, that's why they're there. And they're the trainers and so they do the analysis of what they feel their audience needs are. Then I design, develop it, do the evaluation of it and then they implement. As far as training the trainers, I don't do that because they know a lot more than I do about it. So I'm kind of just the DDE.

Similarly, Captivate was not applicable for his position because of the nature of the job, although he thought it was a great tool for simulation. He primarily used PowerPoint and Word as tools. As he said,

> Well, when you're dealing with software, and you need to go through step-by-step procedures, Captivate is a wonderful tool. Just what I'm doing-we're doing technology and there's no software involved, so it's what's behind the software and the communication process. So for me Captivate just is irrelevant for this position here.

In sum, Tyler developed a web-based tutorial to assist customers in navigating through an e-commerce website. Tyler had a clear vision about the business need and saw that an informational and procedural tutorial would meet this need. He decided to expand his project to cover the whole online shopping process based on the current module. The IDT training reinforced his previous knowledge and experience, although he was not able to apply all that he learned because of the nature of his job.

Cross- Narrative Themes

After presenting individual narrative descriptions, a cross- narrative analysis integrating document analysis was conducted to reveal the themes and patterns across individual narratives. It is a more composite description about essential experiences and perceptions, commonalties, and differences crossing different individuals who came from different fields such as industry, government, and education etc, with different entry levels from a novice to an expert, and with different goals from intrinsic motivation of professional development to extrinsic motivation of the certificate itself. Twelve major themes were categorized.

Theme 1: Participants saw the project approach as a necessary and useful way to reach the training goals (both a knowledge base and application) during the IDT training; overall project experience was satisfactory.

Participants agreed that the project approach was critical for the subject of instructional design, which is of inherently applied nature, because it provided a concrete goal, a focus, a structure, and a connection. As Mary commented, “I don’t think you could do it any other way.” The project approach was seen as indispensable for the training in three aspects. First, the project approach provided a focus and integration of various knowledge components within the ADDIE framework. Instead of presenting each component in isolation, the project approach, as perceived by one participant, “ties different instructional design elements together,” and, as a result, provided participants with a solid knowledge base. Even participants who failed to develop a successful end-product, like Carl, believed that the project approach was a valid instructional approach to integrate various topics. Second, the project approach led to an atmosphere of application and created a bridge between training and the workplace. The project, as perceived by Jane,

> Helped to put things into perspective, in sort of frames, that you need to be thinking about how the adult learners learn, you need to be practicing the principles of that project management, and then you have actual technology software that let you do all these.

The project therefore served as a medium to help trainees develop a situated solution. Finally, the project approach corresponded with adult learning. Participants were satisfied with the connection between the project, work experience, and immediate applications. As one participant commented, “It is an adult learning model.” To summarize, both interviews and documents revealed that students developed an appreciation for PBL and viewed it as a beneficial approach for working adults.

Theme 2: During the post-training, most participants used their IDT class projects as a prototype or template for their job; however, only a few of the IDT class projects were ever directly applied afterwards in their workplaces.

The project approach in the IDT program brought some participants practical benefits. For example, Jane developed a tutorial as a marketing and introduction tool for her outreach program; Alex developed a testing tool for the hiring process for his public library; and Betty developed an account management tutorial for sales managers in her telecommunication company. The project also proved to have extension value in some cases. For example, Jane “capped” her project as a reference to a grant her department had received. Alex distributed his Flash source file to other affiliates and allowed his counterparts to modify it for their own needs. Bill used his project as a vision for his team’s future plan. While these three participants did find immediate practical extensions that increased the value they assigned to the IDT experience, most participants could not use their projects in their original forms. Instead, they used the project as a template or prototype for their later work. As Mary put it, “It teaches you how to do

it so when you come back to your regular job you can just repeat it." Similarly, Tyler saw his class project as a first prototype and decided to develop a series of e-learning modules based on it. Even participants who did hypothetical projects and/or who had low entry level skills, like Kelly and Pearl, also partially used their class projects as templates for their future jobs.

Theme 3: Job-related choice was highly appreciated, and its potential benefit was perceived as a motivational factor.

The job-related choice played a positive role in motivation. For example, Alex saw the choice as a way of optimizing his learning time: "I like the idea that if I would spend all that time working on it that would be something I will use." Jane saw the choice as an immediate application: "I would have been frustrated if it was a project we work on just for class, because it would mean that I couldn't immediately apply the new skills." Not all participants found a job-related topic, due to factors like unemployment. Not all participants finally made the project applicable, due to factors like the small scale of the project. Nevertheless, participants generally appreciated being given the choice. For example, Dave felt that if he had a job and created a project for the workplace, his motivation "would be even much higher, because I am creating something that I can take that to my company and see it put it into use." This choice provided a connection between the training context and the job context. Participants said they acquired the "affective and feeling-based foundation" because "that's something relevant to the job." The job-related choice facilitated an acquisition of motivation because of the relevance. As a result, job-related choice fostered the impetus to transfer.

Theme 4: Participants' job backgrounds gave them a great readiness for the project initiation and were demonstrated in customized and responsive projects.

Most participants showed a great readiness for the projects they proposed because they had "struggled" in their workplaces prior to entering the IDT program. For example, Gary, a senior technical writer, had noticed even before starting the course a need in his company. His idea was to address that need in the training program.

> I was struggling with the way that somehow we got a lot of security analysts that use our software, and our software is very powerful but it is not designed for the user's workload. It's designed more according to the programmer's intention model.

Similarly, other participants also built their projects based on workplace resources and tailored their learning to workplace needs. For example, Jane's workplace had just started a new online program. She had been considering the marketing tool prior to the IDT program, and her Captivate project was a proactive response to that perceived need. Alex had long noticed the time-consuming nature of test preparation. His online tool was considered to be a replacement for their old testing tool. Amanda's company had recently converted to a new financial software system. She felt there was a great need to teach users how to operate the new software, and Amanda's project was a solution to that need. The primary needs that projects in the IDT program were intended to address mainly included decreasing the need for training personnel, reducing repetitive training, aligning training standards, facilitating on-job performance, and providing self-service assistance.

Shirley, a clinical and software trainer, provided a vivid example of her workplace needs.

> The reason why I thought this project might be useful to our business is because, with the way our staffing has been lately, we get small numbers of people coming in frequently who need training. There are times when we'll have a group of people come in one week, and then two or three more people come in the next week who need the exact same

> training. And we don't really have enough staff members, trainers, to devote to that kind of repeated training over and over again and so to automate that training process with e-learning would really be very useful…Another issue I'm thinking it might solve is the fact that since we often use multiple trainers, different trainers for this process at different times. Those different trainers sometimes teach different ways of doing processes. There are staff members that are performing processes with variation that shouldn't be so. If we automate the learning with e-learning, I think that might help to solve both those problems.

Participants felt comfortable with initiating a project topic and were able to conduct a valid needs analysis from the workplace. For those who chose a job-related topic, their workplace experience greatly facilitated their project initiation, although further direction was needed for some projects in order to be actually used in their jobs.

Theme 5: The various projects rooted in different work environments had a similarity in terms of the contents, types, and formats.

A review of participants' projects revealed a similar pattern. The training projects were primarily in human resources, marketing, and customer services. The most common content of projects was training on computer applications, either on-job or off-job. Since software systems are often updated, developing training on an updated system has been reported as a significant and constant task for IDT professionals. Some interviewees also reported that screen shooting software like Captivate had become an indispensable tool for their job.

The type of project in the IDT program was basically informational and procedural training-- learning a policy or learning to use a computer application for example. Although a few projects showed a creative and artful design (e.g. Alex developed a simulation as a testing

tool; Bill designed a character as a coaching strategy), most projects were tutorial in nature. Other formats of projects, like exploratory environments, simulations, or educational games, were not common. One participant made a self assessment of her own project, “It’s not really interactive. It’s a demonstration.” The sequence of projects normally began with an orientation (gain attention/ present instructional objectives), moved to a presentation/instruction, and ended with a practice/testing. This sequence roughly paralleled Gagne’s nine events of instruction. Through their projects, participants showed considerations to learning objectives, the sequence of instruction, multimedia illustration, and testing strategies.

The end-product, targeting at an informational and procedural level and adopting the monotype of a tutorial format, seemed realistic in the IDT program given the short-term time frame (five-weekends) and the overall entry level of the audience. However, IDT professionals nowadays have an increasing need to conduct higher order training and incorporate various participatory strategies. For example, Alex realized more soft skills training, such as custom service or leadership, was needed for his job; Daisy’s workplace was using various strategies, such as case, simulation, coaching, and role playing. Future IDT training should also prepare students to develop various e-learning products with participatory and higher-order characteristics.

Theme 6: Overall, the content framework of ADDIE was perceived as sufficient for the projects and their job responsibility, although participants assigned different value to the various topics depending on their job responsibility or the quality of the sessions.

The sessions presenting the ADDIE framework were deemed sufficient in supporting the participants’ projects and gave them a holistic understanding of instructional design. As Carl responded, “Everything that we did, I think, we needed.” The unanimous learning points for

participants were the ADDIE model, nine events of instruction, learning objectives, adult learning, learning styles, analysis process, levels of evaluations, constructing evaluation/test, technical skills, etc. Somewhat controversial topics depending on the participants' jobs or the quality of the sessions included project management, story boarding, creating training proposal, etc. The participants also proposed some emerging topics which might be presented in a follow-up program. These new topics included learning management systems, decentralization training, soft skill training, accessibility, template design, renewable resources, script writing for global settings, interactions with subject matter experts, etc.

ADDIE seemed to provide enough of a knowledge base for the participants' professional preparation. However, because multiple speakers presenting various topics, participants wanted to see more clearly the connections among these topics and more hands-on activities related to their specific projects. Participants made comments such as: "Each presentation was good, but it seems to be a little difficult to draw connections of the content between each;" "[it] would be helpful to have an outline or some objectives to tie everything together;" "make sessions more interactive;" "more cohesion between presentations; better organized flow; more in-class application activities."

Theme 7: Although peer interaction was positive and pleasant, participants wished for more constructive feedback from peers; interaction with the workplace colleagues was largely limited.

Participants unanimously enjoyed interacting with other learners because "interaction with others was most beneficial." The program created a sense of community whereby participants could share experience, discuss a problem, and observe how peers solved problems. Betty's description typically represented this perception:

> It allowed us to form bonds among everybody … Everyone came from different places and so you were able to-it wasn't just the instructors of what we were doing or seeing but they were saying that we were getting ideas… Just knowing that someone else is doing that and you kind of fed off of, 'Oh you just did that, how did you do that', rather than having to flip through the book, was extremely helpful too.'

A mechanism for more critical and constructive feedback might need to be established during PBL. Jane experienced a lack of "honest feedback" and thought her classmates were too "friendly." Additionally, participants' interaction with workplace colleagues regarding their projects existed but was limited. For example, Betty collaborated with a sales colleague to record narrative as a strategy to increase her product's authority. Among these limited number of interactions, most were unilateral interactions, such as getting approval of the project or showing the end-product. For example, Alex requested approval for re-developing the testing tool; Kelly showed the final product to her manager. Generally, collaborative efforts on the project were rare. Fostering communication and gaining input from participants' workplace might facilitate the success of their projects, e.g., using a project sign-off sheet or inviting a workplace client to be involved.

Theme 8: Real world story sessions were helpful but conditional; a process-oriented real story was seen as more beneficial than a product-oriented one.

Real world story sessions were incorporated to provide exemplary practice and facilitate the connection between theory and practice. Participants saw these sessions as "very informative and eye-opening." Some participants initiated new practices as they learned from these sessions. For example, Betty implemented Impact Map in the workplace and Mary decided to conduct a usability test for the new software roll-out. However, participants found that some real world

stories did not reflect their own field. They also believed the guest speakers talked too much about the product as if they were "selling the product." As a result, they sometimes felt that the stories were not applicable. Rather, they perceived that they were being exposed to too much professional jargon.

Participants felt they needed more understanding of the process, rather than the product itself. As a participant said, "I would have liked to have known a little bit more about their process for getting to the finished product." Participants also wanted more discussions and practice activities so that they could transform these real world stories to their projects and job. Some typical responses were: "Recommend speakers talking less about their business and more about how we can apply skills;" "Talk [about] how these related to my own project and how they could apply in my real world." In sum, although using real world stories exhibited state-of-the-art practice in the industry field, from an instructional perspective, these sessions should emphasize the process leading to exemplary products instead of the often industry specific products themselves.

Theme 9: Incubation of design thinking and demonstration of technology affordance would help participants build a holistic view of the project and help them determine an appropriate scope for their projects.

During project initiation, participants, especially ones with little or no experience in IDT, needed support envisioning their final design work. Participants saw that two aspects were essential for an intelligent plan: 1) tool choice and their affordances; and 2) exemplary examples and processes to target or model their projects after. Surprisingly, the IDT program did arrange a session introducing various web technologies and interactive learning projects; however, the participants unanimously reported an insufficiency of tool knowledge at the early stage of the

project. A typical comment was, “Didn’t know enough about the software to make an intelligent choice beforehand.” Bill recommended providing a matrix of different tools for instructional development according to skill levels, learning curves, task orientation and objectives, and their advantages and disadvantages, etc.

Without a sound understanding of tool affordance, the design process was prone to limitation, especially for the novices. For example, Pearl had difficulty with the idea of the webpage. She envisioned the tutorial as if it were a single word document, instead of a combination of different webpages. She put all contents together on one webpage, and did not realize the hyperlinks as a key mechanism to present her training contents. She had a hard time transforming her thinking with the presentations of contents. If she had been shown an example of a webpage tutorial, she would have designed and developed her tutorial with less difficulty. Similarly, Lucy had no vision about the audio solution in the software initially. She did not realize that an audio file could be parted and narrative and music could be placed into different layers in the software, as a result, she wandered aimlessly at the initiation stage. She even did not know the exact questions to ask because she knew nothing about the audio affordance of the software. Of course, Pearl’s and Lucy’s examples were an extreme case; however, many participants did need some help to envision the blueprint. A demonstration on different authoring tools with different e-learning products would potentially have enhanced their planning process.

Theme 10: During the project development, participants expressed the need for clearer structures, assessments, and feedback; this lack was perceived as frustrating.

This training program was organized in project-based learning which followed the ADDIE framework. The project was announced by the program chair in the first week. Each instructor mainly focused on the topic itself and taught similarly as he/she did with a regular

class. The project had a loose structure. No specific instructor explicitly guided the project work and there were no check-points along the project process. Participants complained about these ambiguities during the PBL process. Typical complaints were, “[I] need more upfront direction - did not feel I know what was expected outcome,” or “I am still a little unclear of any intermediate deliverable surrounding the final project.” As Kelly explained, when she started her project, she did not know what she was supposed to do, “It was really fuzzy.” Not until the third weekend did the project start coming together for Kelly. Only then did she begin to understand what she was going to do. Participants required more explanations of the process and objectives of each project stage.

Participants also wanted to see the connections between the class tasks and the project. Participants argued that each class assignment should have been part of the whole project and the output of an early stage should have been an input of the later stage as informed by the ADDIE framework. One participant expressed it “would be helpful to have an outline or some objectives to tie everything together.” Participants indicated a desire that each task build on the previous tasks and, little by little, create a repertoire of polished components. However, in the IDT program, participants did not seem to experience this ADDIE workflow smoothly.

More crucially, participants wanted to receive assessments and feedback for their intermediate outputs. During the project development, participants were expecting “continual assessment” to make sure they were on the right track. Daisy’s account illustrated such a typical complaint, “I was working hard on it, wrote it up, and yet it was not called for in this class. I did all of this work, and nobody needs to look at it or anything.” The need for formative evaluation was more acute in low-entry level participants. Alex wished for “more checkpoints, more

feedback, more assessing the learner is, where you think that person should be or is." Similarly, Jane wished for more constructive feedback for her project.

Theme 11: Participants needed more participatory, responsive, and customized practice activities to accomplish a successful project.

Overall at the curriculum level, participants needed more participatory activities to facilitate application. Participants made comments such as "more hands-on", "more exercises", "The instructors are all very knowledgeable but did not make sessions interactive", "more interactive sessions where we could try more things", "As a class we needed more opportunity to practice and discuss how what we learn can be applied back on the job;" etc. Each knowledge unit should pair with an activity to support learning transfer. For example, a participant enjoyed concepts in graphic design, but he felt a lack of practice activity and believed it "would have been good to incorporate an application activity to reinforce the concepts." Similarly to some real-world story sessions, participants wanted "more emphasis on how to apply ID principles to the e-learning medium."

At the individual level, participants in this program came from vastly different backgrounds and entered the class with varying expertise levels. Some clearly needed more customized help to overcome their individual challenges. For example, while most were quite confident in PowerPoint, a few were not and suggested the training "to help those with little experience in PowerPoint get more proficient." Similarly, Pearl had difficulty with the idea of a webpage and needed extra scaffolding. Among those challenges, the tool challenge and time constraint were the most common issues. Participants reported needs for either a schedule rearrangement or technology scaffolding. Typical comments included: "being more familiar with software", "be willing to come an extra weekend to learn specific computer program", and "I

would have liked more computer time to work on my project and get assistance before the final weekend."

Theme 12: The IDT training exerted overall a positive impact on participants' experience and professional development. Yet, the application of the knowledge and principles learned was contradictory in reality to a certain degree.

The IDT training provided participants a largely positive experience and had a great impact on their professional development. For novice participants, the training served as a potential career start and a foundation of a knowledge base to grow; for experienced professionals, it served as a refresher and a spark. Even for those who had been in the training field for years but had not received systematic training, the IDT training provided them with a more formal process in the training development and increased their awareness of applying the learning principles. As a result of the training, participants reported their development of workplace projects became more "formal", more "objective", more "analytic", and more "organized". Moreover, participants found that what they learned in the IDT program was applicable in their workplace:

> All the knowledge I gained in the class for us, the things we need to know, such as doing analysis, doing storyboarding, creating your assessment ahead of time, all that information I applied to my project. The difference has been the software I used to compile them.

The IDT training also brought these professionals a new view of training issues and many "Aha" moments. For example, Jane reflected that after the training "I found myself thinking in the project management sort of way." Dave corrected his old perception with the order of creating a test plan; he thought of the test plan before the implementation, instead of after the

implementation. Another participant got a new view with the survey after the session on constructing evaluation tools, “I’ve completed so many surveys in my lifetime. Now I’ll never see them the same.”

There was also much indirect evidence showing the positive experience of the IDT training. Quite a few of the participants kept their notebooks for reference at hand. Some reported an increased confidence in job marketability. For example, Dave was glad that “the certificate helped me to get my current position.” A participant compared the IDT experience with the earlier experience, “I was very reluctant in taking this program because of a previous bad experience with certificate classes. I am certainly happy with what I was taught.” Similarly, Jane compared the IDT program to the distance learning program she was simultaneously taking; she found that the IDT program was more useful for her to develop the training program.

No matter whether in conversations, weekly feedback, or final evaluation, when asked “what are the major learning points for you,” participants evidently considered the ADDIE model as the most important learning point. Participants received clarity and understanding of the ADDIE model and the interdependency between different phases. The ADDIE model has served these professionals as conceptual, communication, and management tools in their work. However, professionals rarely apply it directly and systematically. Participants felt a contradiction between the theory and real practice. This conflict is exemplified in Daisy’s account, “They are all good in theory, but often time our job doesn’t work like that.” Similarly, Carl had the same experience that his IDT job needed “to be hurry, hurry, and hurry” and had to take a “guess routine” to replace a time consuming needs analysis and evaluation. The participants’ application experience indicated that the ADDIE model served more as a conceptual or thinking tool than as a true representation.

Chapter Summary

This chapter organized the major findings in two parts: survey findings and interview/document analysis/ artifacts analysis findings. For the first part, descriptive analysis and T-test were conducted. Using questionnaires as a research tool, the study surveyed experiences and perceptions of professionals who graduated from the program in more than 30 business and industry areas. A total of 43 participants across twelve training sessions from 2000 to 2005 participated in the survey, representing 33% of the whole population. The results show that trainees reported positive benefits through the real-job project approach, although the rate at which they had applied their projects in the workplace was far below expectations. Approximately 65% of survey participants reported that they chose to do a job-related project for their training, less than 10% of the participants were able to fully apply their projects afterwards. A t-test between the real-job project group and the hypothetical project group favors the former group in terms of appreciation, achievement, application, and most aspects of the project experience. There is no evidence indicating that the participants' choice of the project is related to their entry levels. Five primary reasons preventing intensive application of the trainees' projects include choice of project, participants' job changes, and workplace, pedagogical, and tool constraints. Five elements (project vision, formative assessment, responsive activities, technology scaffolding, and workplace client) merit further consideration to help trainees develop more successful projects and exert greater impact on their workplace.

Interview, document analysis, and artifacts analysis served as a further exploration technique of quantitative findings and a means of triangulation technique for validating the findings. The qualitative data were presented as 11 individual stories through case-by-case analysis and then 12 thematic patterns through cross-narrative analyses. Although each

participant's unique job setting, entry-level, goal, personal commitment, etc. resulted in a unique project and training experience, there were some essential themes across cases. The project approach was seen as critical to achieving the training goals and providing a template for participants' jobs. The components contributing to a successful project such as job-related choice, the training content, real-world story sessions, and learning community were appreciated although they could be further reinforced. Envisioning, project structure, formative evaluation, constructive feedback, and participatory and customized practice were in need for project-based learning. Although more creativity, artful design, and instructional models would have made their projects more attractive, participants' projects demonstrated their command of basic components regarding instructional design. Finally, knowledge and skills covered in the IDT training proved to be sufficient for participants' jobs, although real operations did not completely reflect what IDT principles informed.

The next chapter presents further collective interpretation and discussion of the quantitative and qualitative findings as they relate to the literature, teaching instructional design, and future intervention. The next chapter also includes directions for future research.

CHAPTER 5 DISCUSSION, RECOMMENDATIONS, AND CONCLUSION

Overview

This chapter discusses the main findings of the study in relation to the research literature, the research questions, and the future directions. It begins with triangulating and summarizing the results from the multiple data sources. It then highlights new understandings with the real-job project approach in a professional development context. It also provides recommendations regarding follow-up research, interventions of the program, and more general pedagogical guidelines for teaching instructional design. The chapter ends with a reflection on this study, its potential limitations, and closing remarks.

Effects of the Real-Job Project Approach

The effects of the project approach in the IDT program have been organized into three dimensions: What were participants' reactions to this approach? To what extent did the project approach help them develop knowledge and skills? And to what extent did this course project approach prepare professionals for their learning service position?

Appreciation

Both quantitative and qualitative findings indicated that participants were satisfied with their project experience, and that the real-job project approach was seen as useful, relevant, and effective. The overall impression of the project experience in the IDT certificate program was rated at 7.53 on a 10-point scale. Participants especially appreciated being given the choice of a task related to their job (M=4.61, SD=.83). Although not an experimental design, the comparison

indicated that participants who chose to do a real job project acquired a higher level of satisfaction than their counterparts who did not so choose. Participants' appreciation was further confirmed and elaborated through qualitative inquiry. Four specific aspects were frequently expressed satisfactory:

First, the project approach provided an organized framework for training. Mary's view that the project approach was meant to have "a focus," "a goal," and "a structure" was a typical response among IDT participants. The avoidance of isolated knowledge components in instruction has long been proposed by educators (e.g. Sternberg & Frensch, 1993). The project approach illustrated a solution for the integration of various topics around IDT into a goal-oriented structure.

Second, the project approach facilitated participants' application of knowledge and skills. According to the survey, the participants who were subsequently able to apply their projects in the workplace showed a statistically higher level of satisfaction of their project experience than their peers who did not have such opportunities. The appreciation of being able to "immediately apply the new skills" as expressed by Jane was representative among IDT participants. IDT participants developed various applications to their unique job contexts. Alex developed a Flash simulation as a testing tool for new hires. Betty developed an account management software tutorial for her sale managers. The project approach allowed participants to actively make meaning and solve specific problems that concerned them in workplace, rather than simply copy the information from instructors.

Third, the relevance between the training and the workplace was perceived as a great motivational factor. Most participants appreciated being given the opportunity to opt for job-related projects. Alex believed that a project relevant to his job made the best use of training

time. Jane stated that she would “have been frustrated if it was a project we worked on just for class.” Although Dave did not do a job-related project, he felt that his motivation “would be even much higher” if he had created something for an actual job. The connection between the training context and the job context provided what a participant called “an affective and feeling-based foundation.”

Finally, participants appreciated the project approach because it met the characteristic of adult learners. As one participant described, “it is an adult learning model.” The adult learners tend to relate their learning to the current needs and to see the real changes as a result of learning (Mackeracher, 1998). The project approach enabled these working adults to see the immediate application and consequence of their training. Additionally, the community that developed during their design work was also appreciated because it provided those adult professionals “a bond with others in the industry.” The community also provided a zone of proximal development, whereby students could learn from more able peers, rather than “having to flip through the book.” The project approach in the IDT training met both the cognitive and social aspects of participants’ needs.

Contemporary literature has emphasized value aspects in classrooms. Brophy (1999) argued that learning activities should not merely target understanding what students are learning but also foster among students a value for what is being learned and the rationale for learning it. The real job project approach in the IDT program illustrated a type of pedagogy that students can appreciate as worthwhile and authentic because of immediate application, relevance, real benefit, and ownership. The approach created a sound match “between learners’ perceptions of themselves and their perceptions of learning opportunities” (Brophy, 1999, p78) and as a result increased participants’ motivation to learn.

Achievement

No performance test could be done to measure the change of participants' performance in this context. The self-report indicated a fairly high achievement by doing projects (*M*=7.09, *SD*=2.22 on a 10-point scale) although self-reported achievement was less than self-reported appreciation. The large standard deviation of self-reported achievement suggested that the self-report was less consistent among participants and the increase in expertise was quite case-dependent due to personal commitment, background, and motivation. Interviews and document analysis revealed more evidence of understanding. Dave, for example, left the course with a changed understanding of evaluation than that with which he began the course, and he realized the importance of constructing evaluation instruments before implementing training. Jane acquired a new perspective of project management and its importance for the training development in her workplace. Major learning points for participants included the ADDIE model, nine events of instruction, learning objectives, adult learning, learning styles, analysis process, levels of evaluations, evaluation/test construction, technical skills, etc. For novice participants, the training served as a potential career start and a knowledge base to build off of in the future; for more experienced participants, the training served as a refresher and a rekindling of interest. As a result of training, participants reported the positive changes in job performance that they attributed to the learning. They became more "formal," more "objective," more "analytic," and more "organized" for their design work.

An artifacts review also indicated that participants had reached training objectives, 22.05 points on a 25 point scale. Their final projects demonstrated the command of basic principles regarding instructional design, especially in regard to learning objectives, sequence of instruction, and testing strategy. Given the training objectives targeted, the short time span of

training, and the entry-level of participants, their projects showed the evidence of trainees' knowledge, skills, and performance to develop an instructional solution responsive to a specific setting. More creativity and artful design would have been desirable. Participants' artifacts were basically informational and procedural and the artifacts design roughly followed Gagne's nine events of instruction. Most of the projects adopted a tutorial type format while other formats such as exploratory environments, simulations, and games were not commonly observed.

Among self reports, the ADDIE framework was the major learning point. This self report indicated that students had gained a conceptual understanding through the training and project rather than a shallow acquaintance of isolated topics. Participants reported that the ADDIE framework laid a foundation from them to grow as professionals. Even many experienced professionals also perceived that systematic instruction of ADDIE as a "formal training" in their career. In their workplace, participants reported that the ADDIE framework served as a conceptual map and facilitated the strategic thinking of the instructional design job. These self reports support the assumption made by Gustafson and Branch (2002, p.xv) that ID models serve as conceptual, management, and communication tools for analyzing, designing, creating, and evaluating guided learning. Conceptual understanding of ADDIE indicated that participants had reached the essential training goal and had established a foundation of instructional design.

Application

A great advantage of project-based learning is its explicit emphasis of the application of knowledge and skills learned in classrooms (Thomas, 2002). In workplace learning, a project could introduce added seriousness because of a real problem and decision it was intended to resolve (Davis & Davis, 1998). This study demonstrated the value of a project approach for knowledge application and actual benefits as described in the PBL literature. The project

approach enabled participants to mindfully apply IDT knowledge and technology skills to develop a learning service in different settings. Though not extensive, the real benefits were nevertheless illustrated by Alex's Flash sort/shelving tool for the hiring process, Jane's Captivate demonstration for her outreach program, and Bill's tutorial for his company software. The positive reactions from the users of participants' e-learning products, such as Jane's and Alex's, also indicated the success of application.

A unique pattern of application in this IDT program is that the project serves as a template for participants' future jobs. The extant PBL literature primarily discusses the merit of the application of knowledge and skills through the project. The end-product, the tangible outcome of a project, remains marginalized. This study surveyed the use of end products. As shown in the survey, the participants' actual use of their class projects on-the-job was not common, less than 10%. In contrast, many participants reported that they used the project as a kind of a template afterwards in their workplaces. Even those who developed a hypothetical project indicated that they could adapt the class project to a workplace project. In the words of Mary, "When you come back to your regular job you can just repeat it."

A template is a visible and structural product that a user can simply repeat by replacing old content with new content or by modifying the content of the template at hand. A template need not be thoroughly detailed and polished; nevertheless its conceptual prototype can aid in shaping a designer's future task. The projects in the IDT program prepared trainees visible templates which they would potentially return to and extend on the job. As a result, the template indirectly supported their future professional development and job performance. To that end, in similar short-term courses, targeting a template or prototype as a course objective seems

appropriate and beneficial. For a project-oriented field like IDT, targeting a tangible template and conveying a feeling of early success through the class project deserve more attention.

The ADDIE documentation, which could serve as another valuable template for participants' future jobs, should be required in this IDT program. An ADDIE document would be a possible way of increasing the quality and the application of projects. Bill demonstrated an exemplary project, including both the final product and project documentation. As Bill stated, ADDIE documentation reinforced the role of planning and organization. In the workplace participants reported the importance of ADDIE framework to understand the training development. The ADDIE documentation is an equally important deliverable that supplemented the IDT participants' end-product.

Challenges of the Real-Job Project Approach

A project approach does not itself guarantee effectiveness (Blumenfeld et al., 1991; Barron et al., 1998). Likewise, the project approach in the IDT program presented challenges for trainees, instructors, and institutions, and a more rigorous design is needed to promote motivation, understanding, and application. The challenges will be discussed here according to the three project stages.

Project Initiation

Contrary to the literature (e.g. Blumenfeld et al., 1991), which states that younger students have difficulty initiating a valid topic in the K-12 context, most adult trainees in this study had a vivid picture of the needs specific to their job context and, furthermore, much successfully adapted those needs into the project topic. Participants felt comfortable with initiating a project topic from the workplace and were able to conduct a valid needs analysis. The

participants' work experience gave them a great readiness for the project initiation, and this readiness was demonstrated in the customized and responsive projects they produced.

Even with a topic pool, participants needed more help with establishing a clear vision of the project, especially the vision of the end-products in the e-learning format. A typical response was "demo[nstrating] upfront of sample learning products made with each type of software." The demonstration of real examples was considered important by both novice and expert participants and a way of visualizing an exemplary model to follow. The demonstration of tool affordance allowed for "an intelligent choice of tool beforehand." Especially for a novice participant, the demonstration was a means of illustrating the concept of an e-learning product. Consequently, the demonstrations increased the participants' imagination of their own projects' applications. For example, both Pearl and Lucy felt that their entire project experience would have been much smoother had they had a better a priori understanding of e-learning formats and tool functions at the project initiation stage.

Besides envisioning the end-product, forward looking of the project journey would also facilitate the completion of the project. Participants reported that they were not given enough explanation of the processes to do the project. Typical responses included: "[I] need more upfront direction - did not feel I know what was expected outcome." or "I am still a little unclear of any intermediate deliverable surrounding the final project." The facilitators should provide participants with an overview of the project procedure and expected intermediate deliverables for each project stage.

Although participants' work experience gave them a pool of realistic topics, instructors should foster a design thinking to help participants determine a good direction, level, and scope of the project. Barron et al. (1998) have pointed out that students are prone to pursue peripheral

goals in PBL because of insufficient experience as experts have. Demonstrating exemplary projects, assisting tool choice, and envisioning project structure in the early stage will help students keep on the right track later on.

Project Development

The main frustrations participants experienced during the development stage are lack of successive approximation, project checkpoints and feedback, hands-on practice activities, and enough project time. First, participants indicated a desire that each task should build on the previous tasks and, little by little, create a repertoire of polished components. A typical response was “more small, iterative steps (mini-projects) building to final project.” However, participants did not seem to experience this successive approximation smoothly in the IDT program. The whole project should be divided into tasks embedded into different class sessions, and the output of an early stage contributes to the input of a later stage as informed by the ADDIE framework.

Second, along the project, participants were expecting more “continual assessment” and constructive feedback. Daisy’s frustration was typical, “I was working hard on it, wrote it up, and yet it was not called for in this class.” More check points at every milestone should be integrated to ensure the quality of the project. More feedback from instructors, peers, or workplace sponsors was also needed to keep students on the right track.

Third, participants expected more participatory, responsive, and customized practice activities. Typical complaints included: “More in-class application activities”, and “more interactive sessions where we could try more things”. Especially, the sessions provided by field experts should pair with a practice activity to reinforce the project and support learning transfer. Their real world stories were very eye-opening for participants; however, the selling-of-product

style presentation does not increase perceived authenticity. Participants would like to know more about the process of design and development, rather than just the end product itself.

Finally, participants reported a major challenge of insufficient time for their projects, mostly because of the challenge to master computer tools. A typical complaint was “Not enough time learning software.” More technological assistance and schedule adjustment were seen as ways to overcome the time constraint. Typical responses included: “would like to have some extra support for less self-motivated and/or technically skilled students.” and “More time allocated, perhaps earlier in the schedule.”

All these challenges during the project development could be seen as a need for more interventions by the instructors or facilitators. The need could be broadly put under the umbrella of scaffolding (Collins, Brown, & Newman, 1989), a strategic collaboration by teachers and students to support intentional outcomes. From a growing body of research, scaffolding has been reported as the most challenging part in participatory pedagogy (Ge & Land, 2004). This study confirmed the critical role of scaffolding in project-based learning. The study also illustrated that instructionally the scaffolding is more than help. Just fixing problems for participants does not help them in the long term. As a participant reflected, “I didn’t feel that we learned Flash but that the students helping in the lab simply fixed any ‘bugs’ for us.” Scaffolding needs to be presented as a collaborative effort and to keep students at an optimum challenge level.

Project Afterwards

Two challenges participants faced after they returned back to the workplace were a low actual usage of the project and a certain degree of contradiction between principles learned in the IDT program and the real world operation. Surprisingly, the survey indicated that less than 10% of the projects were actually implemented in the workplace. In the workplace, many situational

and technological constraints, such as job transfer, business reorientation, and system updating, prevented the extensive application of the project. Especially because of the unavailability of the tools, many participants like Carl and Mary never used the project as well as the tool they learned in the IDT program. Among these constraints, the quickly changing and diverse nature of tools in the workplace posed a great obstacle for choosing appropriate tool(s) to teach in the IDT training. Additionally, increasing the quality of the participants' projects and inviting workplace clients would also facilitate more intensive and extensive level of application.

Another challenge participants experienced in the workplace was the contradictory nature of instructional design theory with the professional context. The systematic ADDIE framework, although conceptually important, does not designate the business operation. Daisy's comment, "They are all good in theory, but often time our job doesn't work like that" was typical. The "hurry, hurry, and hurry" pattern Carl mentioned more accurately represented the instructional design in reality. This contradiction reflects the academic debates between the systematic approach and the rapid prototyping approach (Tripp & Bichelemeyer, 1990; Dorsey, Goodrum, & Schwen, 1997; Stokes & Richey, 2000). From a business perspective, the rapid prototype model seems more welcome as a development paradigm.

Rethinking Project-based Learning in the Training Context

While there has been an increasing body of literature in PBL over the past twenty years, the majority of research on PBL is rooted in school settings and scenario-project approach. This research context presented a unique case to study PBL in the professional training context. Interactions among pedagogical approach (PBL), adult characteristics (working professionals), and subject matters (instructional design) together introduce distinctive project experience and

necessitate pedagogical consideration. This section discusses differential effects of this approach, its theoretical justification, and pedagogical considerations for more successful projects.

Differential Effects

Project-based learning has been seen as an effective approach to facilitate learning transfer and application since Kilpatrick (1918) proposed the concept. More recently it has also become a novel approach for workplace learning (e.g., DelFillippi, 2001; Scarbrough et al., 2004). A significant design feature of this certificate program is what is called a real-job project approach in which participants' workplace background and needs are seen as significant learning resources. This modified project approach led to a greater connection between the training and workplace and as a result, presents unique training experience for participants.

Compared to the regular project approach, the real-job project approach facilitates topic generation and causes more goal-oriented actions, which are both major concerns of implementing PBL in the K-12 settings (see Blumenfeld et al., 1991). Jane's project, pharmacy regulatory affairs orientation, was a responsive solution to the increased need for the professionals in pharmaceutical regulatory affairs. Gary's project was to create an e-learning module that covers information security best practices as a responsive solution to the gap between users and designers of security software. Shirley's screenshots-software training project was a solution to repetitive, sporadic, ongoing basis, and small scale-training needs in the health education environment. Most participants were well prepared for their projects in terms of readiness and felt comfortable with initiating a project topic from the workplace, although some of them needed help with how to integrate the needs and e-learning solutions. The extant education research shows quite conclusively that the more readiness characteristics of the students are taken into account while planning instruction, the more likely it is they will achieve

the learning objectives. (Friedman, Harwell, & Schnepel, 2006). Participants' experience illustrated that taking students' readiness into account was an effective instruction strategy. The real-job project approach facilitated participants' project initiation process, increased their sense of ownership, and resulted in a different project experience to PBL in the K-12 context.

The job context affected participants' project choice and also modulated participants' development and implementation experiences. The projects demonstrated participants' mindfulness by making them apply knowledge to solve a real problem specific to the context. Some kinds of communication, collaboration, and negotiation were observed during their projects. The job elements, such as the business nature of participants' organization, the participants' position in the organization, and the audience of the project also influenced the participants' project experience. Depending on the types of organizations in which participants were employed—some worked in planning training systems while others worked in production using development tools primarily—the difference in their job responsibility caused them to focus on different components of the project.

Compared to the project approach in the K-12 context, the real-job project approach also provides immediate application and practical benefit for the participants' workplace. For example, Alex's class project was actually used in the hiring and training process in his library. Jane's demonstration project was used to advertise the outreach program in her organization. A unique characteristic of real benefit in this context was that the project served as a template for future projects for most participants. As expressed by one participant, "when you come back to your regular job you can just repeat it." The real job project approach provided a prototype for continuous refinement and a possibility of repeatable successes in participants' later jobs.

Theoretical Justification

The real job project approach in this study exemplifies the integration of job context for diverse participants in a professional development program. The results show that integrating job contexts into project-based learning in the training program is not only feasible but also beneficial. Theoretically, the perceived success of the approach, especially the increased affective foundation, also met the predication of pedagogical foundations, such as constructivism, experiential learning, situated cognition, etc. Here I will discuss its pedagogical merits according to Six C's motivation and transfer of learning, which seem to fit in best with the context.

Six C's motivation refers to providing experience associated with choice, challenge, control, collaboration, constructing meaning, and consequences could positively increase the motivation (Turner & Paris, 1995; Wang & Han, 2007). The theory has been used by scholars as a significant consideration in developing an instructional intervention. Participants in the IDT program were engaged in these experiences overall. IDT participants were given the choice of both project topics and tools. They were challenged by having to solve an instructional problem in their own job context and to present the solution in the format of an e-learning product. Data, especially various needs analysis, showed that participants took ownership of their project and became a creator of content rather than a receiver of the information.

Collaboration was not explicitly stressed in the pedagogical design. Participants were mainly working on an individual project. Yet, the learning community in the class was perceived as highly positive for these adult professionals. Developing a responsive e-learning product was a meaning construction process. Each participant tried to apply knowledge into his/her own job

context and to reach an own-set project goal. The consequence experience was also an apparent characteristic in PBL. The project had a potential impact on their workplace.

Of course, the Six C' motivation theory also indicated the need to reinforce some experiences in the IDT program. For example, a more explicit mechanism was needed to foster the collaboration experience, such as more constructive feedback among peers and more input from the workplace. More scaffolding during the project was also needed to increase participants' control over their project.

As clarified in the literature review chapter, the real job project approach emphasized the importance of the similarity between the training and performance context, the awareness of similarity, and situated and organic learning for learning transfer. Haskell (1998, p.37) argued that "a great deal of the failure to find transfer after instruction is often not due to a lack of learning but to a lack of organizational, social, and contextual support." He further pointed out that learners in corporate training environments have a built-in context of application (their job) and this context should be used to facilitate the transfer of learning. The study illustrated the integration of contextual factors and the connection between the training context and performance context as an important design feature. Using the real-job task as a project topic creates a similarity of projects between training and performance contexts. Solving a problem situated in the performance context promoted an active realization of the relevance, similarity, and difference of the knowledge and skills learned in the training context. The direct relevance and link stimulated a participant to think about his or her own transfer issue and application. Additionally, listening to stories from the guest speakers in the industry field and observing their peers' design work also encouraged an active mindfulness regarding transfer of what was learned and created an atmosphere of transfer.

On the other hand, to further foster the connection between the training context and job context is a fundamental way to increase the participants' project experience, the quality of the project, and the learning transfer. Because of variety in the performance context, the training should consider the contextual diversity. The more customized practice activities were important because participants had vastly different backgrounds and had different projects related to their own specific workplace. Because of the seriousness in the performance context, the training should foster a more rigorous envisioning, planning and documentation process. Moreover, implementing a real-job project approach is more than a cognitive consideration. Many organizational and "political" factors, such as the nature of business, the participants' position, and the consequence of implementing their projects, influence the project experience. Although more investigations are needed to reveal the mechanism of these external factors, facilitators should pay attention to the impact of these factors on participants' projects in a professional development context.

Promoting Exemplary Projects

Several strategies for overcoming challenges during PBL were discussed earlier, such as building a vision of the project, providing a clear project structure, integrating formative assessment, offering hands-on activities, and facilitating interactions between training and workplace. At a more abstract level, these strategies reflect three keys to promote a more successful project experience and a better end-product in this IDT context. They are:

1. Incubate design thinking.

Instructional design is basically a design education similar to engineering or construction to provide a satisfactory solution. It shares similar characteristics with other design domains. Design is a process that is aimed toward proactive problem-solving, has no unique answer

(Lawson, 2006), and is concerned with more than just creating a functional product (Pink, 2005). Design thinking is an essential prerequisite for a good design work. It refers to a capability of imagining and reasoning among problem, solution, and context toward a design prototype creatively, functionally, and aesthetically (Lawson, 2006). In the IDT program, instructors could provide exemplary products, sample ADDIE documents, and a tool matrix to foster pro-active thinking and release their creative potential. More process oriented real-world stories, more emphasis on planning and reflection, and a reinforced design community may also facilitate design thinking.

2. Balance between structure and flexibility.

A balance between structure and flexibility is an important factor along the project process. The project approach, as a learner-centered practice, provides students with more freedom to explore within their own interests and self-paced steps, and as a result, increases the sense of ownership. The uncertainty and ambiguity along the learning process are also believed to have its pedagogical values (You, 1993; Visser & Visser, 2004). In the IDT program, participants were given lots of freedom regarding project topics, development tools, project management, etc., and they highly appreciated being given the choice and flexibility of the project. However, many perceived challenges they reported indicated a need for a more structured process. Participants believed that the project should build upon a continual and successive process and the former output should become the latter input. The IDT participants reported a great need for a clearer project timeline, its intermediate objectives and deliverables, and checkpoints and feedback. Jane asked to modulate peer interaction to elicit more constructive feedback on the project. Bill asked for the requirement of the ADDIE documentation. Also, participants needed more intentional application activities to support their

project. Given the fact that many speakers presented in the training, more coordination in terms of the project approach, rather than the content itself, was necessary to make the project a more collaborative effort. The structure is important to enable students to know what to expect in the project. The literature has also advised instructional designers to explicitly identify and map the structure features in order to raise students' performance during the problem solving process (e.g. Clark & Blake, 1997; Jonasson, 2000). Jonasson (2000) categorized the design problem as a type of ill-structure design problem including many degrees of properties and no correct or wrong answer, but only a better or worse answer. He further emphasized that, to promote and regulate students' performance, the design process needs to be combined with structured mechanisms such as "components that partition the problem into a set of meaningful tasks, process that control the generation of designs, and evaluation procedures"(p.80). Participants' experiences in the IDT program reflected a need for more structured mechanisms to enhance their performance and meet a professional standard during the project-based learning.

3. Foster the perceived authenticity.

Incorporating a job task into the project and presenting real stories in sessions during the IDT training contributed greatly to authentic learning. However, more strategies should be incorporated to enhance realistic projects and foster perceived authenticity. For example, a participant recommended inviting a workplace client to increase seriousness and significance of the project and, as a result, foster the possibility of application afterwards. A client model paired with the real-job project approach reinforces the elements, such as authentic audience, work-driven criteria, and workplace collaboration. From Gulikers et al. (2004)'s view of the authenticity framework, the invitation of workplace sponsors or clients is meant to increase the results-authentic, criteria-authentic, and social context authentic.

Likewise, the participants' comments regarding real-world stories illustrate that including realistic elements does not necessarily foster authentic learning. Although the story-telling technique has been seen as an effective technique to teach professional expertise (Jonassen & Hernandez-Serrano, 2002; Wilson, 2004), a story functions differently depending on how it is told. In the IDT context, quite a few participants reported several real world stories were not helpful and authentic to them. A typical comment was like: "Some of the business professionals focused on their product, not how they created the product." From the authentic learning perspective, the real-world story should be presented to point toward how experts' experience and exemplary practice could be applied to and inform the learners' projects and jobs. Story-telling must connect to the individual's situation and goal-oriented action.

Recommendations for Future Research and Practice

This study has several implications for future research and practice. They are presented on the following three topics: a follow-up experimental study, development of an online PBL model, and teaching instructional design.

Experimental Design Study

A follow-up experimental study could be employed to compare effects between a hypothetical project approach and a real-job project approach (see Figure 3). The study could use authenticity as an independent variable and investigate group difference in terms of performance, knowledge, and satisfaction. Ideally, a pretest-post-test-stability-test control group design should be employed. That is, participants should be given a pre-test before participating in an intervention, a post-test right after the intervention, and a stability test several months after the

intervention. Data analysis should make use of a multivariate analysis technique including pre-test as covariance.

Additionally, the current study indicates that the terms, the hypothetical project and real-job project, should be better defined in follow-up studies. In the IDT program, some participants developed a hypothetical project but it was rooted in their work environment. For example, Daisy's project, "how to design a courseware for a corporate sales force" was not an actual project in her workplace, but was based on the information and materials there. Her hypothetical project is certainly different from an ice-cream project, developed by another participant for fun. On the other hand, the project rooted in the workplace is still different from an actual project undertaken in a participant's job. Although a hypothetical project based on a workplace scenario and a project using a job task are both situated projects, they represent a different authentic level, a different authentic component, and a different consequence. Therefore, in the experiment, I should further control and define two situated project approaches, an actual project and a project situated but not a real task one.

Development of an Online PBL Model

The second avenue for future research is to design and develop an online PBL model using guidelines emerging from this study. An online PBL model seems both socially needed in reaching more distributed learners and pedagogically needed in the constructivist trends. Sophisticated technology has made such a participatory model feasible online. The rapid development of online technology has made schools, business, and government use it to increase and extend educational opportunities. More and more online programs and curriculum, both degree-based and certificate-based, are going online to reach more distributed learners. ASTD (2006)'s survey shows the training delivery via technologies has been constantly increasing in

recent years and has approached 40% among all delivery methods in said exemplary organizations. The IDT certificate program should also go online to become more competitive, to meet huge market needs, and to reach professionals globally. Actually, all respondents in the pilot survey favored the idea of the online IDT certificate program. Although there was a concern about losing the face-to-face interaction experience, participants viewed the online program as a good alternative in terms of flexibility, individualization, and distance. The interviews with participants further confirmed the support for an online program to reach remote learners and to provide more self-paced and training flexible experience.

However, the current online learning programs are still dominated by e-lecture or content transmission formats. Most current online learning models just reflect the advanced technology aspect, rather than take into account recent advancements in instructional paradigms (Helic, 2005). How to integrate participatory, problem-solving, and activity-based pedagogy is critical and promising in the online environment. The online PBL model will illustrate such a more participatory practice.

Thus, what characteristics should be incorporated to develop a valid, practical, and effective online PBL model for teaching instructional design and technology? This study has suggested several components for the online model as listed in Figure 10. These components reflect some design guidelines emerging from the study, such as demonstrating exemplary performance, building a vision of a final product, facilitating the project process, emphasizing professional documents, and reinforcing the connection between the training and the job, etc. A conceptual prototype incorporating interventions has been created as shown in (http://projects.coe.uga.edu/xni/IDT/epbl/index.htm). Although more collaborative efforts are needed to make it practical and valid, I see the online PBL model based on the ADDIE

framework as a useful tool for instruction design teaching and learning. I could also possibly advertise the prototype and locate industry partners to develop a more sophisticated and commercial PBL model.

Design Components	Design Guidelines	Supporting Evidence
1. a project structure based on ADDIE	Ensure a project structure of successive approximation; Integrate the documentation requirement to facilitate project management;	Participants wished the project could be divided into "more small, iterative steps" and "have an outline or some objectives to tie everything together." The literature indicated the importance of structuring the project process to exert impacts on prediction, goal-oriented action, and metacognition (e.g. Blumenfeld et al., 1991; Clarke & Blake, 1997). Effective PBL should support project management and build systems around teaching and learning paradigms, rather than around technology (Helic, 2005).
2. a project handbook	Clarify the project process, desired outcomes, and intermediate objectives;	The literature indicates the importance of defining goals of the project (e.g. Barron et al., 1998). Participants felt that they did not receive "enough explanation of processes to do project" and requested "much more formal sessions for the project [as] many were hit & miss."
3. a case library paired with end-products, design technologies, and documentation	Build vision and model solutions to design problems; Provide learners with a collection of project references to consult when a problem arises to help them decide which direction to take.	Participants felt that they "didn't know enough about the software to make an intelligent choice beforehand" and requested "more exemplary projects at the beginning." Participants asked to see a matrix of tools paired with the sample product, technology affordance, advantage, and disadvantage. The literature suggests both the teaching-by-examples philosophy and the current pedagogical approach of case-based for learning (e.g. Kolodner, Owensby, & Guzdial, 2004). Designers heavily reply on reference material and tend to collect exemplary precedents (Lawson, 2006).

4. project scaffolds (just-in-time hints, coachers, or examples)	Provide responsive scaffolds and practice activities on the project;	The literature on PBL pointed out the importance of providing cognitive aids and scaffolds throughout the project (e.g. Collins, Brown, & Newman, 1989; Barron et al., 1998; Howard, 2002; Mayer et al., 2002). Participants would like to have some extra support for technology and the design process.
5. a space for design community	Foster the community for design activities;	Much of the literature stresses the importance of a knowledge-building community in promoting participation and a sense of agency (e.g. Brown, et al., 1989; Barron et al., 1998; Howard, 2002; Lawson, 2006). Participants reported that the class enabled them to form a social bond and saw that "the interactions with others were most beneficial."
6. check points and sign-off sheets	Elicit a formative evaluation of the project and constructive feedback; Keep students on the right track on the project;	The literature indicates the importance of feedback, formative assessment, and revision opportunities during PBL to keep students focused on the desired performance and to reduce students' anxiety (e.g. Barron et al., 1998). Participants required more checkpoints for the project and more time for review with instructors.
7. workplace stakeholder/sponsor/client	Reinforce the relevance between the training and performance contexts; Besides being task-authentic, ensure that the results and assessment are authentic.	The existing literature on adult learning, authentic learning, and project-based learning all suggests the importance of the relevance and authenticity of learning activities (e.g. Barron et al., 1998; Herrington et al., 2003; Lawson, 2006). Survey respondents favored the real job approach over the hypothetical project. Some interviewees recommended to invite a workplace sponsor or to have workplace sponsors review the project.

Figure 10. Design guidelines for an online PBL model.

Teaching Instructional Design

This study has some implications for the practice of teaching instructional design. Instructional design is a core course in many educational technology majors. Creating a constructivist approach like PBL to enable students to learn instructional design by creating tangible artifacts is very beneficial. This creation could prepare them not only for an early success but also for a tangible template for future design work. However, simply letting students follow an ID process and play with tools is not enough to help them grow into exemplary IDT professionals. Given the nature of "design" field, there are some specific considerations for design teaching.

First, activating proactive thinking/envisioning is likewise important as activating previous knowledge in teaching instructional design. Activating prior knowledge has long been a tenet of education (Merrill, 2002). Ausubel (1968) claimed that effective instruction must "bridge the gap between what the learner already knows and what he needs to know before he can successfully learn the task at hand" (p.148). Teaching instructional design should also observe the tenet of starting from students' prior knowledge and background.

However, as far as the subject of "design" is concerned, pro-active thinking seems more crucial for a design work (Lawson, 2006). Solving a design problem requires first developing a mental image and a sketch of an artifact, before the actual development, with the potential to meet different sets of conditions and criteria (Dijkstra, 2005). An excellent designer projects his/her design functionally, aesthetically, conceptually, contextually, holistically and emotionally. Therefore, for instructional design, it is no longer sufficient to teach students some technological applications like Dreamweaver or Captivate and theoretical principles like nine events of instruction or cognitive apprenticeship. An instructor needs to cultivate students'

proactive problem solving ability, i.e., design thinking. Strategies to help design thinking include presenting exemplary projects, setting up a vision, and prototyping, etc. As Jonassen (1999) claimed that "modeling provides learners with an example of the desired performance" (p.231) and "a widely recognized method for modeling problem solving is worked examples" (p.232), providing various exemplary products as well as documentation of the products seems necessary in order to model design thinking and design solution. Given that many instructional design products are delivered through electronic media, tools and design are inseparable. Helping students better understand the tools and their affordances could also help their proactive thinking.

Second, reinforcing the design community promotes design work. The community practice as a pedagogy is rooted in what Vygotsky (1978) called the social cultural foundation on cognitive development and later further expanded by other scholars (e.g. Brown et al., 1989; Newman, Griffin, & Cole, 1989). The idea of community is to put people sharing common professional culture and pursuing similar goals together so that a learner could develop under scaffolding from a more capable peer. This idea is what Vygotsky called the zone of proximal development (ZPD). Also, the community plays a significant role on affective values for learning and builds a social bond to grow on, that is, the community also creates what Brophy (1998) called affective ZPD. The community practice to teach instructional design has also been illustrated in reality. For instance, the Studio model (http://it.coe.uga.edu/studio/) at UGA exemplifies engaging learners in active construction and collaboration within a design community environment. Participants in the IDT program also reported a high value of peer interaction and social connection they experienced, although more mechanisms to foster constructive feedback were desired. Additionally, alumni talk could also serve as a great resource of the design community. The IDT participants suggested having an alumnus talk at the

early stage of project. Because an alumnus is closer to learners' ZPD levels, alumni talk is potentially more helpful than expert talk in building a vision and reducing anxiety and loss during the learning process.

Third, the instruction should ensure a design process of successive approximation and formative assessment. Barron et al. (1998) insisted on creating frequent opportunities for formative assessment and revision as an instructional principle in project-based learning. Comments from IDT participants also illustrated the importance of this principle in facilitating an instructional design work. An instructional design process should be arranged into an iterative process between problem, solution, and context so that students could gradually refine their work in a manageable fashion. Additionally, a successive approximation also has its motivational value because it challenges a learner at an optimal level and provides a small success over the long-period of design work. For example, Daisy reported excitement when she mastered using image roll-over effects to present content. Some elements to promote constructive approximation include checkpoints, design work review, informative feedback, etc.

Fourth, the class should offer more authentic opportunities for design work, such as incorporating a realistic task, inviting a real client, or locating a collaborative partner. Herrington et al. (2003) proposed incorporating authentic tasks as an essential instructional means to reflect the way the knowledge will be used and to feature the complexity in real-world context. The current study also illustrated the pedagogical value of incorporating a realistic task in learning instructional design. However, to increase the perceived authenticity, more resources from the real world contexts could be integrated, such as work-driven criteria, real-world audience, etc. Especially, the role of clients/sponsors in teaching and learning has been claimed by scholars not only in authentic learning (e.g. Darabi, 2005) but also in the more general field of design

education (e.g. Lawson, 2006). An instructional design course should try to provide such a partnership with industry so that students' learning will become task-authentic, product-authentic, and criteria-authentic, and the design work will become a collaborative effort.

Besides the above implications for design teaching, this study also prompts a consideration of how to balance the systematic approach and the rapid prototyping approach in instructional design curriculum. As mentioned earlier, participants' stories supported the assumption made by Gustafson and Branch (2002, p.xv) that the systematic ADDIE framework serves as conceptual, management, and communication tools for instructional design job. As far as a pedagogical implication is concerned, we should continue to utilize this conceptual framework to structure learning activities. However, participants' application experience in the workplace indicated that they rarely perform instructional design processes systematically according to the ADDIE framework. They demanded a quick response to the business needs. The rapid prototype model seems to reflect industry operation more than the systematic approach. Therefore, considering the instructional design curriculum, how we prepare instructional designers to meet and reflect the industry needs is worthy of further investigation.

The study also revealed some emerging topics that might be added to instructional design training. The topics emerging from the participants' jobs include: more participatory e-learning formats, courses in the global context, template design, project management, learning management systems, accessibility and assistive learning devices, consistent technical writing, and interactions with subject matter experts. For example, besides the lecture-style model, Daisy reported the increased need of training through more participatory models, such as case study, scenario, coaching, and role playing. She also sought to learn how to design a template because the reusable template was beneficial for quick development and could be carried on from project

to project. Some participants reported that project management had been an expected expertise for training professionals. A training project nowadays requires more efficient management skills to plan, coordinate, and communicate to reach the desired quality yet within time and budget constraints. Bill reported a need to ensure the consistency with wording and phrasing in technical writing. The technical documentation accomplished by many writers should "look like one person wrote the entire thing." Additionally, some IDT professionals experienced the complexity in managing complex interaction and communication with subject matter experts. How to make sure subject matter experts, especially those who are used to the traditional way of instruction, fit in with a new way of thinking and presentation in a technology-rich environment was challenging as reported by participants. So, the issues mentioned above might be worthy of consideration for the instructional design curriculum to better reflect the current industry needs.

Concluding Remarks

Constant changes because of technology updates and globalization in today's business environment require organizations to invest in learning for business success. The recent report conducted by ASTD (2006b) estimated that $109.25 billion is spent annually on employees' training by U.S. organizations. More importantly, the report indicated that "a growing number of top executives recognize learning as a fundamental driver of organizational performance and that helps learning executives run the learning function like a business"(ASTD, 2006a, p.33). Considering that instructional design and technology has become an essential medium for developing training today, exploring an effective professional development approach for those instructional designers and learning service practitioners is certainly imperative. This study presented a case of using a real-job project approach as a fundamental way of preparing training service professionals.

Quantitative and qualitative results together in this research provided an in-depth exploration of participants' lived experiences and perceptions regarding developing a realistic e-learning project. The real-job project approach in IDT training was welcome because it, from the participants' point of view, provided "opportunities to produce end products and apply skills" and allowed them to "have a goal to accomplish." Data substantiated that the trainees developed appreciation and competence through the real-job project approach, and perceived it as appropriate for working adults, although the actual application of the projects was not high as expected. More detailed research revealed that major reasons why projects could not be applied in the workplace included the nature of the project, individuals' job change, and workplace, pedagogical, and technological constraints. While not all of these issues could be addressed instructionally, training could at least, through a design perspective, aid trainees to determine the project's direction, scope, and size, and to foster more interactions between training and the workplace.

While incorporating a job task into students' course project is a great step toward authentic learning and promotes both affective and cognitive values, and "a spirit of transfer" (Haskell, 1998, p.39), a number of critical challenges remains for us to address. The themes that require more pedagogical considerations include building a project vision, providing structure and formative assessment, gearing responsive sub-activities to a project, overcoming time constraints of the project, and facilitating interactions between training and workplace. These themes basically parallel the design principles Barron et al. (1998) proposed in the K-12 context (appropriate goals, scaffoldings, opportunities for formative assessment and revision, and social structure promoting participation). Considering this specific context, elements worth emphasizing include pro-active design thinking, ADDIE documentation, tool scaffolding, and

inviting workplace clients. Consideration of these themes and elements could lead to more successful projects, more intensive and extensive applications, and a deeper connection between training and workplace.

As this study employed self-report measures, caution is necessary because using perceived data in the survey has its limitations. As Thomas (1999) has pointed out, self-report measures are not measures of what happened, but what participants believe happened, and thus reliance on these measures can be deceiving. Likewise, the voluntary recruitment process for interviews could also be problematic. Participants who were willing to tell their story would more possibly have a positive experience. Those minor voices might be missed. Triangulation and rich description techniques were used to overcome these limitations.

Caution is also necessary when generalizing the group differences because the research design used here is not experimental. That is, real-job and hypothetical projects were not randomly assigned. Both groups were actually under the same treatment. The differences observed could result from other factors such as participants' disposition, personality, etc. The fact that there is no significant difference in terms of entry levels seems a favorable condition for the detected group differences.

Additionally, the context of the certificate program reduced the rigor of the research conditions and the extent to which the research results can be generalized. For example, the certificate program was open to members of the general public which gave a great variety of participants. The nature of some participants' jobs did not enable them to find a good topic for their project. The fact that no single faculty member directly oversaw the project also led to an instructional weakness, because the participants had no continuity in advising on their projects. Finally, there were no explicit standards required for completion of the certificate program. More

controlled research conditions are needed to investigate the effects resulting from the proposed training strategy.

To conclude, lessons learned to implement PBL in the IDT context include:

1. The real-job project approach is beneficial and feasible in the training context. It promotes goal-oriented action and the feeling of ownership, increases value aspects of learning, and produces practical benefits.

2. The application of course projects is better represented as a template. Targeting a tangible product as a template could be a laudable objective in a project-oriented course so that learners could use the template they produce for future jobs and for repeatable successes.

3. Envisioning both the end-product and project journey and fostering design thinking are important for a successful project and experience a successful project experience. More exemplary products and a tool matrix are helpful for modeling better design work.

4. A project structure, intermediate objectives, and checkpoints should be more clearly clarified and implemented. The project should be arranged into a process of successive achievement and continuous refinement. Formative evaluation and constructive feedback are essential to the success of the project.

5. Clear and consistent participatory exercises and activities should be used to support the whole project and the application of knowledge. Experts' field stories should focus more on how they create the product, rather than showing off the product itself. Additional sessions on learning tools and storyboarding might be very beneficial.

6. Peer interaction is highly valued in the community for design activities. The design community offers not only a cognitive apprenticeship but also an emotional and social bond although more mechanisms should be developed to promote constructive feedback.

7. Fostering interaction between training and the workplace is also important to enhance the direction and quality of project. As a result of the involvement of a real audience and work-driven criteria, the project could become a more collaborative effort and exert more impact on business.

8. Emerging topics which could be considered for similar IDT programs include: participatory learning models, course design for a distributed and/or global audience, template design, rapid prototyping, soft-skill training, accessibility and assistive learning technology, learning management systems, project management, consistency in technical writing, and strategic interactions with subject matter experts.

The current study illustrated using the real-job project approach as an important design feature for the enhancement of professional development for instructional designers. The results indicated that the pedagogy provided participants with useful, relevant, and customized project experience. An increased value aspect of learning, a tangible template for a trainee's future job, and a conceptual understanding of the instructional design process were identified as major outcomes of the pedagogy. More strategies to foster design thinking, design community, formative assessment, scaffolding, and interactions between training and the workplace could further improve the quality and experience of projects. As an extension of this study, more research efforts may be spent on an experimental investigation of the authenticity factor or the exploration of the potentials of PBL in the online context. It is my hope that future research efforts may use, validate, and extend the findings from this study.

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APPENDIX A: SURVEY ON PROJECT-BASED LEARNING IN IDT

Dear IDT participants,

You are invited to participate in a research study titled "Effects and Challenges of Using a Real-Job Project Approach to Teach Instructional Design and Technology" conducted by Xiaopeng Ni under the direction of Dr. Robert Branch, Department of Educational Psychology and Instructional Technology, University of Georgia, 604 Aderhold Hall, Athens, Georgia 30602.

The purpose of this research study is to investigate the effects and challenges of using a real-job project approach in the IDT certificate program. Completion of the survey is expected to take a maximum of 10 minutes. Survey records will be stored in a password-protected database in the college web server and will be destroyed by April, 2007. Any information that is obtained in connection with this study and that can be identified with you will remain confidential except as required by law. If you are not comfortable with the level of confidentiality provided by the Internet, please feel free to print out a copy of the survey, fill it out by hand, and mail it to me at the address given below, with no return address on the envelope.

Your participation in this study is completely voluntary. You may choose not to participate and can withdraw from participation at any time without penalty, or skip any questions you feel uncomfortable answering. Closing the survey window will erase your answers without submitting them. Additionally, you will be given a choice of submitting or discarding your responses at the end of the survey.

If you have any questions do not hesitate to ask now or at a later date. You may contact Xiaopeng Ni at 706-247-6418 or xiaopeng@uga.edu. Thank you for the invaluable help that you are providing by participating in this research study.

Sincerely,

Xiaopeng Ni

Department of Educational Psychology and Instructional Technology

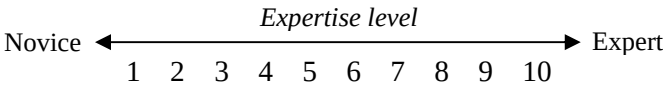
University of Georgia, Athens, Georgia 30602

Additional questions or problems regarding your rights as a research participant should be addressed to Chris A. Joseph, Ph.D. Human Subjects Office, University of Georgia, 606A Boyd Graduate Studies Research Center, Athens, Georgia 30602-7411; Telephone (706) 542-3199; E-Mail Address IRB@uga.edu

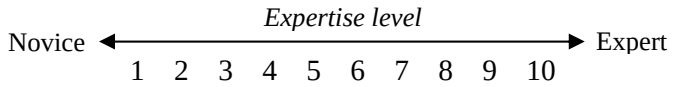
Q1. What was the nature of the project you did in the IDT certificate program?

◯ Part of my job ◯ Hypothetical project ◯ Other. Please specify: _____

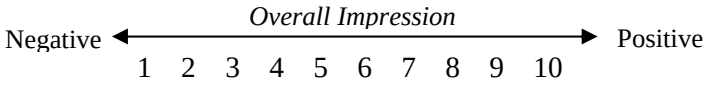
Q2. How would you rate your computer expertise BEFORE you entered the IDT program?



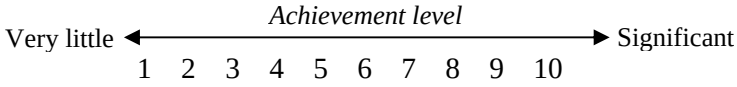
Q3. How would you rate your instructional design expertise BEFORE you entered the IDT program?



Q4. How would you rate your overall impression of your project experience?



Q5. To what extent has the IDT project increased your expertise?



Q6. Rate your feelings about the following aspects of your project:

(1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly agree)

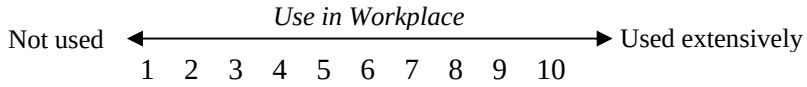
	1	2	3	4	5
Q6a. My project was directly related to my job.					
Q6b. I valued being given a choice of doing a project related to my workplace.					
Q6c. Doing the project was an enjoyable experience.					
Q6d. My motivation was high while doing the project.					
Q6e. Interactions with my classmates benefited my project.					
Q6f. Interactions with workplace colleagues contributed to my project.					
Q6g. My project allowed me to encounter central concepts in instructional design and technology					
Q6h. Knowledge and skills learned through my project were applicable to my workplace.					
Q6i. I am satisfied with my final product.					
Q6j. My project had a positive impact on my job performance.					

7. What barriers have you experienced in accomplishing your project?

(1=No barrier, 2=low barrier, 3=Moderate barrier, 4=High barrier, 5=Very high barrier.)

	1	2	3	4	5
Insufficient time for doing the project					
Lack of personal motivation					
Lack of support from the IDT instructors					
Lack of support from the job environment					
Lack of technical support					
Lack of clear directions for doing the project					
Lack of a clear project idea					

8. To what extent has your project or final product been used since you went back to your workplace?



Please comment on why it has or has not been used?

9. How could project-based learning in the IDT certificate program be improved in your opinion?

10. Please add any other comments, explanatory notes, or stories about your IDT project and product. Thank you.

APPENDIX B: SEMI-STRUCTURED INTERVIEW PROTOCOL

1. Tell me something about your background in the instructional design and technology (IDT) field.

2. I would like you to think back to when you were in the IDT program. How was the project topic chosen or generated?
Probe: (a) *I wonder about the reasons you decided to do this project. (b) Were certain criteria of particular importance? If so, which ones (uniqueness, awardness, or urgent issue)? (c) Is it difficult to find a relevant project from your job for the training? (d) If you had to do the project over again, how would you choose a project?*

3. Do you think the project approach connects your job context and training experience? If so, how?
Probe: *(a) Is your final e-training product a result of the integration of training experience and working context? (b) If not, would you like the training to be more work context related and what are the reasons preventing such integration? (c) Did you consult or work with any colleagues or employers when working on your IDT project? (d) Did you use any data or resources from your working context?*

4. Did you use, show, or expand your IDT project later in your workplace after training?
Probe: *(a) Did you use your project in your working context? (b) If yes, what was the situation? What did you do? What was the result? Can you give examples of individual benefits or organizational benefits? (c) If not, what were barriers preventing you from applying the IDT project? (d) Please indicate what you are doing differently on the job as a result of this training project.*

5. Do you think that the project-based approach in the IDT program fits your developmental goals in instructional design and technology?
Probe: *(a) How was your overall motivation during your project? Why was it low or high? If not, how could it be raised? Do you prefer this kind of learning? (b) Were you satisfied with your final product? If yes, what factors do you think contributed to your project? If not, how would you make it successful? (c) Did the project approach allow you to encounter the central concepts and principles in instructional technology and design? (d) Did this approach give you an authentic sense to solve real problems? Do you think this approach is worthwhile?*

6. How could this real job project-based learning in the IDT program be improved according to your perceptions?
Probes: *(a) How effectively do you think this real job project approach is? What are the strengths? What are the weaknesses? (b) What difficulty have you experienced? How could this approach do better?*

7. Any other comments, experiences, or stories about this real-job project approach.

APPENDIX C: EXPERT REVIEW RUBRIC FOR IDT PROJECT

Reviewer: _____ Project Title: _____

Please circle your rating and write comments on each aspect of the IDT artifact. 1 represents the most negative impression on the scale, and 5 represents the most positive impression. Choose NA if the item is not appropriate or not applicable to this artifact.

Note: The product may not be finished completely. Please rate it as a prototype for a full-scale project given that the trainee was only given five weeks to accomplish it and the trainee was a beginner to the field of web-based training. You need to focus on the evidence of trainees' knowledge, skills, and performance to solve an instructional problem according to training objectives and contexts.

NA=Not applicable 1=Strong disagree 2=Disagree 3=Neither agree/nor disagree 4=Agree 5=strongly agree

Criteria	Description	Ratings
Instructional Problem Analysis	The product demonstrates evidence that the trainee analyzed the instructional problem, including performance gap, context, purpose, goals, audience, and subject matters.	NA 1 2 3 4 5
Instructional Sequence Design	The product demonstrates evidence that the trainee gave consideration to performance objectives, task inventory, the sequence of instruction, and testing strategies. Instructional sequence and path is clear and organized.	NA 1 2 3 4 5
Visual Presentation	The screen design follows overall structure and the screen displays are easy to understand. Each screen demonstrates evidence that the trainee gave considerations to text spacing, alignment, color, background, table, buttons, links, headings, graphics, video, audio, animation (if these elements exist), so that these elements enhance communication and consistency of displays.	NA 1 2 3 4 5
Technical Functionality	The product is operated flawlessly and contains no errors of technical nature. Navigation is of clarity, consistency, working, and ease of use (for example, a link back to the homepage). All links are properly functioning and embedded files (e.g. images, graphics, etc.) are present.	NA 1 2 3 4 5
Originality	The product is compelling and persuasive. The product shows evidence of originality and emphasis on instructional strategy, content organization, interactivity, artful design, technology use with specific purpose, motivational consideration, cognitive engagement, etc.	NA 1 2 3 4 5

Rating Total: _____
Comments:

APPENDIX D: ORIGINAL DATA COLLECTED FROM SURVEY

(N = 43, representing 33.3% of the population in approximately 30 business settings across 12 sessions)

	Hypo	**Real**	**Other**
[Q1] The nature of the project	15 34.9%	23 53.5%	5 11.6%

Entry levels	**L**					**H**	**M**	**SD.**
[Q2] Entry computer expertise	1 1 4.6%	1 4 11.6%	1 5 13.9%	15 10 58.2%	3 2 11.7		6.72	1.94
[Q3] Entry instructional design expertise	4 2 14.0%	8 7 34.9%	6 8 32.6%	1 5 13.9%	2 4.7%		4.72	2.22

Overall self-report values	**L**					**H**	**M**	**SD.**
[Q4] Overall appreciation of project experience	1 3 2.3% 7.0%	2 4 14.0%	9 6 34.9%	14 4 41.9%			7.53	1.96
[Q5] Overall achievement through the project	1 4 2 2.3% 14.0%	3 4 16.3%	5 12 39.5%	7 5 27.9%			7.09	2.22
[Q8] Overall application of the project	20 2 51.2%	3 3 14.0%	4 2 14.0%	2 3 11.7%	1 3 9.3%		3.58	3.07

Experiences with different aspects of project	**SD**	**D**	**N**	**A**	**SA**	**M**	**SD**
[Q6a: Relevance] My project was directly related to my job.	4 9.5%	1 2.4%	10 23.8%	4 9.5%	23 54.8%	3.98	1.34
[Q6b: Choice] I valued being given a choice of doing a project related to my workplace.	1 2.4%		3 7.3%	6 14.6%	31 75.6%	4.61	.83
[Q6d: Motivation] My motivation was high while doing the project.	1 2.3%	1 2.3%	3 7.0%	17 39.5%	21 48.8%	4.30	.89
[Q6c: Satisfaction-Process] Doing the project was an enjoyable experience.	2 4.7%	1 2.3%	5 11.6%	19 44.2%	16 37.2%	4.07	1.01
[Q6i: Satisfaction-Product] I am satisfied with my final product.	3 7.0%	2 4.7%	11 25.6%	16 37.2%	11 25.6%	3.70	1.12
[Q6e: Interaction-Colleagues] Interactions with my classmates benefited my project.	2 4.7%	3 7.0%	8 18.6%	11 25.6%	19 44.2%	3.98	1.17

[Q6f: Interaction-Peers] Interactions with workplace colleagues contributed to my project.	12 34.3%	6 17.1%	8 22.9%	5 14.3%	4 11.4%	2.51	1.40
[Q6g: Knowledge Integration] My project allowed me to encounter central concepts in IDT.		2 4.8%	4 9.5%	24 57.1%	12 28.6%	4.10	.76
[Q6h: Knowledge Application] Knowledge and skills learned through my project were applicable to workplace.	2 4.7%	4 9.3%	4 9.3%	16 37.2%	17 39.5%	3.98	1.14
[Q6j: Performance Impact] My project had a positive impact on my job performance.	1 2.6%	4 10.5%	15 39.5%	10 26.3%	8 21.1%	3.53	1.03
Barriers	**NB**	**LB**	**MB**	**HB**	**VB**	**M**	**SD**
Insufficient time for doing the project [Q7a]	10 23.8%	10 23.8%	4 9.5%	13 31.0%	5 11.9%	2.83	1.41
Lack of personal motivation [Q7b]	28 68.3%	10 24.4%	3 7.3%			1.39	.63
Lack of support from the IDT instructors [Q7c]	28 66.7%	8 19.0%	4 9.5%	2 4.8%		1.52	.86
Lack of support from the job environment [Q7D]	22 53%	12 29.3%	4 9.8%	2 4.9%	1 2.4%	1.73	1.00
Lack of technical support [Q7E]	20 47.6%	14 33.3%	3 7.1%	4 9.5%	1 2.4%	1.86	1.07
Lack of clear directions for doing the project [Q7f]	23 54.8%	12 28.6%	4 9.5%	3 7.1%		1.69	.92
Lack of a clear project idea [Q7g]	24 57.1%	9 21.4%	6 14.3%	3 7.1%		1.71	.97

APPENDIX E: COURSE EVALUATION AT THE END OF THE TRAINING

(n=16, Two Sessions: Spring 2005 and Fall 2005)

	SD	D	N	A	SA	Mean	S.D.
Topics and Instruction							
The subjects were well chosen.		1	2	4	9	**4.31**	**.95**
The instructors were very knowledgeable				6	10	**4.63**	**.50**
The methods of instruction were most appropriate.		3	1	8	4	**3.81**	**1.05**
The instructional materials were very useful.			4	8	4	**4.00**	**.73**
Personal Value							
I gained new knowledge and insights.				5	11	**4.69**	**.48**
The quality of my life/work will be enhanced as a result of participation in this program.			4	5	7	**4.19**	**.83**
I am satisfied with the opportunity I had to participate.		3	1	3	9	**4.13**	**1.20**
The amount of interaction between the participant and the presenter was ideal.		1	1	6	8	**4.31**	**.87**
Informal conversations with other participants were beneficial.				2	14	**4.88**	**.34**
I would recommend this course to others.		1	2	2	11	**4.44**	**.96**
Organization and coordination							
The program was well organized and coordinated.	1		4	4	7	**4.00**	**1.15**
The time of the program (month, day, hour) was convenient.		1	3	3	9	**4.25**	**1.00**
The length of the program was appropriate.			3	5	8	**4.31**	**.79**
The length of the individual sessions was suitable.		3	2	5	6	**3.88**	**1.15**
Conference registration was efficient.				6	10	**4.63**	**.50**
Pre-conference information was helpful.			3	6	6	**4.20**	**.77**
The Georgia Center Website was helpful and informative.			4	5	6	**4.13**	**.83**

	Brochure	Employer	Former attendee	Ad(magazine /newspaper)	Web/Internet	Other
How did you learn of this program?	4	7			5	1

APPENDIX F: IRB APPROVAL FORM

Project Number: 2006-10286-0

The University of Georgia

Office of The Vice President for Research
DHHS Assurance ID No. : FWA00003901

Institutional Review Board
Human Subjects Office
612 Boyd GSRC
Athens, Georgia 30602-7411
(706) 542-3199
Fax: (706) 542-5638
www.ovpr.uga.edu/hso

APPROVAL FORM

Date Proposal Received: 2005-11-09 **Project Number:** 2006-10286-0

Name	Title	Dept/Phone	Address	Email
Mr. Xiaopeng Ni	PI	Instructional Technology 607 Aderhold Hall+7151	(706) 247-6418	xiaopeng@uga.edu
Dr. Robert Maribe Branch	CO	Instructional Technology Aderhold Hall +7153 542-9909/ 542-3810		rbranch@uga.edu

Title of Study: Effects and Challenges of Using a Real-Job Project Approach to Teach Instructional Design and Technology

45 CFR 46 Category: Administrative 2
Parameters:
Waiver of Signed Consent 46.117 (c) (2);
Approved for Institutions with Authorization Letters on File;

Change(s) Required for Approval and Date Completed:
Revised Application;
Revised Consent Document(s);

Approved : 2006-01-18 Begin date : 2006-01-18 Expiration date : 2011-01-17

NOTE: Any research conducted before the approval date or after the end data collection date shown above is not covered by IRB approval, and cannot be retroactively approved.

Number Assigned by Sponsored Programs:

Funding Agency:

Form 310 Provided: No

Your human subjects study has been approved.

Please be aware that it is your responsibility to inform the IRB:
. . . of any adverse events or unanticipated risks to the subjects or others within 24 to 72 hours;
. . . of any significant changes or additions to your study and obtain approval of them before they are put into effect;
. . . that you need to extend the approval period beyond the expiration date shown above;
. . . that you have completed your data collection as approved, within the approval period shown above, so that your file may be closed.

For additional information regarding your responsibilities as an investigtor refer to the IRB Guidelines.
Use the attached Researcher Request Form for requesting renewals, changes, or closures.
Keep this original approval form for your records.

Chairperson, Institutional Review Board