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Students' Perceptions of Their Learning Experiences in an Authentic Instructional Design Context

Nada Dabbagh and Cecily Williams Blijd

Abstract

The purpose of this case study was to examine students' perceptions of their learning experiences while working on a real world instructional design project in a performance oriented team in the context of a situated and problem-based learning environment. Participants were 11 graduate students enrolled in a learning-by-doing instructional design program. The results revealed that, overall, students had a positive perception of their learning experiences despite difficulties related to managing expectations, which led to initial feelings of anxiety and confusion. These expectations were primarily related to the nature of the project, the degree of scaffolding provided, and teamwork.

Keywords: authentic learning, problem-based learning, situated learning, instructional design, team-based learning, collanorative learning, constructivist learning

Introduction

Instructional design (ID) is an ill-structured problem-solving process defined by the context of the problem, the knowledge and skills of the instructional designer, and the quality of available resources (Dabbagh, Jonassen, Yueh, & Samouilova, 2000). This suggests that ID instruction should focus more on the attributes of the problem rather than the generality of the systems approach model (e.g., ADDIE) with its context-free rules. While novice learners typically welcome a systems approach to learning ID and find its prescriptions quite useful for designing instruction, they will likely focus on surface level features of real world ID problems, failing to acquire the observation and thinking skills that are necessary for competent performance. As affirmed by Carroll (1990):

> The mechanism and the self-asserted generality of the systems approach is attractive in a perverse way to educators and instructional designers, who characteristically worry about being too intuitive and not scientific enough. Unfortunately, the systems approach is as thin as it is mechanical and general. It produces predictable outcomes but at best only mediocre success. (p. 3)

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Additionally, several researchers (e.g., Dreyfus & Dreyfus, 1986; Rowland, 1994) have suggested that experienced and proficient designers experience the design process from their perspective, assessing the design environment for salient features that suggest solutions which have proven effective in their experiences. Hence, in order to help students begin to think like competent designers, ID instruction should be contextualized in or framed by an authentic (real world, complex) design problem. This is precisely what the immersion program, a full time instructional design masters program at George Mason University, strives to accomplish. The immersion program is a team-based learning experience designed to support learning instructional design by doing instructional design (Bannan-Ritland, Castellani, & Behrmann, 2001; Lombardi & Oblinger, 2007). This goal is achieved through research and training development grants that engage student teams and faculty in real world ID projects. These grants enable the integration of research, theory, and practice in an authentic problem-solving context, resulting in a beneficial situation for the funding organization, the university, the program, the students, and the faculty.

More specifically, students who enroll in the immersion program earn a master's degree in one year by successfully completing two prerequisite courses in the summer term and subsequently engaging in two consecutive semesters (fall and spring) of full-time participation in a team-based learning environment driven by a real world ID project that requires interaction with subject matter experts and adherence to timelines, status reports, and deliverables. The design team of six to eight students is initially unfamiliar with the project, the context, and other team members (a key principle of problem-based learning). The faculty member assigned to the particular project and team manages the project at the macro-level, helps facilitate the team process, and provides just-in-time teaching of ID concepts and principles. The immersion program also requires students to take intact courses to satisfy the research and technology requirements of the masters program. In addition, eighty percent (80%) of student's tuition is paid by the funding organization making the program very attractive to adults who are interested in switching careers, starting new careers, or formalizing their practice of ID in a fast track masters program.

Theoretical Framework

The immersion program applies a distinct instructional or pedagogical method involving the investigation and exploration of content, theory, and process related to the project at hand. Introducing students to the literature of the ID field as well as grounding them in basic Instructional Systems Design (ISD) principles and processes takes place within the context of solving a real world performance problem and developing functional prototype solutions. Specifically, ID teams in the immersion program require individuals to assume various roles and to work together to analyze problems, determine directions

and objectives, and collectively produce a technical product that meets the established need. These teams deal with many of the characteristics that depict complex problem solving such as a high level of ambiguity and navigating among multiple solutions and solution paths (Bannan-Ritland et al., 2001; Jonassen, 2000). Helping students focus on a clear project purpose, establish a strong commitment to learning, and work towards the achievement of the end result are the major areas of emphasis in this program.

This instructional approach incorporates several constructivist pedagogical models including situated learning (CTGV, 1992; Ertmer & Cennamo, 1995; Henning, 2004), problem-based learning (PBL) (Barrows, 1985; Duffy & Cunningham, 1996; Savery, 2006), action learning (Dilworth, 1998; Marquardt, 1999) and communities of practice (CoP) (Barab & Duffy, 2000; Lave & Wenger, 1991; Wenger, McDermott, & Snyder, 2002). In such pedagogical models, situations, activities, and social interactions are constantly challenging learners' understandings resulting in new meanings and interpretations. Therefore, the context or the activity that frames the knowledge is of equal importance to the learner as the knowledge itself (Brown & Adler, 2008; Brown, Collins, & Duguid, 1989). Rather than acquiring concepts as abstract, self-contained entities, the idea is to acquire useful knowledge through understanding how knowledge is used by a group of practitioners or members of a community (Barab & Duffy, 2000; Lave & Wenger, 1991; Wilson & Myers, 2000).

For example, in a learning community, participants develop capabilities and skills while building and exchanging knowledge in a relevant and meaningful context and a supportive learning environment. The immersion program can be described as a learning community in which control of learning is distributed among the participants including the instructor and subject matter experts. Participants are committed to the generation and sharing of new knowledge exhibited through high levels of dialogue, interaction, and collaboration (Dabbagh & Bannan-Ritland, 2005). The immersion program also integrates the pedagogical characteristics of problem-based learning (PBL) which include an ill-structured problem that drives all learning and allows the team to cycle through a collaborative problem-solving process (Barrows, 1985; Savery 2006). Additionally, team members engage in self-directed learning and reflective activities such as self-directed research, journaling, portfolio development, and self and peer assessment (Barrows, 1985; Duffy & Cunningham, 1996; Savery, 2006).

However, learning environments designed with constructivist pedagogical characteristics are not free of problems. Kirschner, Sweller, and Clark (2006) described constructivist approaches such as PBL, discovery learning, and inquiry learning as minimally guided instructional approaches that could result in incomplete or inaccurate mental representations of the knowledge domain. Others (e.g., Clark & Estes, 1999) argued that an eclectic approach to designing instruction (i.e., mixing techniques from different theoretical approaches and competing paradigms) is the best guidance possible particularly for teach-

ing novice instructional designers how to link theory to practice. While these researchers acknowledge the importance of promoting inquiry and problem-solving skills in academic curricula, they do not support pedagogical approaches that exclusively emphasize constructivist approaches. In contrast, Bednar, Cunningham, Duffy, and Perry (1992) believe that effective design of instruction emerges from the deliberate application of a particular theory of learning. Given these multiple and often conflicting perspectives on how best to design ID curricula, this study sought to add clarity to these perspectives by examining students' perceptions of their learning experiences in the immersion program, which is based on the deliberate application of constructivist learning theory.

Specifically, this study examined students' perceptions of their learning experiences while they worked on the development of an online training system for underground coal mine supervisors. The development of this system was in response to the mining industry's need to replace and train approximately 50% of its aging workforce and to address the complexity of underground coal mine supervisory tasks in a more systematic and systemic manner. The overall goal of this project was to develop an efficient and effective training strategy for underground coal mine supervisors using ID principles, processes, and learning technologies. The project was funded by the Mine Safety and Health Administration (MSHA) agency of the U.S. Department of Labor (DOL) for a period of two years. Students enrolled in the 2005-2006 immersion program and assigned to the MSHA project (*n=6*) were tasked with transitioning existing underground coal mine supervisor Job Task Analyses (JTA) into an effective training strategy. Subsequently, students enrolled in the 2006-2007 immersion program and assigned to the MSHA project (*n=5*) were tasked with implementing the training strategy and developing the training content using Workforce Connections, DOL's SCORM 2004 compliant open source Learning Content Management System (LCMS). The Statement of Work (SOW) for each phase (academic year) of this project can be viewed at: http://msha.immersion.gmu.edu/. This study examined the 2005-2006 and 2006-2007 student teams' perceptions of their learning experiences while working on the MSHA project in the context of the immersion program's constructivist pedagogical approach.

Method

Research Questions

This research study examined students' perceptions of the following pedagogical characteristics or components of the immersion program: a) authentic learning through a complex, ill-structured, real world project, b) team-based learning, and c) ability to link theory to practice. The following research questions were investigated:

1. What were students' perceptions of their learning experiences with regard to working on a real world instructional design project?
2. What were students' perceptions of their learning experiences with regard to working on a performance oriented team?
3. What were students' perceptions of their learning experiences with regard to their abilities to link theory to practice?

Participants

Participants were 11 graduate students assigned to the MSHA project. Six students (5 females, 1 male) comprised the 2005-2006 MSHA immersion team and five students (4 females, 1 male) comprised the 2006-2007 MSHA immersion team. Students entering the program were practicing instructional design informally as teachers, information architects, industrial technologists, graphic designers, and software developers, and through staff training development exercises. One student was changing careers from the marketing and public relations industry. Participants' technology experiences varied from knowledge of highly specialized instructional development technologies such as Lectora, Flash, and HTML scripting, to more customary information technologies such as Microsoft Office products and Internet applications. Participants enrolled in the immersion program in order to formalize their understanding of instructional design, improve their technology skills, learn in an authentic team-based setting, earn a masters degree in one year, and benefit from the tuition support. Participants' ages ranged from 23 to 48.

Data Collection

Interview questions. The interview questions were developed to gauge students' perceptions of the immersion program experience at the end of each semester (Bannan-Ritland, 2001). They consisted of ten open-ended questions, and addressed the different elements and components of the immersion program including working in teams, working on a real world project, pedagogical and curricular aspects, and linking theory to practice. Sample questions included "How would you describe your experiences so far in the immersion program?""How has working on an actual design project influenced your understanding of the instructional design process?""In which area of the instructional design process do you feel most competent and why?" and "How has the team aspect impacted your learning?" (See Appendix for the complete list of interview questions.) The interview questions were administered to members of the various student teams who participated in the multiple yearly immersion projects since the beginning of the immersion program in 1999. Doctoral students were typically selected to conduct these interviews in order to protect the identity of the students. The interviews can be characterized as semi-structured because although the questions were predetermined, the interviewers were instructed to probe for more information where appropriate which could shape the flow of information (Wilkinson & Birmingham, 2003).

In this study, interviews were conducted with members of the two teams that worked on the MSHA project. Members of the 2005-2006 MSHA immersion team (*n=6*) were interviewed individually by a doctoral student at the end of the fall 2005 semester (mid program point) and members of the 2006-2007 MSHA immersion team (*n=5*) were interviewed individually by another doctoral student at the end of the fall 2006 semester (mid program point) and at the end of spring 2007 semester (end program point). Due to scheduling conflicts it was not possible to conduct end program interviews for the 2005-2006 team students. The interviews (a total of 16) were recorded and later transcribed by an independent transcriber. Transcripts were coded numerically (by semester, academic year, and a student identifier), and any reference to a student's identity was removed. The transcripts were made available to the faculty member that facilitated the MSHA project (the first author of this paper) after students graduated from the program.

Web-based portfolios. Students in the immersion program were required to develop an individual web-based portfolio that includes: a) personal goals that could be revisited and revised throughout the program, b) a resume, c) potential and realized contributions to the team, d) evidence of individual contributions to the project, and e) personal reflections that document personal growth and development as an instructional designer. Students were required to post personal reflections about twice a month resulting in approximately 10-12 entries across the two semesters (fall and spring). These entries or personal reflection statements served as the second data collection source for this study. These entries were also coded numerically by semester, academic year, and a student identifier.

Research Design and Analysis

This research used an exploratory case study design and qualitative data analysis (Yin, 1994). A conceptual content, or thematic, analysis was performed on the interview transcripts and reflection statements to transform and organize the data (Maxwell, 1996; Miles & Huberman, 1994; Wilkinson & Birmingham, 2003). First, the 16 interview transcripts were aggregated across each of the 10 interview questions while preserving the identification of the semester and year in which the interview was conducted. Second, the researchers (authors of this study) independently read the aggregated transcripts and generated explicit themes inductively. This was done by examining the incidence or frequency of phrases or concepts articulated in the transcript text. The researchers typically looked for three or four respondents or more than five responses per interview as a justification for an emerging theme and to address issues of triangulation (Miles & Huberman, 1994). Third, the researchers discussed those themes and converged on four explicit themes. Throughout the analysis process, the researchers were careful in the ways they organized and interpreted the data to ensure the transferability, dependability, and reliability of the results. This was accomplished through methodological triangulation, data/source trian-

gulation, and investigator/analyst triangulation in order to ensure the credibility of the study (Denzin, 1978; Patton, 1990). Specifically, we developed a data analysis matrix (see Table 1) known as a conceptually clustered matrix display (Miles & Huberman, 1994) to help us analyze the interview data, sort them into themes, and cross check the accuracy of the analysis (Wilkinson & Birmingham, 2003; Patton, 1990). The first dimension of the analysis matrix (first column) contained the explicit theme categories that emerged from the content analysis of the interview transcripts and the second dimension of the analysis matrix (first row) contained the research questions of the study. A conceptual content analysis was also performed on participants' journals that comprised part of their web-based portfolios. This analysis focused on the degree to which a student's reflection statement demonstrated evidence of the following criteria, which were stated in the portfolio assessment rubric (see http://immersion.gmu.edu/immsite/program/assess.htm):

- Connections between previous experience and understanding the immersion experience.
- Discussion of ID concepts and processes in relation to the project at hand.
- Meaningful linking of learning in other courses to the project at hand.
- Individual contributions to the team and the project tasks.
- Development of skills applied to the project.
- Leadership initiatives and actions taken (e.g., skill sharing) to promote and support team progress.
- Insights, realizations, and aha moments related to the learning and application of ID principles and processes.

More specifically, student reflections were independently reviewed by each author of this study and quotes that aligned with the rubric criteria were extracted. This was not a difficult process since most participants organized their reflections using the rubric criteria as an outline. Next, the researchers discussed their findings and used the rubric criteria that aligned with the interview themes to filter the data. The data were organized in a conceptually clustered matrix (see Table 2) in which the first dimension (first column) depicted the four themes that emerged from this analysis and the second dimension (first row) contained the research questions of the study. Further content analysis was performed to triangulate the eight themes resulting from the interview transcripts and reflections analyses and provide convergence on the data to ensure that any inferences were valid and viable (Miles & Huberman, 1994; Yin, 1994). Table 3 illustrates the theme convergence across the two data sources and their alignment with the research questions.

Table 1. Interview Transcripts Data Analysis Matrix.

Themes \ Criteria	Authentic learning (working on a real project)	Collaborative learning (working in a team)	Linking theory to practice
1. Managing expectations (student expectations versus program reality)			
2. Reflective practice			
3. Dealing with ambiguity and complexity			
4. Teaming issues: • appreciation of multiple perspectives and diversity of experience and expertise • decision making process • creative friction			

Table 2. Reflection Statements Data Analysis Matrix

Themes \ Criteria	Authentic learning (working on a real project)	Collaborative learning (working in a team)	Linking theory to practice
1. Connections between previous experience and understanding the immersion experience			
2. Discussion of ID concepts and processes in relation to the project and meaningful linking of learning in other courses to the project			
3. Insights, realizations, and aha moments related to the learning and application of ID principles and processes			
4. Teaming issues			

Table 3. Thematic Convergence Matrix .

Research Questions	Interview Themes	Reflection Themes
What were students' perceptions of their learning experience with regard to working on a real world instructional design project?	Managing expectations (student expectations versus program reality) Dealing with ambiguity and complexity	Connections between previous experience and understanding the immersion experience
What were students' perceptions of their learning experience with regard to working in a performance oriented team?	Teaming issues: • appreciation of multiple perspectives and diversity of experience and expertise • creative friction • decision making process	Teaming issues: • appreciation of multiple perspectives and diversity of experience and expertise • creative friction • decision making process
What were students' perceptions of their learning experience with regard to their ability to link theory to practice?	Reflective practice	Discussion of ID concepts and processes in relation to the project and meaningful linking of learning in other courses to the project Insights, realizations, and aha moments related to the learning and application of ID principles and processes

Results

The main goal of the immersion program is to enable students to construct knowledge of instructional design and learn relevant competencies and skills while working on an authentic project in a team-based environment. Students' perceptions of the immersion learning experience with regards to a) working on a real world ID project, b) working on a performance oriented team, and c) ability to link ID theory to practice were revealed through the eight themes that emerged from the data analyses. We organize the results by the three research questions and related themes as depicted in Table 3 and provide illustrative excerpts from the interview transcripts and the reflection statements (journal entries) that substantiate these themes. The excerpts are identified by semester and participant number where P1-P6 are members of the 2005-2006 MSHA immersion team and P7-P11 are members of the 2006-2007 MSHA immersion team.

What were students' perceptions of their learning experiences with regard to working on a real world instructional design project?

This question was primarily addressed through three themes: a) managing expectations, b) dealing with ambiguity and complexity, and c) linking previous experiences with the immersion experience. The results revealed that while students, overall, appreciated working on a real world ID project and were able to make connections between previous experiences and the immersion experience, they had difficulty managing expectations and dealing with ambiguity and complexity particularly in the first semester of the immersion program. The following excerpts reveal students' positive perceptions with regard to working on a real world ID project:

> (Fall 05, P2) It's sort of exciting that this whole MSHA project addresses current events that are in the news so I look forward to hopefully contributing something.
>
> (Fall 06, P7) We are kind of thrown into the project so it's been kind of neat to follow the whole process and it's not as easy as it looks – it's not as simplistic and straightforward so it's definitely preparing me for the job market— things are not always going to go smoothly.
>
> (Fall 06, P10) That real experience or real problem was very moving and helped me focus my attention. If it was a contrived or simulated project, even if it was well constructed, I don't think I would have felt that motivated to engage.
>
> (Fall 06, P11) Even though we were rehashing things that last year's team did, like the needs assessment, that's how we learned about needs assessment. We needed to go through those things to make the project our own, even through sometimes we did not change much from last year's needs assessment.
>
> (Spring 07, P11) It helped us to develop a clear understanding of the entire cycle of instructional design. Also, working on an actual project revealed the constraints one has to deal with or work under to accomplish the goals of the project.
>
> (Spring 07, P9)The unstructured constructivist learning environment of the immersion [program] provides us with great chances in the enhancement of critical thinking and problem-solving skills by exploring real problems.

Additionally, the following excerpts reveal that students, overall, were able to make connections between previous experiences and understanding the immersion experience particularly as this relates to working on a real world ID project:

(Fall 05, P3) I've had to write marketing plans in the past, so combining that experience with this immersion experience has helped me with the analysis— writing process— learning how to develop design documents.

(Fall 06, P8) From work experience, I know how deadlines and priorities can change, so learning how to manage those changes and cope with them when they happen has been really helpful in understanding the instructional design process.

(Spring 07, P7) In researching the concept of functional fixedness I found that this concept plays into many areas, it affects how people problem solve and assimilate new learning. This is a common challenge faced daily in software development companies. I have spent a great deal of time in the software arena and found this to be an interesting parallel while working on this project.

Contrastingly, several students (*n=7*) indicated that what they expected would happen before beginning the immersion program was very different from what actually happened. This covered expectations related to teamwork, access to subject matter experts, degree of scaffolding provided, and understanding instructional design, as revealed by the following statements:

(Fall 05, P3) It's a little different from the work that I do professionally, I work with clients. I think here just the degree of removal I guess or access to the client has been one of my challenges. I am used to having greater access to the client.

(Fall 05, P5) On the group side, it's been different from what I thought it would be. I thought everybody's commitment to the process would be the same and people are not the same.

(Fall 05, P6) This was a little more loosey, goosey than what I'm used to. I think that's where the disconnect came as to what I thought it would be than what it turned out to be.

(Fall 06, P9) No structure to come into because everybody is new and no one knows their responsibilities whereas in corporate, when you are hired, existing employees have well defined job duties and they mentor you and you fill in the gaps.

(Fall 06, P8) Immersion sets an expectation that the experience is on par with what the learner will experience in the real world. As a result, students that are struggling with concepts and processes are convincing themselves that they will not be prepared for a similar real world experience.

> (Spring 07, P7) Working with SMEs could be frustrating at times. In the fall we started working with two SMEs who gave us direction and then they retired so we had to work with new SMEs in January who gave us another direction but they kept changing the direction every time we met with them. So I think just learning to adapt to the fact that change happens, knowing how to deal with it, asking the right questions to make sure you understand why they may be changing directions and that they are making the right decisions for the right reasons and not because it is what they feel or a gut response because SMEs may or may not be aware of instructional design process.

> (Spring 07, P8) The academic SMEs (i.e., our faculty) were able to review and evaluate content models and make suggestions for and provide us with additional materials for content development. That changed last week when we were visited by several SMEs from MSHA. It was a scheduled visit to review the training we built last semester. We were expecting some changes for sure but in reality we got a totally new direction on more than a few training items. So, some of our previous work will go the way of the trash can. These field SMEs could not agree on what they wanted to see in the training.

Constructivist learning environments such as the immersion program are inherently unstructured and complex because they shift the responsibility of organizing and constructing knowledge from the teacher to the student (Brickell, Ferry & Harper, 2002). Students are typically ill-prepared for this type of learning environment and find the beginning weeks of the immersion program daunting. However as students progress into the spring semester and their understanding of ID develops, their perceptions towards managing expectations tend to improve particularly in relation to working with the project SMEs.

What were students' perceptions of their learning experiences with regard to working on a performance oriented team?

This question was primarily addressed through three themes: a) appreciation of multiple perspectives and diversity of experience and expertise, b) creative friction, and c) team decision-making process. With respect to the first theme, the analysis revealed that students, overall, appreciated and learned from the diversity of experiences that different team members brought forth as revealed by the following excerpts:

> (Fall 05, P1) It's great to be exposed to people who have different viewpoints, from different backgrounds—for example if somebody had marketing experience, they

> will bring that in—that gives them like a creativity—an edge and then they have that to contribute.
>
> (Fall 06, P8) So, our teams are composed with different areas of expertise and different ideas about things. It can make things tough but it also means you don't have people thinking the same way all the time and that if you're not sure about some things you can ask somebody.
>
> (Spring 07, P11) There are people with perspectives that I don't have and so that helps me broaden my understanding of things. And, there are people with work ethics that I don't share either and that's enlightening as well.
>
> (Spring 07, P10) The diverse personalities and life and work backgrounds of the team members opened my eyes to what else is out there in the real world, especially professionally!

However, diverse perspectives can also cause tremendous tensions in any group (Bagshaw, 2004). Such tensions were also evident in the data leading to another teaming theme which we labeled creative friction; a concept that encompasses what happens when you get people together with diverse perspectives and approaches to work towards a single thought or product (Hirshberg, 1998). Johnson and Johnson (2000) refer to this concept as an intrinsic state of tension that stimulates group movement toward the achievement of common goals. Successful teams can recognize and transform moments of friction and conflict into creative and innovative opportunities as reflected in some of following excerpts:

> (Fall 05, P4) It's not a project you can do by yourself and so you realize you do need to work with a team to get things done, but conflicting viewpoints about how things should be implemented slows you down a lot of the time.
>
> (Spring 07, P9) I, admittedly, always want to be in control of the creative aspects of any project. It was difficult for me to adjust to concede some of those decisions. I'd like to think I'm better at it now than I was before.
>
> (Spring 07, P8) Challenging is the word that comes first. It's not that I am not used to working in groups but it's not this type of group where everyone is involved with the same thing. I guess dealing with your personality and learning at the same time, dealing with misunderstandings and confusion and instructions, it's been a challenge.

As to the team's decision-making process, most of the participants in this study (n=8) did not feel that it was effective or efficient. These participants stated that the various levels of expertise and experience of the team members made it very difficult to integrate all perspectives when faced with making decisions. The teams also tended to base decisions on the expertise of the field SME and the professor in charge. The analyses also revealed that while the 2006-2007 MSHA team worked at establishing an atmosphere of inclusion, the 2005-2006 MSHA team did not make shared decisions, rather, a few of the team members made the decisions. Additionally, the results revealed that the team that made decisions by reaching consensus adopted a different decision-making strategy in the second semester. The following excerpts support these findings:

> (Fall 05, P5) For most part, the decisions were taken by only some team members without making an effort to include everyone on team. The less informed and less experienced ones never really got to explore their thinking about the project. But that is understandable as we had deadlines and deliverables, so it was okay.

> (Fall 05, P3) Problem solving in the context of a group, sometimes it works but sometimes it's a hindrance. And sometimes, I am the one that makes it work and sometimes, I am the hindrance. And that varies depending on the problem and on the individual.

> (Fall 06, P6) It's a team that doesn't want to step on each other's toes so absolutely everybody's opinions counted which means that you sometimes get bogged down in details because you can't move on because everybody has to agree and that's not necessarily a good thing every time.

> (Spring 07, P9) When you kind of split and do different things simultaneously I would say it's a better learning process. . . . Keeping the group as a whole for one individual thing has not been a good idea. You have several people focus on this one particular thing, too many different personalities, too many different perspectives and it gets kind of jumbled. It takes the process far too long to get moving

> (Spring 07, P8) The main characteristic of the team "Divide and Work" was very much evident at the end as all of us worked on our own sections with the least possible interaction. Not that our final product suffered in any way due to this team characteristic, I still feel that a little more interaction as a team, both inside and slightly outside of the immersion program would have given me a more fulfilling learning experience.

What were students' perceptions of their learning experiences with regard to their abilities to link theory to practice?

This question was primarily addressed through three themes: a) reflective practice, b) discussion of ID concepts and processes in relation to the project at hand and meaningful linking of learning in other courses to the project, and c) insights, realizations, and aha moments related to the learning and application of ID principles and processes. Reflective practice, a concept introduced by Schön (1987), is often used in education pedagogy to refer to a continuous process that students, researchers, and educators, engage in to thoughtfully and critically reflect on their personal experiences by applying knowledge to practice while being coached by professionals in the discipline. The data analyses revealed that the majority of the participants in this study (*n=9*) perceived that they were able to link theory to practice through reflective practice as depicted in the following excerpts:

> (Fall 05, P2) I began to notice parallels of my experiences with a professional organization called Black Data Processing Associates (BDPA). I compared what I remember of my involvement with BDPA to the description of a CoP and believe that BDPA would have been considered a community of practice [CoP], although I don't believe that the term had been coined back in the mid-1980s.

> (Fall 05, P1) As for the task analysis, I've found that the informational differences between a procedural and a hierarchical analysis are significant. The hierarchical analysis seems the most relevant for MSHA. The reasons most applicable to me . . ."What must the learner know?" versus "What are the steps the learner must do to complete the task?" and an analysis based on learning taxonomies versus one that is not.

> (Fall 06, P10) Learning in an applied context has given me a definite understanding of objectivist versus constructivist approaches in ID and when one is appropriate and when one is not.

> (Spring 07, P7) We switched from developing personas because we were headed towards specifics without enough data, to outlining user roles that outline the characteristics of the average user(s) of our training solution. This approach worked better—an example of the iterative nature of the ID process in action—review . . . revise.

With respect to the other two themes that addressed this research question, the analyses revealed that students (*n=8*), were able to connect what they were learning to

the project needs and to meaningfully link knowledge acquired in other courses to the project. Additionally, there was evidence that throughout the learning process students (*n=8*) gained a great deal of ID content knowledge and skills. The following excerpts from the interviews and reflection statements support these findings:

> (Fall 05, P4) The classes that we take around the project have been great in exposing me to theory (like constructivist theory) and then we discuss implementing it in our immersion project if appropriate (like adding a discussion board to support a CoP).
>
> (Fall 06, P10) The [mine] visit was a revelation to the multiple challenges in a miner's life and the importance of safety and health issues related to underground coal mining. Understanding the operations in underground coal mining has helped us understand the mining environment that will facilitate our design approach for the training system.
>
> (Spring 07, P7) During the summer courses I found that the hands on application of the material enabled me to synthesize the course work into practical use. In addition, the application of the material to my portfolio creation as well as to my work life solidified that this is right academic program for me.
>
> (Spring 07, P11) I was never a highly successful student, in large part because my experience with formal education was that of teach, test, assess. Immersion gave me an opportunity to experience formal education from a different approach. As a result I have been successful and I have transformed my approach to Instructional Design. Through the MSHA project and work within our team and with our professors I have begun to build a knowledge base that I can bring with me and continue to grow.
>
> (Spring 07, P6) While researching survey instruments, I opened the Lee and Owens book to the chapter on Instrument Development and there is a discussion of statistical measures (p. 261) which includes all of the statistic tests that we have been discussing in Educational Research.

Discussion and Implications

This study examined students' perceptions of their learning experiences while working on an authentic (real world, ill-structured) problem in a performance-oriented team in the context of a full time instructional design graduate program grounded in a constructivist

pedagogical approach. The ID problem or performance challenge that participants in this study tackled involved developing an online training system for underground coal mine supervisors in order to address the complexity of supervisory tasks and to provide a more systematic and systemic training system. Overall, the results of this study revealed that students perceived learning in the immersion program as a positive experience. Despite students' difficulties in terms of managing expectations, which led to initial feelings of anxiety and confusion, the results revealed that students were able to apply previous professional experience and skills to the project at hand and to effectively link theory to practice as they worked towards a resolution of the problem.

Specifically, the results revealed that students' expectations of the immersion program were very different from what they actually experienced particularly with respect to teamwork, the nature of the project, the degree of scaffolding provided, and understanding instructional design. Although students for the most part were able to apply previous professional experience and skills to the project at hand and to connect newly learned concepts to the project needs, the analyses revealed that students found it difficult to manage the project, the team process, and their own learning. This was largely due to the constructivist nature of the immersion program and more specifically, to the ill-structuredness of the ID problem. Jonassen (2000) classified design problems as "among the most complex and ill-structured kinds of problems that are encountered in practice" (p. 80). Furthermore, Conklin (2003) posited that ill-structured problems have no definitive problem statement and that problem identification or clarification depends on who you ask, for example, different stakeholders have different views about what the problem is. This is precisely the challenge that students faced with the MSHA project. Even though both teams had what could be perceived of as a well-defined SOW (statement of work), meetings with different SMEs led to more ambiguity because different SMEs had different ideas of what needed to be accomplished. Additionally, there is no right or wrong solution to an ill-structured problem (Jonassen, 2000). There are viable solutions and better or worse solutions adding to the complexity of the problem solving process (Conklin, 2003).

Integrating constructivist learning approaches such as situated learning or PBL into an academic curriculum is not an easy process. No matter how beneficial and useful constructivist pedagogical approaches are, students for the most part are still the products of the traditional "professor tells" approach and hence have little experience in this type of learning in an academic setting (Dabbagh, et al., 2000). Despite spending a few weeks at the beginning of the fall semester enculturating students into the immersion approach, students' initial perceptions of the learning experience were that of anxiety and confusion. However, when students begin linking theory to practice as they worked towards a resolution of the problem at hand, they started to realize the benefits of this approach. The results of this study revealed that students were able to make meaningful and insightful connections between ID theory and the design problem supporting the

premise that learning in constructivist learning environments results from problem-solving, collaboration, and reflection, a process referred to by Schön (1987) as *knowing-in-action* or reflective practice as described earlier.

Kinesella (2006) argued that Schön's theory of reflective practice has constructivist underpinnings that are integral to the process of reflection. In addition to positing that all knowledge is constructed through a process of reflection, Schön also posited that purposive activity, which is a characteristic of constructivist learning environments, activates cognitive structures and induces their transformation such that they are continuously under development. It was evident from the analyses that students' cognitive structures were continuously under development. Students entered the immersion program with a wealth of experience related to ID but were continuously forced to reconceptualize their understandings of ID in light of newly learned information. Osterman (1998) posited that reflective practice is a cyclical process that flows through four stages, experience, assessment, re-conceptualization, and experimentation. The immersion program allowed students to cycle through these stages as they re-evaluated their understanding of ID by working towards the resolution of an ill-structured problem.

The analyses also revealed that working on a performance-oriented team was perceived positively by the participants of this study but only as far as valuing the multiple perspectives and diversity of experience and expertise evident in team-based learning. The participants indicated that team-based learning supports optimization of skills as well as challenges that reflect real world experiences. Senge et al. (2000) posited that "Team members do not need to think alike" (p.73) and that team members must employ their interpersonal skills to make meaning of the given task and exercise creativity to bring what was learned into tangible fruition. However this is particularly difficult in instructional design teams that are typically cross-functional and comprised of members with diverse backgrounds as was the case in this study (Bannan-Ritland, 2001). When teams are engaged in making project design decisions, team members need to research and consider several alternatives, which involves time and energy. In addition, some team members may have a strong commitment towards one design approach which could make or break the ability to reach a decision and subsequently result in a dysfunctional team. Faculty members can help teams reduce the likelihood of dysfunctional teams by working with students to help improve their capabilities to make team decisions (Foundation Coalition, 2001). Various guidelines exist related to fostering team skills, avoiding failure in teams, providing leadership and operating at a high performance level (e.g., Block, 2002; Johnson & Johnson, 2000; Katzenbach & Smith, 1992). Effective teams typically work at establishing an atmosphere of inclusion, cooperation and shared focus, however strong resistance to a team environment is not uncommon in both work and educational settings (Bannan-Ritland, 2001).

Research also indicates that organizations should carefully consider personality types and individual differences when implementing self-managed teams (Thoms, Moore, & Scott, 1996; Chatman & Barsade, 1995). Thoms et al. conducted a study of 126 employees in a manufacturing firm that was considering implementing self-managed work groups and found that personality types, attitudes, and dispositions were significantly related to self-efficacy and performance. However Varvel et al. (2004) did not find a significant correlation between personality type dimensions and team effectiveness; rather they found that training individuals on better understanding the personality types of team members helped to improve communication, trust, and interdependence, which are essential characteristics of an effective team. The immersion program addresses team-building by bringing in a Myers-Briggs expert at the beginning of the fall semester to conduct a two-day workshop that exposes students to the drivers and barriers of effective teamwork based on their personality types. However as the data analyses revealed, team issues continued to emerge, particularly with regards to decision-making, underscoring the importance of providing appropriate scaffolding for the team process.

Conclusion

Educational researchers have found that despite the initial disorientation or frustration that often arises in a constructivist learning environment, students are motivated to persevere when engaged in learning-by-doing experiences that give the discipline its meaning and relevance (Herrington, Oliver, & Reeves, 2003; Lombardi & Oblinger, 2007; Torp & Sage, 2002). With the increased emphasis on problem-solving in the field of instructional design (Jonassen & Hernandez-Serrano, 2002), pedagogical or curricular models that emphasize learning-by-doing can help promote student understanding of expert instructional design practice and the cultivation of portable skills such as the flexibility to work across disciplinary and culture boundaries to generate innovative solutions (Lombardi & Oblinger, 2007). Overall, the results of this study support these researchers' claims and findings; however, the results of this study need to be interpreted relative to the study's limitations. First and foremost, this is an exploratory rather than an explanatory case study; hence, conclusions about cause-and-effect relationships cannot be drawn (Scholz & Tietje, 2002; Yin, 1994). Second, external validity has been compromised by the small sample size; hence, the findings of this study have limited generalizability. Despite these limitations, the data collection procedures can be repeated to establish replication and consequently design an explanatory case study to test specific hypotheses related to the effectiveness of using constructivist approaches to teach instructional design. Future studies should consider adding more frequent interviews that coincide with project deliverables in order to perform cross-time analysis of student perceptions of their learning experiences and including additional data sources such as the project deliverables to assess the quality of the team-based product.

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References

Bagshaw, M. (2004). Is diversity divisive? A positive training approach. *Industrial and Commercial Training, 36*(40), 153-157.

Bannan-Ritland, B. (2001). An action learning framework for teaching instructional design. *Performance Improvement Quarterly, 14*(2), 37-51.

Bannan-Ritland, B., Castellani, J., & Behrmann, M. (2001, April). *The immersion approach: Teaching novice instructional designers based on action learning principles.* Paper presented at the annual meeting of the American Educational Research Association (AERA), Seattle, WA.

Barab, S. A., & Duffy, T. M. (2000). From practice fields to communities of practice. In D. H. Jonassen and S. M. Land (Eds.), *Theoretical Foundations of Learning Environments* (pp. 25-56). Mahwah, NJ: Lawrence Erlbaum Associates.

Barrows, H. (1985). *How to design a problem-based curriculum for the preclinical years*. New York: Springer.

Bednar, A. K., Cunningham, D., Duffy, T. M., & Perry, J. D. (1992). Theory into practice: How do we link? In T. M. Duffy and D. H. Jonassen (Eds.), *Constructivism and the technology of instruction* (pp. 18-34). Hillsdale, NJ: Lawrence Erlbaum Associates.

Block, P. (2002). *The Answer to how is yes: Acting on what really matters.* San Francisco: Berrett-Koehler Publishers.

Brickell, G., Ferry B., & Harper, B. (2002). Developing informal reasoning skills in ill-structured environments: A case study into problem-solving strategies. *ASCILITE 2002 Conference Proceedings*.

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher, 18*(1), 32-42.

Brown, J. S., & Adler, R. P. (2008). Open education, the long tail, and learning 2.0. *EDUCAUSE Review, January/February 2008*, 18-32.

Chatman, J. A. & Barsade, S. G. (1995). Personality, organizational culture and cooperation: Evidence from a business simulation. *Administrative Science Quarterly 40*(3), 423-443.

Carroll, J. M. (1990). *The Nurenberg funnel: Designing minimalist instruction for practical computer skills*. Cambridge, MA: MIT Press.

Clark, R. E., & Estes, F. (1999). The development of authentic educational technologies. *Educational Technology, 39*(2), 5-16.

Cognition and Technology Group at Vanderbilt (CTGV). (1992). Technology and the design of generative learning environments. In T. M. Duffy and D. H. Jonassen (Eds.), *Constructivism and the technology of instruction: A conversation* (pp. 77-90). Hillsdale, NJ: Lawrence Erlbaum Associates.

Conklin, J. (2003) *Wicked problems and fragmentation*. Retrieved January 19, 2008, from http://www.cognexus.org/wpf/wickedproblems.pdf

Dabbagh, N., & Bannan-Ritland, B. (2005). *Online learning: Concepts, strategies, and application*. Upper Saddle River, NJ: Prentice Hall, Pearson Education.

Dabbagh, N., Jonassen, D. H., Yueh, H. P., & Samouilova, M. (2000). Assessing a problem-based learning approach in an introductory instructional design course: A case study. *Performance Improvement Quarterly, 13*(3), 60-83.

Denzin, N. K. (1978). *The research act: A theoretic introduction to sociological methods*. New York: McGraw-Hill.

Dilworth, R. L. (1998). Action learning in a nutshell. *Performance Improvement Quarterly, 11*(1), 28-43.

Dreyfus, H. L., & Dreyfus, S. E. (1986). *Mind over machine: The power of human intuition and expertise in the aera of the computer*. New York: Free Press.

Ertmer, P., & Cennamo, K. S. (1995). Teaching instructional design: An apprenticeship model. *Performance Improvement Quarterly, 8*(4), 43-58.

Foundation Coalition. (n.d.). *Effective decision making in teams.* Retrieved December 13, 2007, from http://www.foundationcoalition.org/home/keycomponents/teams/decision.html

Greeno, J. G., & The Middle School Mathematics through Applications Projects Group. (1998). The situativity of knowing, learning and research. *American Psychologist, 53*(1), 5-26.

Hannafin, M. J., Hannafin, K. M., Land, S. M., & Oliver, K. (1997). Grounded practice and the design of constructivist learning environments. *Educational Technology Research and Development, 45*(3), 101-117.

Henning, P. H. (2004). Everyday cognition and situated learning. In D. H. Jonassen (Ed.), *Handbook of research on educational communications and technology* (2nd ed.) (pp. 143-168). Mahwah, NJ: Lawrence Erlbaum Associates.

Herrington, J., Oliver, R., & Reeves, T. C. (2003). Patterns of engagement in authentic online learning environments. *Australian Journal of Educational Technology, 19*(1), 59-71.

Johnson, D. W., & Johnson, F. P. (2000). *Joining together: Group theory and group skills* (7th ed.). Boston, MA: Allyn and Bacon.

Jonassen, D. H. (2000). Toward a design theory of problem solving. *Educational Technology Research and Development, 48* (4), 63-85.

Jonassen, D. H., & Hernandez-Serrano, J. (2002). Case-based reasoning and instructional design: Using stories to support problem-solving. *Educational Technology Research and Development, 50*(2), 65-78.

Katzenbach, J. R., & Smith, D. K. (1992). *Wisdom of teams*. Boston, MA: Harvard Business School Press.

Kirschner, P. A., Sweller, J., & Clark, R. E. (2006). Why minimal guidance during instruction does not work: An analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching. *Educational Psychologist, 41*(2), 75-86.

Kinesella, E. A. (2006). Constructivist underpinnings in Donald Schön's theory of reflective practice: Echoes of Nelson Goodman. *Reflective Practice 7*(3), 277-286.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge, MA: Cambridge University Press.

Lombardi, M. M., & Oblinger, D. G. (2007). Authentic learning for the 21st century: An overview. *EDUCAUSE Learning Initiative (ELI), ELI Paper 1: May 2007*. Retrieved August 28, 2008, from http://net.educause.edu/ir/library/pdf/ELI3009.pdf

Marquardt, M. J. (1999). *Action learning in action: Transforming problems and people for world-class organizational learning*. Palo Alto, CA: Davies-Black Publishing.

Maxwell, J. A. (1996). *Qualitative research design: An interactive approach*. Newbury Park, CA: Sage Publications.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Osterman, K. F. (1998). *Using Constructivism and Reflective Practice to Bridge the Theory/Practice Gap*. Paper presented at the annual meeting of the American Educational Research Association (AERA), San Diego, CA.

Patton, M. Q. (1990). *Qualitative Evaluation and Research Methods*. Newbury Park, CA: Sage Publications.

Quinn, J. (1994). Connecting education and practice in an instructional design graduate program. *Educational Technology Research and Development, 41*(1), 79-91.

Rowland, G., & Wilson, G. (1994). Liminal States in Designing. *Performance Improvement Quarterly, 7*(3), 30-45.

Savery, J. R. (2006). Overview of PBL: Definition and distinction. *The Interdisciplinary Journal of Problem-Based Learning, 1*(1), 9-20.

Scholz, R.W., & Tietje, O. (2002). *Embedded case study methods: Integrating quantitative and qualitative knowledge*. Thousand Oaks, CA: Sage.

Schön, D. (1987) *Educating the reflective practitioner: toward a new design for teaching and learning in the professions.* San Francisco, CA: Jossey-Bass.

Senge, P., Cambron-McCabe, N., Lucas, T., Smith, B., Dutton, J., & Kleiner, A. (2000). *Schools that learn: A fifth discipline fieldbook for educators, parents, and everyone who cares about education.* NewYork: Doubleday.

Thoms, P., Moore, K. S., & Scott, K. S. (1996). The relationship between self-efficacy for participating in self-managed work groups and the big five personality dimensions. *Journal of Organizational Behavior, 17*(4), 349-362.

Torp, L., & Sage, S. (2002). *Problems as possibilities: Problem-based learning for K-16 education* (2nd ed.). Alexandria, VA: Association for Supervision and Curriculum Development.

Van Berkel, H. J. M., & Dolmans, D. (2006). The influence of tutoring competencies on problems, group functioning and student achievement in problem-based learning. *Medical Education, 40*(8), 730-736.

Varvel, T., Adams, S. G., Prifie, S. J., & Ruiz Ulloa, B. C. (2004). Team effectiveness and individual Myers-Briggs personality dimensions. *Journal of Management in Engineering, 20*(4), 141-146.

Wenger, E., McDermott, R., & Snyder, W. M. (2002). *A guide to managing knowledge: Cultivating communities of practice*. Boston, MA: Harvard Business School Press.

Wilkinson, D. & Birmingham, P. (2003). *Using research instruments: A guide for researchers.* New York: RoutledgeFalmer.

Wilson, B. G., & Meyers, K. M. (2000). Situated cognition in theoretical and practical context. In D. H. Jonassen and S. M. Land (Eds.), *Theoretical foundations of learning environments* (pp.57-88). Mahwah, NJ: Lawrence Erlbaum Associates.

Yin, R. (1994). *Case study research: Design and methods* (2nd ed.). Beverly Hills, CA: Sage Publishing.

Young, M. (2004). An ecological psychology of instructional design: Learning and thinking by perceiving-acting systems. In D.H. Jonassen (Ed.), *Handbook of research on educational communications and technology* (2nd ed.) (pp. 169-178). Mahwah, N.J.: Lawrence Erlbaum Associates.

Zimmerman, B. J. (2000). Attaining self-regulation: A social-cognitive perspective. In M. Boekaerts, P. Pintrich, & M. Seidner (Eds.), *Self-regulation: Theory, Research, and Applications* (pp.13-39). Orlando, FL: Academic Press.

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Appendix

Interview Questions

1. How would you describe your experiences so far in the immersion program? (Probe for details and description)
2. How has working on an actual design project influenced your understanding of the instructional design process?
3. In which area of the instructional design process do you feel most competent and why? (Probe for instructional experiences)
4. Can you describe how you link theory to practice given the experiences so far in the instructional design program?
5. What are the elements of the program that have impacted your learning?
6. How has the use of technology within this program influenced the learning process?
7. How have the different instructional strategies used in the program influenced your learning? (Probe for specific examples)
8. How has the team aspect impacted your learning?
9. Describe the collective identity of your team that distinguishes it from the other team(s). (Probe to determine affect of team's identity on the individual member)
10. Describe your team's decision-making process. (Probe to determine how decisions were made, whether they were made rationally or chaotically; whether they were fairly representative of team members' opinions, and whether team members were comfortable with the decisions)