

7-27-2015

An Examination of the Effects of Multiple Learning Environments on Problem Solving in Graduate Instructional Design Students

Robyn A. Defelice
Indiana University of Pennsylvania

Follow this and additional works at: <http://knowledge.library.iup.edu/etd>

Recommended Citation

Defelice, Robyn A., "An Examination of the Effects of Multiple Learning Environments on Problem Solving in Graduate Instructional Design Students" (2015). *Theses and Dissertations (All)*. 922.
<http://knowledge.library.iup.edu/etd/922>

This Dissertation is brought to you for free and open access by Knowledge Repository @ IUP. It has been accepted for inclusion in Theses and Dissertations (All) by an authorized administrator of Knowledge Repository @ IUP. For more information, please contact cclouser@iup.edu, sara.parme@iup.edu.

AN EXAMINATION OF THE EFFECTS OF MULTIPLE LEARNING ENVIRONMENTS ON
PROBLEM SOLVING IN GRADUATE INSTRUCTIONAL DESIGN STUDENTS

A Dissertation

Submitted to the School of Graduate Studies and Research

in Partial Fulfillment of the

Requirements for the Degree

Doctor of Philosophy

Robyn A. Defelice

Indiana University of Pennsylvania

August 2015

© 2015 Robyn A. Defelice

All Rights Reserved

Indiana University of Pennsylvania
School of Graduate Studies and Research
Department of Communications Media

We hereby approve the dissertation of

Robyn A. Defelice

Candidate for the degree of Doctor of Philosophy

B. Gail Wilson, Ph.D.
Professor of Communications Media, Advisor

Nurhaya Muchtar, D.Phil.
Assistant Professor of Communications Media

Anna V. Ortiz, Ph.D.
Assistant Professor of Communications Media

ACCEPTED

Randy L. Martin, Ph.D.
Dean
School of Graduate Studies and Research

Title: An Examination of the Effects of Multiple Learning Environments on Problem Solving in Graduate Instructional Design Students

Author: Robyn A. Defelice

Dissertation Chair: Dr. B. Gail Wilson

Dissertation Committee Members: Dr. Nurhaya Muchtar
Dr. Anna V. Ortiz

This research seeks to comprehend the why, what, and how of novice instructional designers' (students of instructional design) interactions with their respective learning environment as they problem-solve. Even for foundational research on educational practices and its ability to increase instructional designers' skill development, there is still a need to understand the effectiveness of these approaches, such as real-world experiences and metacognition. In addition, there are deficiencies in the literature both in providing understanding to why these pedagogical methods are effective and in validating the effectiveness of these methods in various learning environments. Furthermore, there is a need for research of mediating variables in conjunction with different educational settings and pedagogical practices.

Using grounded theory, this study examined how interactions within a learning environment shaped the novice instructional designer's perception of his or her problem-solving abilities. A problem-solving inventory used in a pre-/post-test format along with a three-part semi-structured interview series gathered these novice designers' experiences. Leveraging both online and face-to-face educational settings, inquiry and self-assessment yielded detail-rich research artifacts. Analysis occurred through qualitative and quantitative grounded theory methods.

Findings indicated that problem solving and interactions within learning environments were decisions made by the student through a basic input-output process. The learner first

decided internal determinations about key aspects of the issue. Then his or her perceived problem-solving abilities helped in choosing which interactions to use for resolving the problem. Students prioritized the pattern of their interactions based on what they thought would bring about the quickest resolution to their issue. The most common priority was through an individual's personal research.

The findings serve as an initial opportunity to evaluate how to utilize online and traditional educational settings to facilitate development of problem-solving abilities. In addition, the self-defined learning environment and personal research, an additional interaction type, lend to further investigation. As a recommendation, before moving into more empirical and/or other inductive methods, researchers should advance this grounded theory study further to derive full meaning from the interplay of the education setting, student mediating variables, and interaction types.

ACKNOWLEDGEMENTS

The thanks, appreciation, and gratitude I have go far beyond the confines of this paper. This page will never capture the essence of each individual person's contribution, let alone personality, and how it shaped and colored my perspective and this paper. There are simply too many to name, however, the next time we are together I will assuredly do one of the following: toast your unwavering support, share a drink with you, if I have not made it myself I will buy you dinner, hug you, laugh with you, or shake your hand. Most certainly, I will sincerely thank you and tell you that your assistance, whether big or small to you, was monumental to me. Your collective imprint does reside here in these pages, but more importantly, your indelible mark is upon me.

Dedicated to Gertrude Andy-Pandy.

Precocious, inquisitive, and a tad defiant are the first three words that come to mind, but that was so many years ago. Time has passed, memories have faded, but impressions last and create the foundations of our being. Your appreciation for your roots and your struggle to define yourself as you weave through life are admirable. When you are in the midst of this angst of attempting to fit yourself into this new definition, dig deep into your convictions, use that mouthy humor and remind yourself that what you are really seeking is to accept your evolution. The boundaries of your personality are limitless and your faith infinite. Continue to believe in YOU!

TABLE OF CONTENTS

Chapter		Page
1	INTRODUCTION TO THE STUDY	1
	Nature of the Problem	2
	Rationale for the Study	4
	Need for the Study	5
	Purpose of the Study	6
	Theoretical Framework	6
	Research Questions	8
	Limitations	9
	Definition of Terms	11
	Educational Setting/Learning Environment	11
	Problem-Based Learning	13
	Problem Finding vs. Problem-Solving Skills	14
	Problem-Solving Ability	15
	Defining the Population	16
	Organization of the Study	16
	Conclusion	17
2	REVIEW OF THE LITERATURE	18
	Introduction	18
	The Role of Learning Environments	21
	The Role of Interactions	24
	Designing College Curricula	28
	Instructional Design and the Designer	31
	The Instructional Designer	32
	Educating Novice Instructional Designers	36
	Curricula for Instructional Designers	39
	Modeling Social Cognitive Theory	43
	Conclusion	47
3	RESEARCH METHODOLOGY	48
	Introduction	48
	Research Questions	49
	Grounded Theory	49
	Research Design	54
	Positionality	54
	Population	56
	Procedures	59
	Sampling Strategy and Sample	61
	Confidentiality, Anonymity, and Data Protection	62
	Data Collection	63

Chapter		Page
	Pre-/Post-Test Inventory.....	63
	Interviews	65
	Data Analysis.....	68
	Grounded Theory Analysis – Qualitative and Quantitative	68
	Grounded Theory Analysis – Triangulation and Saturation	77
	Conclusion	79
4	FINDINGS	80
	Introduction.....	80
	Overview of Participants.....	80
	Sample Characteristics	80
	Participant Synopsis – Online	85
	Participant Synopsis – Face-to-Face (F2F)	89
	Results PSI and Interviews	94
	Acknowledging the Learning Environment	97
	Evaluating the Problem Type	104
	Prioritizing Problem Urgency	109
	Reflecting on Mediating Variables.....	112
	Selecting Interaction Patterns.....	117
	Problem Solving in Multiple Learning Environments	121
	Findings by Research Questions	124
	Conclusion	128
5	DISCUSSION	129
	Introduction.....	129
	Summary of Study	129
	Conclusion of Findings	131
	Problem Solving in Multiple Learning Environments	133
	Interactions and Learning Environments	136
	Evaluation of Theory	138
	Implications for Practice	140
	Limitations of Research.....	141
	Recommendations for Future Research	144
	Conclusion	145
	REFERENCES	147
	APPENDICES	172
	Appendix A – The Problem Solving Inventory	172
	Appendix B – Proof of Permissions.....	174
	Appendix C – Information Sheet and Informed Consent – Fall	178

Chapter	Page
Appendix D – Interview Scheduling Intake Survey	179
Appendix E – E-mail Communications - Fall.....	180
Appendix F – PSI Pre-/Post-Instrument	186
Appendix G – Interview Protocol (Interview Series 1-3).....	192

LIST OF TABLES

Table	Page
1	Initial and Focused Coding Examples70
2	Example of Memoing74
3	Summary of Participant Characteristics..... 81
4	Summary of Participant Pre-/Post-Test PSI Overall Scores 85
5	Summary of Participant – Adam (OP1)..... 86
6	Summary of Participant – Beth (OP2) 86
7	Summary of Participant – Carla (OP3)..... 87
8	Summary of Participant – Devon (OP4)..... 87
9	Summary of Participant – Evan (OP5) 88
10	Summary of Participant – Faye (OP6)..... 89
11	Summary of Participant – Greg (FP1) 90
12	Summary of Participant – Helen (FP2)..... 90
13	Summary of Participant – Ivana (FP3) 91
14	Summary of Participant – Julie (FP4)..... 91
15	Summary of Participant – Ken (FP5)..... 92
16	Summary of Participant – Laurie (FP6)..... 93
17	Summary of Participant – Mike (FP7)..... 93
18	Prioritization of Interaction Types for Solving Problem Totals 120

LIST OF FIGURES

Figure		Page
1	Bandura's model of reciprocal determinism.....	44
2	PSI self-assessment and associated total possible scores	83
3	Problem solving in multiple learning environments process	122
4	Paths of research implications	132
5	Bandura's model and problem-solving process in multiple environments combined.....	139

CHAPTER 1

INTRODUCTION TO THE STUDY

Educational paradigms continue to adapt as the technological landscape keeps evolving. While inquiry into the effectiveness of online learning platforms, such as those used in higher education, for knowledge acquisition become exhausted. A vast amount remains unanswered when adding to this the inconclusive effects of various educational settings on learning, for example, teaching in a virtual environment. This leads to inquiries such as how interactions within learning environments potentially influence the development of skills such as problem solving. Another issue is a narrow body of literature examining mediating variables, such as a learner's motivation or self-efficacy in conjunction with learner interactions within an educational setting. In addition, unearthing the capabilities and limitations of each educational setting, such as, online or face-to-face, remains a challenge.

Scholarly research suggests inquiry needs to move beyond determining which learning platform is more effective and into what makes an educational setting more effective for knowledge or cognitive-based learning (Bethel & Bernard, 2010; Clark, 1983; Johnson, Aragon, Shaik, & Palma-Rivas, 2000; Means, Toyama, Murphy, Bakia, & Jones, 2009; Roberts, 2011; Sitzmann, Kraiger, Steward, & Wisher, 2006). Examinations of educational settings are now beginning to investigate skill-based learning, such as problem solving (Ertmer et al., 2009; Ertmer et al., 2008; Ge et al., 2005; Hernandez-Serrano, 2001; Hung & Liu, 2008; Jonassen, 2008; Jonassen & Hung, 2008; Jonassen et al., 1999; Kapp, Phillips & Wanner, 2002; Kenny et al., 2006; Kim & Hanafin, 2011; Luck & Norton, 2005; Pearson, 2006; Rounds & Rappaport, 2008; Savery & Duffy, 1995; Shank, 2012; Valatis et al., 2005; Woods et al., 1997). These researchers are now starting to look at combinations of factors that affect the development of

competencies. For example, a selected pedagogical approach and its effect on problem-solving capabilities (Kapp et al, 2002; Woods et al., 1997).

Looking specifically at the field of instructional design and its didactic practices in the preparation of students for their careers, investigation of these learning environments, the students' mediating variables, and instructional approaches are just beginning to surface (Ge et al., 2005; Kapp et al., 2002). However, a broader examination of educational research does not explain why or how these instructive methods increase proficiencies. Moreover, the literature appears deficient in studies that observe the interplay of a student's mediating variable with the student's interactions in the learning environment and whether the two affect one another. For example, as an instructional design student uses his or her problem-solving abilities (the mediating variable) to solve an instructional design problem. Interactions would include interfacing with peers, content, the instructor, and the environment itself. Given these deficiencies in the research, our ability to realize how to ascertain the best methods for curriculum and skill development is lacking.

Nature of the Problem

Instructional designers need to be at the forefront of their skills to keep pace with the demands of their clients. They rise to client tasks through application of core instructional design competencies, past experiences, and by solving instructional problems of varying complexities. Having a foundation rooted in conceptual and applied knowledge assists a novice instructional designer (i.e. a student with little to no experience) to be more readily prepared for the challenges he or she will face in the field (Bannan-Ritland, 1999; Boling & Smith, 2009; Campbell, Schwier, & Kenny, 2009; Cartlidge, Gerity, & Eastmond, 1999; Ge, Chen, & Davis, 2005; Julian, Kinzie, & Larsen, 2000; Rowland, Parra, & Basnet, 1995; Stepich & Ertmer, 2009).

Novice instructional designers typically begin their acquisition of these skills through a degree program. One of the most valuable skills students of instructional design develop during their formal education is problem solving (Ertmer et al., 2009; Ertmer et al., 2008; Ge et al., 2005; Harde et al., 2006; Hernandez-Serrano, 2001; Lechner, 2010; Morian & Lu, 1993; Rowland et al., 1995; Sims & Koszalka, 2008; Stepich & Ertmer, 2009; Stepich et al., 2001). By believing they can approach and create solutions to challenges, they regulate their capacity for problem finding and problem solving. This refers to the student's problem-solving ability, a mediating variable rooted in self-efficacy (Heppner, Witty, & Dixon, 2004; Isaksen, Dorval, & Treffinger, 2011). Mediating variables, like learner motivation or instructor involvement, and the impact they have on students and their success in learning are rarely examined (Lattuca & Stark, 2009). Given minimal research on instructional designers and the influence of their internal learning characteristics (such as problem-solving abilities) on skill development, the field is left with a gap in understanding how to develop curricula to account for these types of mediating variables. In general, the body of literature for designing curricula in higher education institutions has a deficit with respect to the effect of mediating variables on effectiveness.

Additionally, there appear to be no available comparative studies investigated whether one learning environment is more effective over another for cultivating a specific skill or teaching a specific subject such as instructional design. With the advent of research into online learning environments, multiple educational settings were examined for environmental attributes that manifest student interactions in relation to effect on learning (Bernard et al., 2009; Bourne & Moore, 2005). The four interactions that provide the construct to educational settings are student with content, student with instructor, student with peers, and student with the environment itself (Swan, 2003). These interactions have been determined to be critical for a student's performance

and success in learning (Cavanaugh, Gillan, Kromrey, Hess, & Blomeyer, 2004; DiCicco & Lowell, 2009; Pearson, 2006; Roberts, 2011; Swan, 2004).

However, little research exists on comparing learning environments and how the interactions within these educational settings interplay with a student's intrinsic learning attributes, like problem solving. Examination of these aspects in multiple learning environments will shed light on ways to benefit the students in shaping proficiencies.

Rationale for the Study

The intent of this study was to expand the current bodies of research on the following fronts: (a) comparison of two learning environments based on a student's interactions with the educational settings for solving a problem, (b) incorporation of a mediating variable (problem-solving abilities) into the examination of educational settings, and (c) examination of the interplay of problem-solving abilities with student interactions within the learning environment.

This research explored the capacity to problem-solve in alternate learning environments through examining how students used the four types of interactions with the educational setting: student with peer, student with instructor, student with content, and student with environment. From the larger academic sphere, examination of these items provided foundational research for further understanding what creates effective learning environments for skill development. This presented opportunity formulated an understanding of how and why students engage with their educational setting; allowing best practices for curriculum development to emerge (Abrami, Bernard, Bures, Borokhovski, & Tamim, 2011; Benard et al., 2009; Paechter & Maier, 2010; Swan, 2004).

Need for the Study

To expand the limited discourse, there is a need for research that brings together educational settings, intrinsic learning characteristics of the student and the curricula for examination. Online learning is still in its infancy with roughly twenty years worth of research to support the benefits and constraints of its use (Cavanaugh et al., 2004; Hew & Cheung, 2010; Means, Toyama, Murphy, Bakia, & Jones, 2009). Current studies confirm online learning has no significant difference or provides no significant advantage for learners over traditional, face-to-face (or classroom) learning (Cavanaugh et al., 2004; Clark, 1994; Hew & Cheung, 2010; Luck & Norton, 2005). However, recent research also discusses other facets such as teacher involvement, motivations of the learner, learner self-efficacy, and problem-solving capacity of the learner as influences on learning (Heppner & Lee, 2009; Kapp et al., 2002; Means et al., 2009; Van Gog, Ericsson, Rikers, & Paas, 2005). The collective reviewed literature provides a limited perspective on effectiveness through mainly quantitative research with a heavy focus on knowledge transference.

Additionally, current research does not provide an explanation to the how, what, or why of a mediating variable (like problem solving) in context to learning effectiveness or educational settings. This suggests a need for a richer understanding to explain how these intersecting factors create an effective learning environment. As Lattuca and Stark (2009) recommend, it is important to consider all factors affecting a learner when designing effective curricula. This includes these noted aspects of the learner (e.g. self-efficacy, motivation, etc.) and the interactions with the educational setting. Without any currently studied mediating variables in this manner, an opportunity for a new vein of research emerges. The research executed for this study assisted in shedding light on the experiences that embody changes in an instructional

design student's problem-solving abilities through his or her interactions with the learning environment.

Purpose of the Study

The purpose of this study was to understand the experiences of novice instructional design students in face-to-face and online learning environments through their interactions with an educational setting. Specifically, comprehension of problem-solving experiences in conjunction with the four interactions of an educational setting mentioned previously was the focus.

Theoretical Framework

Sims and Koszalka (2008) contend advancements in technology and society have changed learners' behaviors and skill development, which in turn presents challenges when designing effective curricula. They further purport this progression has influenced the theoretical perspectives used currently to guide instructional development. Previous research has also examined problem solving in conjunction with technology using both inductive (the how) or deductive theories (the what), which are rooted in the transference of learning (Ertmer et al., 2009; Ertmer et al., 2008; Ge et al., 2005; Hernandez-Serrano, 2001; Hung & Liu, 2008; Jonassen, 2008; Jonassen & Hung, 2008; Jonassen et al., 1999; Kapp et al, 2002; Kenny et al., 2006; Kim & Hanafin, 2011; Luck & Norton, 2005; Pearson, 2006; Rounds & Rappaport, 2008; Savery & Duffy, 1995; Shank, 2012; Valatis et al., 2005). Both approaches have garnered little in progressing theory or the discussion of learning transfer (Clark, 2001, p. 119). Suggested approaches to examining problem solving with respect to technology advocate the use of metacognitive approaches and the advent of a new theory (Clark, 2001, p. 120).

What Sims and Koszalka and Clark do not address is examination of behaviors, skill development, and technology with other potential supporting theories. For example, Albert Bandura's work with Social Cognitive Theory reflects examination of personal factors and environments and their reciprocal effect on each other (Bandura, 2001). Social Cognitive Theory (SCT) centers on the learner and promotes the idea of acquiring behavior and knowledge as dependent on the learner's self-efficacy. SCT is a descendent of social learning theory that traces back to Miller and Dollard's work on observational learning (Bandura, 1977). Albert Bandura expanded the idea of social learning theory with his research of observational learning and modeling in a network of reciprocal interactions (Bandura, 1977). In other words, people could learn by observing others actions and behaviors. Bandura later broadened his research by recognizing the intrinsic factors of the learner as central to the learning process (Bandura, 1986; Pajares, 1996). With his theory of self-efficacy being critical to the learner's ability to produce change, Bandura re-positioned his theory to how it is known today: Social Cognitive Theory (Bandura, 1977). The idea of learned behavior through observation expanded to acknowledge that the environment, behaviors, and personal factors of the individual work together in a reciprocal network to influence behavioral changes (Bandura, 1986, 1989). SCT has been used at length in attempts to comprehend motivation and learning in educational settings (Clark, 1994; Compeau & Higgins, 1995; Fletcher, 2005; Hardre, Ge, & Thomas, 2006; Price, 2009; Purzer, 2009; Raelin, 2007; Swan, 2003; Woods et al., 1997; Zimmerman, 1989).

What SCT has not answered is whether personal attributes, such as self-efficacy, are interrelated to how a learner interacts with his or her learning environment. However, recognition of similar phenomena in the literature increases sensitivity to theoretical construction (Creswell, 2013; Strauss & Corbin, 2008). To that point, as Clark (2001) and Sims and Koszalka

(2008) denote there is a possibility for new theory or a shifting theoretical perspective. Using grounded theory allows for examination of this reciprocal interplay while allowing meaning to emerge from the voices of participants through constant comparison of collected data during study execution (Strauss & Corbin, 1994, p. 274). Given the dearth of research on the presented problem, using a preconceived method such as SCT limits the ability to discover all that is within the data to explain the issue (Charmaz, 2014; Glaser, 1998; Patton, 2002). Researchers using grounded theory, an ascending process, create an iterative method of gathering and analyzing data to form themes and subsequently patterns (Glaser, 1998; Strauss & Corbin, 1994). This provides opportunities to investigate broad-based relationships in conjunction with current literature and/or experiences to conclude possible theories or generalizations (Charmaz, 2014; Corbin & Strauss, 2008; Creswell, 2009; Glaser, 1998). Also being theoretically sensitive, but agnostic in research design allows examination of the main study inquiries without bias (Charmaz, 2014; Creswell 2013).

Research Questions

Though existing research continues to find no significant difference in online learning environments when compared to face-to-face classrooms, the two still require examination for determining optimal use of both for educational purposes (Campbell, Gibson, Hall, Richards, & Callery, 2008; Clark, 1994; Means et al., 2009). As student performance in research is usually measured through grades (knowledge acquisition), this research delved deeper by exploring skill acquisition, specifically problem solving. As each environment can have unique characteristics, these may interact differently for a learner when engaging in problem solving. Given the current line of research still contends there is no difference in student performance, this study inquired as to whether or not experiences in either environment (online or face-to-face) influenced the

learner's ability to problem-solve. This research pursued similar lines of inquiry as in studies performed by Aman (2009); Fletcher (2005); Johnson, Aragon, Shaik, & Palma-Rivas (2000) and Swan (2004).

With a demand for education to cultivate more expert-like skills in entry-level instructional designers (Shank, 2012) along with inconclusive findings on learning environments and their effectiveness (Roberts, 2011), this investigation focused on both. The primary inquiry was, *As novice graduate instructional design students describe how they problem-solve, what interactions do they refer to given the learning environment?*

Research questions stemming from this line of inquiry were as follows:

RQ1: How do novice graduate instructional design students describe how they problem-solve in an online learning environment?

RQ2: How do novice graduate instructional design students describe how they problem-solve in a face-to-face learning environment?

RQ3: What interactions do novice graduate instructional design students describe when problem solving in an online learning environment?

RQ4: What interactions do novice graduate instructional design students describe when problem solving in a face-to-face learning environment?

RQ5: How do the descriptions of problem solving and the interaction types expressed by novice graduate instructional design students in an online learning environment compare to novice graduate instructional design students in a face-to-face environment?

Limitations

There were few limitations to this investigation. However, each drawback to the research design also supported a beneficial trade-off for the study. The main shortcoming was the inability to infer the eventual findings to a greater population. First, grounded theory was preferred over a single-case to generate a set of detail-rich experiences from which to examine the possibility of recurring factors, such as, why students choose to interact or not with their

instructor or contribute more than expected to a team-based project. Case-based methods only provide the ability to illuminate these as potential factors. Yet, when using grounded theory, the amount of inference to the population from which the sample was drawn can only be weighed by how strongly each case within the sample has a particular repetitive element (Creswell, 2013). This isolated perspective may present the notion of limited purpose. However, the researcher's intent is to expand this study for longitudinal examination. Keeping the design well focused will continue to yield deep descriptions of experiences for comparison to the study population. A secondary constraint to this study was it did not investigate the level of effectiveness with respect to actual learning. This was beyond the scope of the study, but is the inherent next step for elaborating and expanding upon this research design.

Lastly, the researcher would be remiss if she did not acknowledge her own bias having a potential impact on interpreting the results of problem-solving self-assessments and interviews. The researcher disclosed being a graduate of the master's degree program under examination. In addition, the researcher held a faculty position in the same department as the course used in this study. However, the population of study participants was from a course the researcher did not instruct. The position of the researcher remained objective due to the nature of the profession, though admittedly passionate and interested in the discoveries. Instructional designers must stay impartial, as they must ultimately serve the needs of the learner who will receive the training. Research has shown subjectivity by instructional designers can affect quality and effectiveness of the solution they develop (Hodell, 2011; Rothwell & Kazanas, 2008). Not only this, but partiality limits the credibility of the research itself. The desire to build and continue discourse on this topic with researchers and practitioners outside of the instructional design field helps to be a

strong reminder of the need for objectivity. Likewise, familiarizing readers on the key terms in this study provides a common platform to begin those discussions.

Definition of Terms

There are several frequently used terms throughout this dissertation. In an effort to ensure equal comprehension definitions of these terms follow.

Educational Setting/Learning Environment

An educational setting or learning environment is the location where students interact with the course content, their instructor, their peers or classmates, and their educational surroundings (Felder & Silverman, 1988; Swan, 2003). There are three common types of didactic settings (face-to-face, online/virtual, and blended/hybrid) and four common attributes, known as interactions (performed by the student), shared by each type of setting.

Types of settings. The mode of delivery defines the educational setting and encompasses three common types: face-to-face or traditional, online or virtual, and blended or hybrid.

Face-to-face. A face-to-face setting is synchronous (simultaneous occurrence) and incorporates the instructor, students, and content into one setting, typically a classroom or laboratory (American Society for Training and Development [ASTD], 2010; Patel, 2010). Face-to-face, otherwise known as a traditional classroom, delivers content through the instructor and without the use of online technologies (Allen & Seaman, 2010; Bannan-Ritland, 2001; Patel, 2010).

Online. An online or virtual learning environment can be both synchronous and asynchronous (not simultaneous) and the interactions with the instructor, students, and content transpire through online technologies (Allen & Seaman, 2010, p. 7). An example of a synchronous online learning event could be an online workshop or training session for

international sales representatives for a company. All learners would log into a central location at the same time to meet virtually with a trainer. This individual facilitates the content through different teaching strategies to the learners in attendance. Using the same group of international sales representative, an asynchronous design will have each learner taking the training during a time convenient to his or her schedule. Participants still logged into a system to track what they were learning, but were not be required to meet with others (whether classmates or instructor) at a specific time. Learners interacted with the content and learning tools at their own pace. In higher education, it is common to see different institutions develop a preferred online learning format (synchronous or asynchronous).

Blended. A blended or hybrid setting provides the opportunity for both synchronous and asynchronous encounters for the students, instructor, and content. The pretext behind blended environments is to provide a reduction in face-to-face meetings and to perpetuate content and discussions in the class through online technologies (Allen & Seaman, 2010).

Types of interactions. With the advent of research into online learning environments, educational settings have been examined for their attributes that manifest student interactions (Bourne & Moore, 2005; Cavanugh et al., 2004; Swan, 2003). Viewed as an essential aspect to learning, interactions embody the various behaviors of individuals and groups within the educational setting (Abdous & Yen, 2010). Three interactions provide the construct of the educational setting, which are student with content, student with instructor, and student with peers (Swan, 2003). A recognized fourth dimension is the student with the environment itself (Bernard et al., 2009; Cavanaugh et al., 2004; Roberts, 2011; Swan 2003). Considered only relevant to online education only, Abdous & Yen (2010) present research on learner-interface interactions. Student-environment interactions encompass any type of educational setting.

Student-content. The manner in which a student interacts with the subject matter depends on the design of the course. This could come in the form of reading a book, watching a movie, listening to a speaker or speech, or even a tactile object or item. A student's learning style (a preference for how an individual likes to learn) can impact comprehension of content (Rothwell & Kazanas, 2008).

Student-teacher. The student engages with the instructor for various aspects of his or her learning. This may be to seek clarification, feedback, or to complete an activity (submission of work). Intrinsic or internal aspects (of the learner) to these interactions can be associated with motivation and self-efficacy (Lee and Tsai, 2011).

Student-student. Student to student interactions can occur on two fronts; through course activities or through a student's own effort. The teacher may have designated group work or participation in activities which include the entire class (e.g., peer sharing) or a student may seek to better understand a topic or compare approaches to completing an assignment. Here again, inherent elements of the learner (e.g., level of introversion or self-efficacy) will facilitate or mute these interactions (Abrami et al., 2011; Lee and Tsai, 2011).

Student-environment. Research has shown that due to technological advancements of educational settings the interface through which a student engages in learning online does affect the quality of what he or she acquires (Abdous & Yen, 2010; Swan, 2004). However, student-environment for this research encompassed traditional classroom and online environments.

Problem-Based Learning

Problem-based learning is an outcome of the work at the University of Canada where the institution's medical schools applied this approach to evolve job preparedness of future physicians (Woods et al., 1997). Problem-based learning starts with an ill-structured problem,

which focuses the learning goal. Ill-structured problems are very unlike the scripted and tightly structured tasks, which lead to just one possible answer (Arts, Gijssels, & Segers, 2002; Demetriadis, Papadopoulos, Stamelos, & Fischer, 2007; Ge et al., 2005; Hung, Jonassen, & Liu, 2008; King & Kitchener, 2004). The best definition for these is loosely formed tasks with little structure and multiple possibilities for solutions (Chen, 2009) or simply put “messy problems” (Stepich & Ertmer, 2009, p.147). Learning acquisition through this method typically occurs in small groups rather than lecture (Kapp et al., 2002). Barrows and Tamblyn (1980) noted as learners begin to associate new information they will discover gaps in their knowledge, which is the core of problem-based learning (Jonassen, 2008; Woods et al., 1997). The initiative of the student balances these learning disparities, gathering more resources, and executing various techniques of knowledge acquisition (Bannan-Ritland, 2003; Dabbagh & Blijd, 2010). A possible outcome of a problem-based learning activity is the development of a final product (Ertmer et al., 2009; Ge et al., 2005). Whether tangible or intangible, it is typically, what is evaluated to determine the learner’s achievement of the assignment.

Problem Finding vs. Problem-Solving Skills

Two skills considered core traits for an instructional designer are problem finding and problem solving (Stepich & Ertmer, 2009). The number one asset of an instructional designer is problem finding, where a he or she must be able to examine a situation and provide a cohesive and succinct accounting of the dilemma(s). After finding the problem, problem solving is the natural next step, requiring a plan germane to the situation and clearly outlines a resolution to the identified element(s) (Treffinger, Selby, & Isaksen, 2008).

Problem-Solving Ability

Treffinger et al. (2008) consider the distinct differences an individual has in his or her approach to solving problems as a problem-solving style. They denote attitude and disposition as influential to an individual's ability to problem-solve. Heppner and Lee (2009) propose three factors similar to Treffinger, et al.; Problem-Solving Confidence, Approach-Avoidance Style, and Personal Control as comprising an individual's capacity for problem solving. A way to derive an individual's problem-solving ability is through the Problem-Solving Inventory (PSI). This is an instrument developed by Paul Heppner in 1988 to measure an individual's perceived approach to problem-solving (Heppner & Lee, 2009). For a copy of Heppner's original instrument, refer to Appendix A.

Agency. Agency is the inter-related dynamics of a person's beliefs, actions, and his or her environment acting as change agents or agentic mechanisms to behavior (Bandura, 2001). This element provided Heppner (1988) a foundation from which he could examine the problem-solving process. Agency in the context of this research refers to one's ability to exert power over something to bring about change (Bandura, 2001, p. 21). For example, an instructional design student's ability to solve a learning need.

Self-efficacy. Self-efficacy is an individual's belief in his or her ability to produce change given a behavior (Raelin, 2007). One theory is that self-efficacy affects an individual's motivations, thoughts, emotions, and behaviors given the perceived level of stress associated with a circumstance or situation (Heppner, et al., 2004). Research has shown an inherent relationship between an individual's self-efficacy and his or her ability to problem solve (Bandura, 2001; Hardre et al., 2006; Heppner et al., 2004; Pajares, 1996; Price, 2009; Raelin, 2007).

Mediating variable. In the context of this research, a mediating variable takes into account an internal attribute of the learner, which can impact his or her ability to learn effectively (Lattuca & Stark, 2009). The abovementioned term self-efficacy is a mediating variable or also a type of agentic mechanism. For example, a learner's self-efficacy could be so low that he or she does not believe he or she can fix the presented problem and therefore will not make an effort to resolve it. Viewed as both a mediating variable and an agentic mechanism, an individual's problem-solving capacity comprises other intrinsic attributes such as self-efficacy, motivation, and his or her disposition (Heppner & Lee, 2009).

To continue building the common platform for discussion of this research the next sections present a brief overview of the population and an outline of each chapter's main topics.

Defining the Population

This study centered on an instruction design-based problem assigned to second-semester novice instructional design graduate students from a mid-sized university in northeastern Pennsylvania. The population sample for this study was comprised of thirty-two graduate instructional design students enrolled in an Advanced Instructional Design course during the Summer (online) and Fall (face-to-face) semesters of 2014. This master's level course, which the researcher did not instruct, was designed to allow students to practice and apply their instructional design knowledge by solving and providing a sound solution to a real-world instructional problem in a team setting.

Organization of the Study

With a solid comprehension of the reason and need for the study along with key terms associated to the research and the population under examination presented the following summary highlights each of the remaining chapters.

The literature review, Chapter 2, discusses common interactions of educational settings and implications stemming from these environments. It presents relevant instructional design competencies, including problem solving and self-efficacy of the learner and pedagogical approaches to teaching instructional design. Finally, the literature review will elaborate grounded theory and its use in the study. An examination of scholarly literature relevant to the research is included throughout.

The study's methodology, outlined in Chapter 3, addresses the research approach, design, population, and analysis. Additionally, discussion of the challenges to the selected research approach and justification of the chosen method round out this section.

Chapter 4 covers presentation, discussion, and analysis of the collected data. Tables and figures support and further explain the study's qualitative and quantitative artifacts.

In the final section, Chapter 5, a summary of the research along with discussions on the implications of the phenomena are included. Correlations to prior research germane to the phenomena are incorporated. Lastly, this section addresses future research opportunities.

Conclusion

The focus of this study was to unearth the how and what of novice instructional design student's interactions with learning environments in conjunction with problem-solving abilities. Leveraging both online and face-to-face educational settings, inquiry and self-assessment yielded a corpus of research artifacts. Examination of these experiences and data provided opportunity to evaluate skill development of students prior to entry-level employment. A synthetic presentation and discussion of the multiple underlying factors of this main idea emerge through a detailed literature review.

CHAPTER 2

REVIEW OF THE LITERATURE

Introduction

Roughly 33.5% of all students at the university level took a class online in 2013, based on a report by the Sloan Consortium (SLOAN-C), an association for integrating and improving online higher education (Allen & Seaman, 2013). Also in 2013, 91% of chief academic leaders (the title given to survey respondents) predicted students would take at least one online course in the next five years (Allen & Seaman, 2013). This same report also denotes that 74% of respondents think that online learning is equal to or better than face-to-face instruction. The use of this new learning environment creates lines of inquiry for examining the many attributes an educational setting can yield such as instructor's guidance, student's self-efficacy, and course design. In addition, investigating alternate environments determines if these dynamics influence the ability to learn and learning in general.

Current technologies continue to advance access to academic opportunities via the use of online learning environments. Yet the current body of research indicates inconclusive findings on the effectiveness of online versus face-to-face learning (Cavanaugh et al., 2004; Clark, 1983; Clark, 1994; Clark & Salomon, 1986; Means et al., 2009; Roberts, 2011; Sitzman et al., 2006; Weegar & Pacis, 2012). However, investigation is limited in understanding how a student's interactions with his or her educational setting shape skill development. Additionally, scholars and studies suggest exploration into mediating variables (e.g. self-efficacy, problem solving, and motivation) internal to the student for how each affects the learning environment (Clark, 1983; Clark, 1994; Clark & Salomon, 1986; Lattuca & Stark; 2009).

Presently, research indicates little significant difference in educational settings when using the same instructional methods designed for both environments and when customizing methods for a specific technology (Cavanaugh et al., 2004; Clark, 1983; Clark, 1994; Clark & Salomon, 1986; Means et al., 2009; Roberts, 2011; Sitzmann, et al., 2006; Weegar & Pacis, 2012). However, some research has established that how the student interacts with his or her learning environment in combination with his or her level of self-efficacy influences learning effectiveness (Swan, 2003; Woods et al., 1997). How students interact with their instructor, the content, the educational setting itself, or their peers can be associated back to their self-efficacy (Heppner et al., 2004). These affect learners' motivations, attitudes, and even their ability to problem-solve in these learning environments (Hardre et al., 2006; Heppner & Baker, 1997; Zimmerman, 1989). One industry that focuses on accruing problem solving capabilities through education is instructional design (Richey, Fields, & Foxon, 2001; Rothwell & Kazanas, 2008; Shank, 2012)

Looking at the field of instructional design in particular, time and experience augments an instructional designer's problem-solving skills (Cassarino, 2006; Ertmer et al., 2008; Ertmer et al., 2009; Ge et al., 2005; Hardre et al., 2006; Stepich & Ertmer, 2009; Stepich et al., 2001; Tripp, 1994). Some research indicates problem-solving capabilities are a contributing factor to how well instructional designers shape their skills (Ge et al., 2005; Hardre et al., 2006; Kapp et al., 2002; Larson, 2004). Foundational knowledge and application of instructional design principles typically occur through educational programs at college/university level (Shank, 2012). These programs quite commonly offer courses and even full degrees online. The noted research above examines the effectiveness of learning environments and how instructional

designers acquire problem-solving skills, but investigation into pedagogical practices for skill development in multiple educational settings has yet to occur.

One instructional method examined for problem-solving skill development is problem-based learning (Barrows & Tamblyn, 1980; Bichelmeyer et al., 2006; Boling & Smith, 2009; Cassarino, 2006; Dabbagh & Blijd, 2010; Jones & Hodges, 2005; Hung et al., 2008; Jonassen & Hung, 2008; Kapp et al., 2002; Kenny, Bullen, & Loftus, 2006; Luck & Norton, 2005; Pearson, 2006; Rounds & Rappaport, 2008; Savery & Duffy, 1995; Valatis et al., 2005; Woods, 2007). A constructivist view (a learning theory posits learners make meaning from interacting with their learning environment) indicates the more realistic the problem, the more it develops a learner's problem-solving competencies (Jonassen & Hung, 2008; Savery & Duffy, 1995). One common approach is to use project-based work and teams to collaborate on a common problem and provide multiple perspectives on how to solve the same issue (Helle, Tynjala, Olkinuora, & Lonka, 2007; Helle, Tynjala, & Olkinuora, 2006; Thomas, 2000; Van Rooij, 2008). Using these strategies in face-to-face classroom settings, as well as, online learning environments have both shown skill growth in learners (Kenny et al., 2006; Luck & Norton, 2005). Examining the experiences of the novice instructional designers in various learning environments may help educators to comprehend how the educational setting interactions shape the way designers solve problems. However, interactions may not provide the total picture of how these skills are developed. An emerging area of interest is whether there are mediating variables that influence how a student problem-solves (Kapp et al., 2002, Lattuca & Stark, 2009). An instructional designer's perceived ability to problem-solve is considered a mediating variable to actually solving a problem (Hardre et al., 2006; Heppner, 1988; Kapp et al., 2002). Using social cognitive

theory to examine the behavior of the novice instructional designer may corroborate that this agentic mechanism is directly tied to his or her ability to problem-solve.

Since examination of these aspects are in educating a student, curricula is an additional research consideration. When designing curricula for instructional design graduate programs, combining metacognitive activities with contextual learning settings help to form the foundational knowledge of the designer (Bichelmeyer et al., 2006; Ertmer et al., 2008; Ge et al., 2005; King & Kitchener, 2004; Morian & Lu, 1993). In developing these educational programs, instructors are encouraged to present students with instructional activities that give them opportunities for problem finding and problem solving. (Ertmer & Cennamo, 1995; Ross, 1998). These types of activities support the epistemology of practice (synthesis of theory and practice), as it permits reflection and application of knowledge, experiences, and a chance to improve instructional design performance in creating training solutions (Raelin, 2007; Ross, 1998; Tripp, 1994). Research indicates these and other strategies help novice instructional designers model the expert designer more rapidly (Stepich & Ertmer, 2009).

To address how learning environments modify problem-solving in novice instructional designers, this chapter will review literature connected to four core themes: (a) interactions of educational settings, (b) the instructional designer and his or her problem-solving competencies, (c) pedagogical practices in instructional design, and (d) the theoretical underpinning used for examination of this research.

The Role of Learning Environments

With an expansion of course offerings in virtual and hybrid formats, students can now participate in the same course using varying levels of technology. These convenient learning methods lend to inquiry on the mutually beneficial characteristics, along with the divergent

aspects of each educational setting and its effect on the learner. As previously discussed in Chapter 1, an educational setting is the framework for student interactions. Whether the students are sitting in a classroom or in front of a computer, they need to interface at a minimum with the course content, the instructor, and the environment. Interactions with classmates vary based on if or how the instructor has created opportunities for these types of exchanges (Heckman & Annabi, 2006). Additionally, students may or may not interact with peers on their own accord aside from how the teacher designates interactions among classmates.

Though three common educational settings were presented (face-to-face/traditional, online/virtual, and blended/hybrid), a continued discussion of only traditional and online formats were pursued for purposes of this research. Blended learning environments were outside the scope of the study design. Based on the established definitions, use of traditional and online formats are evident through the Advanced Instructional Design course employed in this study. The application of technology in the face-to-face class served to function as a repository to access content and materials reviewed as part of synchronous face-to-face class meetings. Hybrid classes promote discourse by leveraging online technologies such as discussion threads and other tools, which provide asynchronous dynamics to the course structure (Allen & Seaman, 2010). The intent of blended learning environments is to minimize physical engagement of the student in a classroom (Allen & Seaman, 2010). These characteristics were not evident in the current design of the face-to-face course used in this study.

Furthermore, examination of which educational environment is more effective for learning is a debated point in academia as each setting is studied for its capabilities and limitations (Abrami et al. 2011; Beldarrain, 2006; Bourne & Moore, 2005; Chen, 2009; Clark, 2001; Dede, 1996; Heckman & Annabi, 2006; Means et al., 2009; Pearson, 2006; Roberts,

2011). However, literature is limited on why or how one learning setting is effective compared to another. Research has mainly focused on whether one environment is more effective over the other (Abdous & Yen, 2010; Bethel et al., 2010; Campbell et al., 2008; Johnson et al., 2000; Paechter & Maier, 2010; Sitzmann et al., 2006). The following review of literature summarizes key findings about the efficacy of traditional and online classes.

Findings from Roberts' (2011) study conclude there are no significant differences in the efficacy of online versus face-to-face education. In this comparative meta-analysis, Roberts (2011) examines seven meta-analyses spanning from 2005-2009 covering over 20 years of research that compares these two environments. However, Roberts (2011) notes heterogeneity (variances) in the studies in the literature, such as pedagogical methods or methodological quality. The research of some of the individual meta-analyses under investigation corroborates this diversity (Bethel & Bernard, 2010; Means et al., 2009; Sitzmann et al., 2006). The respective meta-analyses and the aforementioned comparative meta-analysis took into consideration these variances that may impact effectiveness. Most notably are: (a) the quality of the research design itself, (b) the instructor's involvement with the course, (c) type of interactions selected to engage learners, and (d) instructional approaches (Roberts, 2011). All noted facets are elements that Roberts (2011) suggest for additional research.

For example, many of the studies included in the comparative meta-analysis only examined the effectiveness (e.g. for generating discourse or improving interactions) of the learning environment for which one was better. Much like Clark (1994), Bernard et al. (2009) and Roberts (2011) indicate, comparisons of which environment is more effective is an exhausted area in the literature. Today, researchers are encouraged to include the three other noted potential moderators in their study design for a full discussion of learning environment

effectiveness. Also observed by Bernard et al. (2009) are the studies in their meta-analysis could not generate conclusions on how interactions played a part in effectiveness. Little was done in the way of qualitative research to address aspects that are more inductive as discovered through the investigations into the literature for these meta-analyses.

A less common element, but a strong one when factoring for learning effectiveness, is mediating variables (Lattuca & Stark, 2009; Roberts, 2011). With dimensions such as subject matter, pedagogical practices, the students in the class, the instructor, the delivery platform for the materials, and time spent on the task (with respect to coursework), these aspects have varying scales of effectiveness. The learners' characteristics such as preference for learning, motivation, self-efficacy and learning disabilities in addition to other traits affect these noted factors (Heppner & Lee, 2009; Hodell, 2011; Lattuca & Stark, 2009; Rothwell & Kazanas, 2008). Given the dynamics at play, current research is beginning to examine not so much which educational setting is better than the other, but which interactions within the setting are more effective given these other noted factors (Abrami et al., 2011; Beldarrain, 2006; Kanuka, 2011; Lee & Tsai, 2011).

The Role of Interactions

Arguments within existing research include a spectrum of comparative investigations of online and traditional classrooms, however recent studies have moved away from attempting to find which is more effective (Abrami et al., 2011; Beldarrain, 2006; Kanuka, 2011; Lee & Tsai, 2011). Current research seeks to define the virtual learning environment as its own unique educational setting as opposed to having it perform to the same standards as face-to-face learning environments (Abrami et al., 2011; Bernard et al., 2009; Paechter & Maier, 2010). Bernard et al. (2009) and Abdous and Yen (2010) advocate there is nothing new to learn by comparing the

online and face-to-face unless it is a closer examination of how to effectively adapt instructional methods from traditional classrooms for online use or vice-versa. Lee and Tsai (2011) further support this claim through their research, which they indicate has implications for helping educators select instructional activities which yield more positive perceptions from students. In their study, significant differences were found between the two learning environments and a student's perceptions of self-regulated learning ($t=2.95, p < .01$), information seeking ($t=7.35, p < .001$), and collaboration ($t=2.07, p < .05$) based on instructional methods used (Lee & Tsai, 2011). Students perceived that when participating in an online course they were more collaborative, self-directed, and interested in seeking out information as compared to a face-to-face environment. Though the results indicated significant differences, the effect size was small. More importantly, this study investigated use of an online environment and if it had an effect on perceived capabilities for collaboration. Results showed students spending moderate amounts of time online perceived themselves to be more experienced and capable of collaborating as compared to students who took one online course. Lee & Tsai (2011) think this indicated that students, over time, would become more comfortable with the learning environment, which in turn changes their perception about collaborative experiences and abilities.

In examination of the topic of interactions with and within learning environments, the body of work, currently, does not appear to seek similarities and differences (Bernard et al., 2009). Furthermore, researchers suggested studies look at the role of interactions for better selecting instructional strategies (Paechter & Maier, 2010). However even these factors do not appear to take into account the act of interacting with the educational setting itself. Even the well cited meta-analysis performed by Bernard, et. al (2009) only shares evidence of the importance of student interactions with his or her peers, instructor, and the content of the course for distance

education. Within the literature, little discussion alludes to a traditional classroom embodying these same or similar types (e.g., peers, instructor, content and environment) of interactions (Abrami et al., 2011; Beldarrain, 2006; Kanuka, 2011; Lee & Tsai, 2011). Though established research comparatively investigates aspects of interactions, for example discussion or group work, studies have not evaluated interactions as a whole (Abrami et al., 2011; Bernard et al., 2009; Kanuka, 2011; Roberts, 2011). It is uncertain whether this indicates researchers do not view traditional classroom settings in this manner, as having three distinct methods of interacting. This may indicate these interactions are considered known aspects about the environment so further discussion and investigation are not necessary.

Either way, an element lacking within the larger domain of research on learning effectiveness appears to be a comprehension of how the role of interactions plays a part in the educational setting from a comparative standpoint. Given the subject matter, learners, and environment, research suggests focusing on the quality, quantity, and effects of interactions to determine which instructional methods to use (Bernard et al., 2009; Kanuka, 2011). Paechter and Maier (2010), who investigated the experiences and preferences of both face-to-face and online learners, provides a step in the direction for gaining insight into these suggested lines of inquiry. From their research, they concluded students preferred the structure and comprehensive picture online learning provides to the subject matter. However, learners also favored communicating in-person to develop shared understandings or to develop relations with others. This again demonstrates a need for further investigation of a student's preferences and how these impact knowledge and skill acquisition.

Efforts to locate research addressing perceptions and/or effectiveness of interacting with the learning environment itself provided only limited results for online education and none for

face-to-face. Though there is no research to support why the literature is lacking, it could indicate that the dimensions of interactions in traditional educational settings are not viewed the same as online. Along the same lines, a student selecting content to download, posting to a discussion thread, or typing in a chat box during a synchronous online session are considered interface interactions (Swan, 2004). These aspects are denoted because current standards for evaluating the quality of online courses include criteria for having a variety of methods for engaging the learner (QM Rubric, 2013). This infers an expectation that the instructor considers the learning environment for which he or she must design. Rationale for this evaluative measure stems from attempting to provide engagements appealing to various learning styles. Prior research indicates that learning styles are associated in part to students' internal factors, such as perceived competency in the subject matter or use of technology, motivation/interest for the topic, and preferences for acquiring and applying knowledge and skills (Rothwell & Kazanas, 2008). This means there is the potential for a student to perceive his or her computer literacy to be lacking which in turn means he or she may only engage with the educational interface of the learning environment on a basic or required (to complete course tasks) level.

As a concluding point to online versus face-to-face and efficacy, Clark (1994) provides a strong argument to why media (emerging technologies) should not be a factor in the influence of how an individual learns. He likens the idea of a delivery method for instruction being the same as a truck delivering groceries – given the chosen vehicle it does not alter learning and nutrition; transportation is merely the conduit (Clark, 1994, p. 445). Current research corroborates Clark's position (Bernard et al., 2009; Roberts, 2011). Several meta-analyses performed in recent years all indicate no significant findings with respect to learning effectiveness in one learning environment over another (Bernard et al., 2009; Roberts, 2011). Clark contends that given a

selected educational context, a curriculum or instructional designer will adjust the presentation of learning materials, resources, activities, and tools for interacting and collaborating. These noted items all factor into designing instructional approaches to teach the material. Whether or not one of these noted attributes or a combination of these listed attributes has more effect in one learning environment over the other is unfounded and research in this area is limited. Studies comparing educational settings typically focus on the teaching of a specific subject with a selected pedagogical or instructional approach for learning effectiveness, not on student interactions for their influence on learning effectiveness (Beldarrain, 2006; Luck & Norton, 2005; Pearson, 2006). Looking at how higher education develops curricula in conjunction with all variables that impact learning effectiveness may assist in maximizing all educational settings for benefit of learner.

Designing College Curricula

The application of the term curriculum in the context of higher education can have multiple meanings. Curriculum can be the sum of the entire academic institution's approach to teaching or it can represent an individual department and its criteria for degree completion (Lattuca & Stark, 2009). It can also be indicative of a singular class (Lattuca & Stark, 2009). The term, within the field of instructional design, varies in application (Dick, Carey & Carey., 2009). However, several researchers and practitioners agree that curriculum, whether academic or work-related, has similar characteristics, which include (Brown & Green, 2011; Cartlidge et al., 1999; Dick et al., 2009; Lattuca & Stark, 2009):

- a learning goal or intent,
- a concentrated subject matter area,

- a path through the content which builds knowledge or skill acquisition in a logical order,
- a learner profile which embodies various characteristics of the targeted group for instruction,
- selected instructional strategies and activities given a chosen theoretical framework(s), as multiple theoretical approaches can be incorporated (Popkewitz, 1998, p. 536),
- an identified environment and materials,
- methods for evaluation, and
- revision upon analysis of presented data from the evaluation.

Although curriculum may have universal characteristics, application of various learning theories in conjunction with the development of specific curriculum can increase learning effectiveness (Compeau & Higgins, 1995; Duffy & Jonassen, 1992; Helle et al., 2006; Holmes et al., 2001; Jonassen, Davidson, Collins, Campbell, & Haag, 1995; Popkewitz, 1998; Simons, 1999; Van Gog et al., 2005; VonGlaserfeld, 1989; Weegar & Pacis, 2012; Wilson, 1995; Winn, 1995).

The role of learning theories in curriculum development. To discuss curriculum design without considering an applicable learning theory would be akin to voting without knowing the political candidates. There are three well-defined perspectives on how one learns: Behaviorism, Cognitivism, and Constructivism (Brown & Green, 2011; Duffy & Jonassen; Hodell 2011; Jonassen et al., 1995; Popkewitz, 1998; VonGlaserfeld, 1989). Behaviorism and Cognitivism both investigate how the learner acquires knowledge with less emphasis on the context than Constructivism (Lattuca & Stark, 2009). B.F. Skinner, a founding father of

Behaviorism, examined how changes in behavior indicate retention of knowledge (Brown & Green, 2011). Whereas Chomsky, a leader in cognitive thought, countered that learners are not passive but are actively engaged in acquiring knowledge (Felder & Silverman, 1988). However, Constructivism considers an even larger array of variables when factoring how an individual learns (Brown & Green, 2011; Lattuca & Stark, 2009). Where Cognitivism focuses more on the processes of how a learner obtains, structures, and organizes knowledge, Constructivism focuses on how learners continuously attempt to make meaning based on their experiences, conduct, and the environment around them (Duffy & Jonassen, 1992; Jonassen et al., 1995).

As with Cognitivism, Constructivism contends learners engage in their surroundings; they dynamically build comprehension through social and cognitive processes (Lattuca & Stark, 2009). For example, problem-based learning is a pedagogical approach that is rooted in Constructivism as this method provides students an opportunity to interact with not only the environment, but also the people within while gaining and applying old and new knowledge (Barrows & Tamblyn, 1980; Jonassen et al., 1995). The advent of technology brings about reconsideration of traditional strategies for teaching and the implications of these new environments on the individual's ability to learn (Jonassen et al., 1995). In academia, curriculum design provides students an opportunity to interact with real-world problems while applying multiple disciplines, couching the subject in a work context (Brown & Green, 2011; Duffy & Jonassen, 1992; Raelin, 2007).

These learning theories and their associated pedagogies are considered in conjunction with various learner characteristics (e.g., motivation, self-efficacy, prerequisite knowledge) and the core learning outcomes of the curriculum to develop an academic plan (Brown & Green, 2011; Lattuca & Stark, 2009). Through administering pre-tests and post-tests and measuring

identified mediating variables, attributes of these outcomes are evaluated (Dick et al., 2009; Hodell, 2011; Lattuca & Stark, 2009). Using this method of appraising learning in lieu of experimental designs permits instructors the ability to consider alternate facts, which may contribute to a student's knowledge growth (Lattuca & Stark, 2009).

Examination of literature for learning theories and pedagogical practice for teaching instructional design competencies focuses mainly on constructivistic methods, such as problem-based learning on skill acquisition, like the skill to problem-solve (Ertmer et al., 2009; Jonassen, 2008; Kapp et al., 2002; Wood et al., 1997). This is another subject within the body of research limited by the same issues surrounding attainment of knowledge. Whether the student attempted to acquire knowledge, skills, behaviors or a combination of the three, comprehension of factors that shape how a learner actually learns is limited. To this extent, it will be beneficial to establish foundational guidelines for designing curricula that support developing competencies like those of instructional designers.

Instructional Design and the Designer

With less than a century of practice, instructional design is still a comparatively young field. Its roots began in educational psychology and now encompass communication, learning systems, and instructional theories (Hodell, 2011; Richey et al., 2001). According to research performed by Hodell (2011), some of the more notable influences on the practice of instructional design are B.F. Skinner's for his research in behaviorism and operant behavior and John Dewey's through engaging the learners actively as constructivists. He also mentions Benjamin Bloom for his taxonomy on cognitive thinking and Robert Mager for conceptualizing performance objectives and leading the way to measurable evaluations (Hodell, 2011; Roberts, 2011; Savery & Duffy, 1995). Robert Glaser formalized the idea of a systematic approach

(Clark, 1983) to instruction and Hodell (2011) credits Robert Gagne for breaking down instruction into learning events.

Instructional design transcends the educational realm and is recognized for its importance in both the government and professional spheres (Dick et al., 2009; Rothwell & Kazanas, 2008). As newer technologies emerged, the need to train and educate a growing work-force was realized (Dick et al., 2009; Reiser, 2001). In addition, the function of the educational psychologist transformed to become that of the instructional designer (Hodell, 2011), serving a larger learning need outside of the academic setting. Evaluating and considering each new technology for its use in delivering and engaging learners in instruction perpetuate the adaptation of the instructional designer (Dick et al., 2009; Richey et al., 2001; Shank, 2012).

The Instructional Designer

What exactly is an instructional designer? This is a familiar inquiry for many in the profession. There are many variations to the title along with the true function of this occupation, but, in summation, these practitioners are a part of the learning and development profession (American Society for Training & Development [ASTD], 2011). Granted this brings no more clarity to the inquiry, but it is rare for those outside the field of instructional design to define an instructional designer accurately. An instructional designer is a flexible, creative problem-solver who works with a specific client or variety of clients to provide educational solutions based on need (Brown & Green, 2011; Cartlidge et al., 1999; Quinn, 1994; Winn, 1995). Or in the simplest of terms, an instructional designer is an individual who designs instruction.

Competencies of designers. Instructional designers must possess multiple skills to perform the challenging work of their dynamic profession. For example, an instructional designer must work with a client to determine the current need for training, then formulate a

solution and map its specifics. The designer continues to work with the client to gather additional information, gain consensus, approve drafts of the developed solution, and finally to implement the solution. In doing all of this the instructional designer relies on communication, managerial, and organizational skills to engage with the client, to develop the strategy for completing the project, and to move forward the deliverables. The instructional designer also utilizes his or her comprehension of the principles of instructional design to create and develop the solution, to implement the product and to create the management plan for it.

The 2000 International Board of Standards for Training, Performance, and Instruction (IBSTPI) Instructional Design Competencies, identifies 23 competencies for an instructional designer (Richey et al., 2001). There are 122 performance statements associated with these aptitudes, which are broken into four general domains: (a) professional foundations, (b) planning and analysis, (c) design and development, and (d) implementation and management (Roberts, 2011; Rothwell & Kazanas, 2008; Sims & Koszalka, 2008). IBSTPI defines competency as “A knowledge, skill or attitude that enables one to effectively perform the activities of a given occupation or function to the standards expected in employment” (Richey et al., 2001, p. 26; Sims & Koszalka, 2008). These instructional design competencies help provide a standard set of criteria for instructional designers, as well as to distinguish this industry from curriculum development in education and human resource training (Richey et al., 2001). While some skills are considered advanced for experts within the field, most of these proficiencies are essential to an instructional designer (Richey et al., 2001).

Novice and expert designers. A novice designer can demonstrate and practice the essential competencies of instructional design, but has little experience in application (Ertmer et al., 2009; Richey et al., 2001; Rothwell & Kazanas, 2008; Stepich, Ertmer, & Lane, 2001).

Expert designers have a variety of diversified experiences and can demonstrate advanced application of their design skills (Ge, Chen, & Davis, 2005; Hernandez-Serrano, 2001; Shank, 2012). For example, it may only take an expert designer a day to perform a task, such as analysis of the presented training need, whereas it could take a novice a week. The expert designer can attribute this ability to performing analysis repeatedly; for each project he or she has completed he or she has applied analysis. Through the repetition, the expert has learned to use skills like active listening and inquiry to gather additional information. The novice instructional designer has limited experiences and therefore, has had less time to practice skills such as active listening or inquiry.

The work of both novices and experts revolve around ill-structured problems. Ill-structured problems are not unique to the field of instructional design; engineers, medical practitioners, and even those in marketing and public relations, such as crisis management, face daily challenges of finding and resolving their industry-specific quandaries (Jonassen, 2008; Woods et al., 1997). The ability to approach an ill-structured problem, identify key issues, and present solutions is an applied process mastered over time and with multiple experiences. These attributes are defining characteristics of expert designers (Chen, 2009; Quinn, 1994; Yusop & Correia, 2012). The more a novice can think and model expert methods, the more quickly his or her skills will take shape (Demetriadis et al., 2007; Stepich et al., 2001). Though solving messy problems are common in other fields, there is still much to be discovered with respect to shaping novice instructional designers capabilities.

This has been the pursuit of Stepich and Ertmer (2001), along with several others such as Boling and Smith (2010), Quinn (1994), Rowland et al. (1995), Tripp (1994), and Wilson (1995). In comparing research and discussion from these authors, Stepich and Ertmer have consistently

evolved their line of inquiry on the subject. For example, in 2005 Ertmer and Stepich proposed a conceptual model of instructional design expertise based off their research. In 2009, they used this model in new research to focus on one of the model's core components, problem finding. In their conceptual model of instructional design expertise, Stepich and Ertmer (2009) broke down expert instructional designers' thinking into recognizable elements or traits. These traits verified experts sift through a problem by selecting key factors and leveraging previous experiences to devise a solution, in essence finding the problem and solving it. Considered the two major core competencies of instructional design experts, problem finding and problem solving, being able to find the problem is the key (Demetriadis et al., 2007; Stepich et al., 2001). Much of Stepich and Ertmer's research revolves around discovering expert thinking processes and effective strategies for imparting these skills to novice designers.

The three core strategies Stepich and Ertmer (2009) recommend incorporating into pedagogical practice to hone problem-finding skills for novices are accumulating experiences, indexing the accumulated experiences, and providing scaffolds such as instructional design models. The latter strategy provides an opportunity for students to categorize their indexed experiences. Discussions had by others in the field about these individual strategies strengthen the recommendations of Stepich and Ertmer (Bannan-Ritland, 1999; Demetriadis et al., 2007; Ge et al., 2005; Jonassen, 2008; Savery & Duffy, 1995; Shank, 2012; Thomas, 2000; VonGlasersfeld, 1989).

Another aspect inherently related to developing the competencies of novice instructional designers that greatly influences their ability to advance their skills is their self-efficacy (Hardre et al., 2006; Heppner & Baker, 1997). Self-efficacy plays a large role in shaping all behaviors of an individual. This affective domain dimension directly shapes learning environments and

behaviors in addition to other personal factors such as cognition and biological composition (Bandura, 2001; Fletcher, 2005; Hardre et al., 2006; Zimmerman, 1989). Self-efficacy acts as a catalyst or deterrent for novice instructional designers with respect to their problem-solving capabilities. For example, if the novice has a high degree of self-efficacy concerning instructional design principles, he or she has a strong belief in his or her capacity to perform or execute to those views. If novices were to perceive their self-efficacy as low, they may not even take action. The degree of success, however, is not determined purely by self-efficacy, but by behavior, the interplay of this and other personal factors (e.g., socioeconomic status, employment, family, etc.), and their environment (Fletcher, 2005).

Opportunities for students to exemplify these traits in the most effective manner are not well defined. Given the presented recommendations within this review, little is still known of whether the suggested pedagogical approaches have been found to be consistently reliable. In addition, investigation into the level of influence a mediating variable, such as problem solving, has on the instructional methods is just emerging (Ertmer et al., 2009; Jonassen, 2008; Kapp et al., 2002; Wood et al., 1997). Even more importantly, research comparing educational settings and their impact on mediating variables such as problem solving is limited. To begin building this new line of inquiry, a combination of prior research recommendations will need to be examined in a more expansive manner. To set the stage for the presented investigation the following discussion highlights curriculum design, learning theories, learning platforms, and mediating variables.

Educating Novice Instructional Designers

Trends in the instructional design industry contend it is not a necessity to have a degree in instructional design to meet the demands of organizations with respect to learning development.

However, to gain principle knowledge of the instructional design field and to practice core competencies, the quickest way is to enroll in an instructional design-based academic program (Larson, 2004; Lechner, 2010; Shank, 2012). Through accessing information and studies of national and international training and technology organizations, in addition to professional trade journals, results are sparse in research examining instructional design programs. To locate past research on preparing students for their potential work environments exploration of specific themes included core curricula, pedagogical approaches, and learning environments.

Fewer than twenty articles were located that discussed curriculum and how educators approach creating an instructional design program. Even the discussion of pedagogy within an instructional course or a general approach to use in teaching instructional design had less than 30 articles. Attempts to locate current research that takes any of the suggested methods by earlier investigators, such as Bannan-Ritland (1999), Quinn (1994), Trip (1994), Rowland et al. (1995), and Stepich and Ertmer (2001), yielded no results. This leaves the field with a gap in knowing whether the selected strategies of instructional design curricula, both as academic degrees and within specific courses, help novice designers model expert-styled skills more quickly. In return, does that advance the instructional designers' overall skill-base more rapidly? The following is a summation of three publications exemplifying issues continuing to challenge the performance of novice designers.

The first article from the eLearning Guild provided ratings of selected graduate instructional design schools with limited input; only five to seven respondents represented most programs (Shank, 2012). However, the research acknowledged the line of inquiry focused more on the students' satisfaction of the program as a whole and not on the pedagogical approaches (Shank, 2012). The study's qualitative portions provided perspective on skills novice

instructional designers lacked and where improvement of instruction could better prepare new instructional designers. Some of the more noteworthy proficiencies considered deficient are the abilities to work and manage clients, perform analysis, write in a technical format, and problem-solve (Shank, 2012).

The second publication, a dissertation written by Larson (2004), discusses findings from a survey and case study. The first phase of the study polled current practitioners on their opinions about their education and preparation for their career. Results indicated those who attended programs designed to build competencies for their specific career (e.g., e-Learning developer or technical writer) reported being better prepared than those who attended a generalist program (e.g., theory and skill application) (Larson, 2004). During the first phase, respondents rated institutions for being exemplary, which provided the basis for the second phase. This next stage was a qualitative case study. Interviews with educators, administrators, and current and former students, from one institution, obtained their philosophical, theoretical, and pragmatic insight to preparing novices for their future careers. Findings reported these abovementioned facets came from personal and work related experiences in and outside of the field. Respondents also noted their time in the field and having opportunities to figure out methods to improve their instructional approach were critical to their skill development.

Lastly, the third article presents and tests the nature of a single mediating variable, problem-solving ability, in conjunction with a pedagogical model grounded in problem-based learning (Kapp et al., 2002). This research epitomizes Lattuca & Stark's (2009) recommendations for attributing learning back to experiences within academia and ensuring intervening variables are considered. Teacher involvement, motivation, self-efficacy, and capacity for problem solving are just a few examples of elements that may alter the full potential

of learning (Means et al., 2009). The Kapp et al. (2002) findings indicated students who participated in a master's level capstone course, Managing Multimedia Projects, increased their confidence in being able to solve learning-based problems. This course teaches students how to acquire business in the field of instructional technology. The research by Kapp et al. (2002) used the three constructs of Heppner's Problem-Solving Inventory (problem-solving confidence, approach-avoidance style, and personal control) to categorize student's written responses to further support the line of inquiry of Kapp et al. (2002).

Revisiting the previous discussion, research from Stepich and Ertmer (2009) on suggested practices to incorporate into the edification of the novice designer the research by Kapp et al. (2002) also denoted such methods integrated into the course's curriculum. Though the Kapp et al. study pre-dates the most current publication from Stepich and Ertmer, it does present the supposition there is indeed a disparity in research on effective pedagogical practices. Given the focus on higher education and curriculum design for instructional designers, a presentation of core elements for designing college-level curricula need consideration. This ensures the suggested pedagogical strategies from previous research can uphold the higher order of good overall curriculum design at the institutional level as well as to a specific program. Secondly, with the advent of online learning and trends in this delivery mode becoming more common, all educational settings need evaluated.

Curricula for Instructional Designers

Whether face-to-face or online, a review of current literature on instructional design graduate program development advocates many of the same methods for building instructional design skills as used in the past. These approaches include the ability to problem-solve, create and communicate a solution, and manage the process of the project and/or the client (Brown &

Green, 2011; Dick et al., 2009; Hardre et al., 2006; Hodell, 2011; Rothwell & Kazanas, 2008). However, with a prevalent mobile and virtual world, the speed at which information is needed, processed, and used becomes significant. The ability to have a skilled instructional designer create educational materials for these platforms in a timely manner requires strong problem-solving abilities and experience. Students, practitioners, and researchers have discussed difficulty in having novice instructional designers accumulate enough experience solely via their education (Bichelmeyer, Boling, & Gibbons, 2006; Boling & Smith, 2009; Lechner, 2010; Rowland et al., 1995; Shank, 2012; Stepich & Ertmer, 2009; Tripp, 1994; Yusop & Correia, 2012). Given the selected methods of an instructional design program, educators can better prepare their students by providing foundation experiences and applications through selected instructional techniques (Boling & Smith, 2009; Cartlidge et al., 1999; Lechner, 2010; Quinn, 1994; Rowland et al., 1995; Shank, 2012; Stepich & Ertmer, 2009).

Consider the following elements when preparing instructional designers: (a) real-world application, (b) practicing application of skills in context of a job, and (c) self-reflection (Bannan-Ritland, 1999; Bichelmeyer et al., 2006; Campbell et al., 2009; Dabbagh & Blijd, 2010; Ertmer & Cennamo, 1995; Felder & Silverman, 1988; Jonassen et al., 1995; Shank, 2012; Woods et al., 1997). These qualities heavily support the use of constructivist methodologies. For example, a classroom which emulates a real office, working with a real client, or a team-based effort. These all provide platforms for novice instructional designers to begin honing their skills and thinking about their work and current capabilities (Bannan-Ritland, 1999; Boling & Smith, 2009; Boling & Smith, 2010; Jonassen & Hung, 2008; Quinn, 1994; Rowland et al., 1995; Tripp, 1994). However, a smaller group of contingents advocate for an additional focus, not on the core competencies, but the elements that appear ancillary but germane to instructional skills. These

facets are communications and client management, along with considerations for social and civic aspects of the instructional design profession (Campbell, Schwier, & Kenny, 2005; Yusop & Correia, 2012).

Currently, a typical program prepares students through teaching the foundational principles and then using various methods of problem-based learning to engage and allow the learners to practice applying their new knowledge (Ertmer & Cennamo, 1995; Larson, 2004; Rowland et al., 1995; Shank, 2012).

Problem-based learning. Problem-based learning is a widely used constructivist teaching strategy providing opportunity to study, observe, or participate in an issue to bring it to resolution (Barrows & Tamblyn, 1980). An expanded definition of this term is located in Chapter 1, Definition of Terms. Problem-based learning has application both to curriculum design and to systemically solving contextualized challenges (Roberts, 2011; Savery & Duffy, 1995; Thomas, 2000). A key component of problem-based learning is problem solving, a core attribute of an instructional designer (Stepich & Ertmer, 2009). Pedagogical approaches, which exemplify problem solving, are action learning, case-based learning, apprenticeship, and problem-based learning. For example, case studies allow for analysis of past-situations to help students build skills in identifying problems (Bennett, 2010). However as an observer of the scenario, the student, is not reacting to the circumstances and resolving them in real-time. Whereas problem-based learning couches problem-solving situations in their true context, allowing learners to consider and discuss their experiences and comprehension as they progress (Jonassen & Hung, 2008). Through benchmark research performed by Stepich and Ertmer (2009) on instructional design expertise advocates this strategy for teaching instructional design. Kapp et al. (2002) illustrate this practice through their research of using an adapted problem-based learning model.

Problem-based learning focuses on a set of six sequenced steps recommended by Barrows and Tamblyn (1980) which include:

1. Presenting the challenge prior to any training/teaching.
2. Emulating a problem in reality
3. Allowing learners to approach their work by applying what they know and use deductive reasoning based on their knowledge.
4. Providing an opportunity to learners to be self-reflective and inventory their disparities through working on the presented problem.
5. Having the ability to re-examine the problem based upon newly acquired knowledge and applying the most currently discovered information.
6. Incorporating the learner's experiences from both the self-directed learning and their work with the presented problem into their knowledge/skill base.

Barrows and Tamblyn (1980) noted as learners begin to associate new information they will discover gaps in their knowledge. This defines the basis of problem-based learning (Jonassen, 2008; Woods et al., 1997). In other words, the learner is self-assessing or problem finding. Through the initiative (self-efficacy) of the student, gathering more resources and executing various techniques of knowledge acquisition these learning disparities are balanced (Bannan-Ritland, 2003; Dabbagh & Blijd, 2010). In addition to individual efforts, learning acquisition through this method typically occurs in small collaborative groups (Kapp et al., 2002). A possible outcome of a problem-based learning activity is the development of a final product that is either tangible or intangible (Ertmer et al., 2009; Ge et al., 2005). It is typically the item evaluated to determine the learner's achievement of the assignment. Coupling these components with competition, they formed the model used in research performed by Kapp et al.

(2002). This educational approach follows good tenets of not only problem-based learning principles, but also social cognitive theory in providing students the opportunity to model behaviors needed by instructional designers.

Modeling Social Cognitive Theory

Humans are not just products of their environment; they are also the producers or agents (Bandura, 2001, p. 270). Agency is driven by an individual's: (a) intentionality (likeliness to act), (b) forethought (future consequences of intentions), (c) self-reactiveness (ability to regulate self and behavior), and (d) self-reflectiveness (ability to reflect and analyze) (Bandura, 1989; Zimmerman, 1989). Through personal (the individual) agency, proxy (an intermediary) agency, or collective (a group with mutual belief of worth) agency, human agency is enacted (Bandura, 1989; Bandura, 1999). The capacity for personal agency is rooted in the individual's belief that they can control events affecting them (Bandura, 1989). Otherwise known as self-efficacy, it is a person's belief in his or her own competence (Heppner et al., 2004). These hallmark ideas drive forward the core concepts of social cognitive theory (Pajares, 1996).

The roots of social cognitive theory (SCT) trace back to Miller and Dollard's work on social learning theory and imitative behaviors (Simon, 1999). Bandura advanced this theory by acknowledging variances in learning new behaviors through observational modeling (1977). As Bandura continued to research social learning theory, he pinpointed an additional aspect solidifying his proposed social cognitive theory, human agency (Bandura, 1986). In examining the agentic mechanisms (factors influencing agency), he conceptualized the three core constructs of SCT: personal factors, behavior, and environmental factors. He posited each of these works together in a reciprocal network to influence behavior change in a regulated manner as opposed to a reactive or behaviorist manner (Bandura, 1986; Fletcher, 2005). See Figure 1.

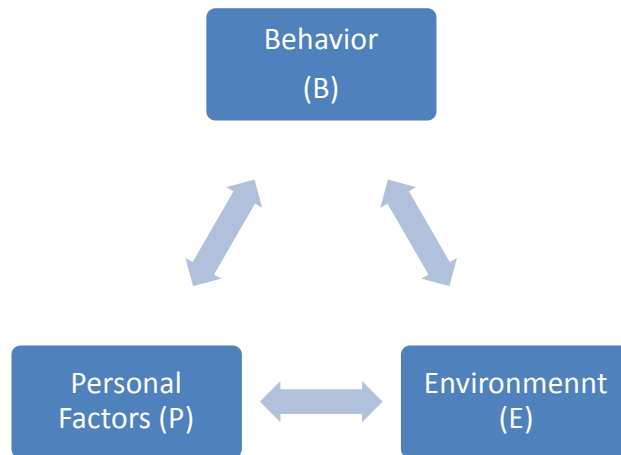


Figure 1. Bandura's model of reciprocal determinism.

Looking specifically at the interplay of the constructs in Figure 1, the following example contextualizes the three sets of causation: (a) personal factors (P) ↔ behavior (B), (b) environment (E) ↔ personal factors (P), and (c) behavior (B) ↔ environment (E). The environment of an online learning format is the same for each student; however, the student's behavior toward this setting will change it (B ↔ E). Perhaps this educational setting has the option for rearranging of materials or sorting materials based on user preference (E ↔ P). The individual may opt to execute the behavior of changing his or her learning environment because in the past he or she has found this to be a successful method for organizing the content and his or her studies (P ↔ B). Here we have witnessed the triadic give-and-take of social cognitive theory. Another learner may not even alter the materials within the environment for multiple reasons; for example, he or she is unaware of the option to re-arrange, he or she does not like the subject, or he or she is fine with the way the class is set up.

In summary, Bandura's model of reciprocal determinism contends the personal factor contributes to an individual's cognitive, affective, and biological make-up or the why and how for one's actions. In addition, a person's behavior is the positive, negative, or neutral actions one performs given the level of control he or she has over varying personal factors and his or her

surroundings. Finally, the physical location and the happenings around the person comprises the environment. Surroundings provide the who, what, and where to our actions (Bandura, 1989).

Behavior in multiple contexts were widely examined using SCT, for example, mental and physical health and education (Barrows & Tamblyn, 1980; Campbell et al., 2008; Heppner & Baker, 1997; Rounds & Rappaport, 2008; Valatis et al., 2005; Woods et al., 1997). With respect to education in particular, social cognitive theory has been researched from multiple perspectives, but the most applicable research for this dissertation comes from studies on self-efficacy (Bandura, 1986; Bandura, 1993; Fletcher, 2005; Pajares, 1996; Zimmerman, 1989). A person's belief in his or her own capabilities is a catalyst or deterrent to success in many facets of one's life (Bandura, 1986; Bandura, 1993; Fletcher, 2005; Pajares, 1996; Zimmerman, 1989). These ideas launched Heppner's research on how individuals problem solve (Heppner & Lee, 2009). He theorized that the capacity for solving problems is rooted in the individual's (a) level of belief in solving the problem, (b) the level to which the individual will engage in the problem, and (c) the level to which the individual can stabilize their emotions/behaviors (Heppner et al., 2004; Price, 2009). Heppner's research gets to the root of Bandura's ideas by examining the cognitive and affective factors of the personal construct.

Given the idea of reciprocal determinism, it stands that the environment in which one learns has the potential to influence personal factors of the learner. In turn, this could modify the learner's behaviors. The same holds true of personal factors. These affect learner behaviors, which then shape the learner's educational environment. Each of these constructs and the level of positive, negative, or neutral actions embodied by each can directly impact the success of the learner. This infers that though the instructor and the content may both be optimal in their respective capacity for facilitating effective learning, it is the student's interplay of reciprocal

determinism driven by his or her self-efficacy influencing success in mastering the subject (Bandura, 1986; Bandura, 1993; Heppner & Baker, 1997; Kapp et al., 2002).

Even within the foundation of research supporting how an instructional designer should be educated to maximize skill development, there is still a need to confirm the effectiveness of the suggested approaches (e.g., real-world experience, practice, and reflection). In addition, there are deficiencies in the literature verifying the effectiveness of these methods in various learning environments. In examining all dimensions of how a learning environment, the subject matter and the design of instruction, and the learner intertwine will provide more descriptive data for analysis to better understand the what, why, and how behind student learning.

What SCT has not answered is whether personal attributes, such as self-efficacy, are interrelated to how a learner interacts with his or her learning environment. Given the lack of research on the presented problem, using a preconceived method, such as SCT, limits the ability to discover all possible meanings within the data to explain the issue (Glaser, 1998). Both Clark (2001) and Sims and Koszalka (2008) discussed as part of the rationale for inconclusive results on which learning environment is more effective the possibility of a shifting theoretical perspective. A general methodology used to examine the reciprocal interplay while allowing meaning to emerge is grounded theory (Strauss & Corbin, 1994). Researchers using grounded theory, an inductive process, begin with gathering detail-rich information for analyzing to generate explanations. This provides opportunities to examine broad-based relationships in the data in conjunction with current literature and/or experiences to conclude possible theories or generalizations (Creswell, 2009).

Conclusion

Even for foundational research on educational practices and its ability to increase instructional designers' skill development, there is still a need to understand the effectiveness of these approaches, such as real-world experiences and metacognition. In addition, there are deficiencies in the literature both in providing understanding to why these pedagogical methods are effective and in validating the effectiveness of these methods in various learning environments. Furthermore, there is a need for research of mediating variables in conjunction with different educational settings and pedagogical practices. In examining all interrelated aspects of how a learning environment, the subject matter and the design of instruction, and the learner connect, the hope is that indicators of effectiveness will emerge. These guides will help identify potential gaps existing between learning environments.

This research intended to seek understanding of the why, what, and how of novice instructional designers interactions with their respective learning environment as they problem-solve. The study outlined in the following chapter uses a methodology that supports researching experiences to gain meaning, otherwise known as grounded theory.

CHAPTER 3

RESEARCH METHODOLOGY

Introduction

The meanings and relationships between types of learning environments, a learner's problem-solving abilities, and educational setting interaction types used in solving problems have minimal literature. In light of insufficient understanding about this noted interplay, this grounded theory study examined all three factors. This exploratory research leveraged a three-part semi-structured interview series, which included an interview guide and a pre-/post-survey to yield a rich set of data. Grounded theory guided the design and subsequent analysis of novice instructional design students' problem-solving capabilities and interactions with their learning environment.

The purpose of this study was to examine the interactions of novice instructional design students in face-to-face and online learning environments through their interactions with an educational setting. Specifically, this research identified the extent to which using interactions was part of their problem-solving processes. Also, students' perceptions about their problem-solving capabilities and how they used interactions in the learning environment to assist in solving the problem emerged. This exploration brought reasons to the surface that addressed the interplay of the student, his or her problem-solving abilities, and his or her interactions with the educational setting. This chapter presents the philosophical underpinnings, which weave through and inform the research design, data collection methods and analytical approaches to provide insight to the established lines of inquiry.

Research Questions

As previously stated in Chapter 1, the primary inquiry addressing the proposed research is, *As novice graduate instructional design students describe how they problem-solve, what interactions do they refer to given the learning environment?* The research questions stemming from this line of inquiry are as follows:

RQ1: How do novice graduate instructional design students describe how they problem-solve in an online learning environment?

RQ2: How do novice graduate instructional design students describe how they problem-solve in a face-to-face learning environment?

RQ3: What interactions do novice graduate instructional design students describe when problem solving in an online learning environment?

RQ4: What interactions do novice graduate instructional design students describe when problem solving in a face-to-face learning environment?

RQ5: How do the descriptions of problem solving and the interaction types expressed by novice graduate instructional design students in an online learning environment compare to novice graduate instructional design students in a face-to-face environment?

This research utilized grounded theory as a framework to gain insight into the how, what, and why behind this line of inquiry.

Grounded Theory

Considered a general methodology, grounded theory utilizes a systematic process of constant comparative analysis to generate theory (or meanings or explanations) from data (Glaser, 1998; Glaser & Hon, 2008; Strauss & Corbin, 1994). The roots of grounded theory emerged through the efforts of Glaser and Strauss's 1962 study on the influences of the awareness of dying (Glaser, 1998). Glaser and Strauss designed their study using a methodical procedure to collect and analyze data to generate reasons for the phenomena they observed (Glaser, 1998; Charmaz 2014; Corbin & Strauss, 2008). In reflecting on the formation of this

method, Glaser (1993, 1998, 2008) contended the foundation of their grounded theory approach stemmed from a combination of two research approaches. Glaser claimed it was his quantitative training under Lazarsfeld in sociological research methods paired with Strauss's qualitative research background gained from Herbert Blumer that guided the formation of an entirely new method (Glaser, 1998). These influences established a technique allowing analysis of all data for purpose in generating meanings and suggesting patterns within those theories (Glaser, 1998).

Grounded theory continues to evolve from its origins more than four decades later through differing schools on how to approach the basic tenets Glaser and Strauss set forth (Charmaz, 2012; Corbin & Strauss, 2008; Glaser, 1998; Walker & Myrick, 2006). The key evolutionary, though heavily debated, point has been through analytical methods (Creswell, 2013; Patton, 2002; Walker & Myrick, 2006). For example, Glaser and Strauss both possessed a positivistic viewpoint and kept to the same systematic process of collecting data, however they varied on the idea of how to code the data (Charmaz, 2014; Glaser, 1998). In particular, Glaser sought to code data for emergence of meaning versus Strauss who sought verification of data through a constant comparative method (Charmaz, 2014; Corbin & Strauss, 2008; Creswell, 2013; Glaser, 1998; Patton, 2002). Additionally, Glaser contended that this methodology, commonly considered qualitative only, is not. As he denotes "all is data", signifying both qualitative and quantitative have equal opportunity for analysis without pre-conception to meaning (Glaser, 1998, pg. 8, Patton, 2002). Thus providing an opportunity for natural emergence of explanations in revealing a participant's behavior through the selected data types (Glaser & Hon, 2008; Van Kamm, 1996).

What Glaser and Strauss both omitted from grounded theory was the researcher themselves, which Charmaz (1983, 2014) advocated as part of constructing a true reality of the

meanings derived from analysis. Charmaz's (1983, 2014) approach provides the ability for the researcher to acknowledge him or herself as part of the study in the sense that he or she will interpret and give a voice to the participants. Whereas Glaser (1998) contends that this is a form of storytelling and that grounded theory is about uncovering the behaviors and patterns in which participants engage. The product of grounded theory analysis that Glaser advocates is still possible by using constructivist based grounded theory. Data collection and analysis of constructivist grounded theory research allows meaning to emerge on behaviors and patterns; the explanation of those discoveries comes through interpretation from the researcher and the rich descriptions provided by the participants (Charmaz, 2014). The use of Charmaz's approach melds the rigor of data collection and analysis advocated by Glaser and Strauss while embracing a more postmodernist view on the interpretation and presentation of those findings (Charmaz, 1983, 2014). Given the positionality of the researcher, which is elaborated in the following section, and her appeal for the flexible nature of constructivist grounded theory, this was the framework used to design this research.

As is consistent with grounded theory, the presented study, used an inductive constructivist approach provided a platform for exploring the noted subject matter. As the literature is limited and/or non-existent on the topics in the aforementioned review, starting with a line of exploratory inquiry, in this case a grounded theory study provided an opportunity to build the foundation to these meanings (Charmaz, 2012; Creswell, 2013). This allowed meaning to emerge as opposed to forcing the data into preconceived or pre-established theories (Corbin & Strauss, 2008; Charmaz, 1983; Creswell, 2009; Glaser & Hon, 2008; Groenewald, 2004). The data collected by both quantitative and qualitative means used a pre-/post-test inventory on

problem solving and interviews with participants. This conforms to Glaser's "all is data" (1988) and Charmaz's belief that research problems form the methods used to gather data (2012, 2014).

Charmaz (1983, 2012) also suggests four strategies to approaching constructivist grounded theory that guided this particular study. These are: a.) gaining theoretical sensitivity, b.) gathering data in a manner which evolves the process and product, c.) verifying emerging ideas using a systematic method, and 4.) the resulting data is open to additional interpretation. Given the simultaneous and iterative nature of these grounded theory strategies in collecting data and analyzing it, for purposes of this study, there is a need to discuss analysis in this section to substantiate the selected approach. Though elaboration of all four strategies occur in this specific section, a detailed discussion of analysis characteristics follows at the end of this chapter to maintain context.

First, Charmaz (1983, 2012, 2014) denotes prior to starting research, analysis of other theories, as opposed to disregarding them, will assist in directing the study aim. The review of the literature, as noted in the previous chapter, is limited on substantiated theory. The most applicable theory, Social Cognitive Theory (SCT) by Bandura (1989) was acknowledged for its potential merits, but was dismissed for now as the desire was to limit preconceived explanations prior to full analysis (Glaser, 1998). This assisted in reducing bias or skewing data to fit to established theory (Charmaz, 2014; Creswell, 2013). However, recognition of similar phenomena in the literature increased sensitivity to theoretical construction or, in other words, helped determine what to look for as potential codes and meanings during analysis (Creswell, 2013; Strauss & Corbin, 2008). Though these last two statements seem to contradict one another, having theoretical sensitivity provides an opportunity to determine if current theory is relatable to what emerged from the analysis (Charmaz, 2014; Creswell, 2013; Corbin & Strauss, 2008). In

addition, it assists in establishing whether there are areas within the study that current theory cannot support (Creswell, 2013; Corbin & Strauss, 2008). Given the lack of studies supporting a firm use of SCT the preference was to be theoretically agnostic in designing and executing the research.

The second strategy Charmaz (1983, 2014) provides is the need for gathering rich data through appropriate methods with analysis occurring simultaneously (Creswell, 2013; Glaser, 1998; Corbin & Strauss, 2008). Data collection is a flexible process within a grounded theory study as the researcher can select and adjust what methods he or she uses during the iterative phases of obtaining and analyzing artifacts (Charmaz, 2014; Corbin & Strauss, 2008). This study used a combination of three semi-structured interviews and a pre-/post-survey to gain the comprehensive information (Corbin & Strauss, 2008; Guion, Diehl, & McDonald, 2011). The three-interview series recommended by Seidman (2013) aided in gaining the detail-rich information the researcher sought. These dialogues were also valuable in establishing flexible opportunities to gain additional data given constant analysis of the collected artifacts.

Analysis, in the context of grounded theory, as noted above, begins during data collection (the second strategy) and moves forward through the third strategy proposed by Charmaz (1983). The third strategy deals with the emergence of theory development, theoretical sampling, and saturation to refine conceptual categories (Charmaz, 1983). The final or fourth strategy speaks to the process of leaving the data open to future interpretation (Charmaz, 1983, 2014). As these three strategies directly relate to full analysis, the discussion on these remaining strategies will continue in the appropriate sections at the end of this chapter.

However, one aspect that precedes and influences not only the research design but also subsequent analysis of the collected data is the positionality of the researcher. With the noted

postmodern movement, the constructivistic mindset countered the traditional positivistic approach to grounded theory (Charmaz, 2012; Creswell, 2013; Patton, 2002). In other words, allowing analysis to refrain from removing the objectivity of the researcher from what he or she studied. Instead, analysis and the research method itself acknowledge the role of the researcher (Charmaz, 2014; Creswell, 2013; Patton, 2002). The largest proponent of this idea is Charmaz (1983, 2012, 2014), as she views grounded theory as constructed realities based on the researchers' interactions with not only the data collected but on the totality of the world they perceive around them. Following this line of thinking, the researcher accounts for him or herself within the research and the analysis of the data (Creswell, 2013; Corbin & Strauss, 2008). The researcher also acknowledges the subjectivity of his or her position as part of how the theory was constructed (Charmaz, 2014; Deyhle, Hess, & LeCompte, 1992; Patton 2002). Lastly, the researcher's study design is guided not only by the method, but their positionality, which are both addressed in the following section.

Research Design

By examining current literature, gaining theoretical sensitivity through investigation of potential theories, and addressing the selected methodology this exploratory design leveraged a systematic process for collecting and analyzing data. Additionally, as noted above, the positionality of the researcher in a grounded theory study intertwines with the design of the research. The following provides explanation to the researcher's stance.

Positionality

The researcher's role and assumptions interweave with her research and therefore influenced how the design was executed (Charmaz, 2014; Creswell, 2013). Van Manen (1990) denotes how the lived experiences of the researcher will guide the subsequent interactions with

those interviewed and the data analysis. Corbin & Strauss (2008) state that the researcher's reflexivity should take into consideration his or her interests and position and how these may influence the study design, involvement with study participants, and even how participants are represented in written analysis. Transparency of the position of this researcher is preferred to lend understanding to what brought about this study and the potential inherent biases present in executing the research and performing analysis (Van Manen, 1990). The following reflective explanation contextualizes the reasons for this researcher's study aims.

Foremost, the researcher's professional practices in the field of instructional design shape her interest in problem solving. Stemming from being a consultant in the field of instructional design, this researcher's ability to solve instructional design problems lent credibility to her skills; oftentimes hired to resolve issues other consultants manifested or propagated. In turn, this created a frequent ponderance as to how instructional designers problem-solve using fundamental principles and concepts of the field. How do these abilities of "knowing" how to solve the problem aptly manifest?

As the researcher began an academic career, the curiosity for this subject perpetuated itself through assisting her students in gaining comprehension of how to apply their developing instructional design skills. Admittedly this research was somewhat self-serving as it was hoped explanations would be uncovered that answered the "how" which, in turn, would assist in better educating and preparing students to become instructional designers. The larger gain is not solely the researcher's though; any understandings derived from this study have the ability to serve a larger population of educators. Additionally, the byproduct is an effort in improving the education of students, not in improving the station of the researcher for professional or personal gain.

Given the stated position and key elements influencing the design of the study, it would also be valuable to address how this guided the actual collection of data. To that point, a noted competency of an instructional designer is active listening (Richey et al., 2001) which is a method for focusing the attention on the participant speaking (Bernard, 2002; Charmaz, 2014; Kvale, 1996; Seidman, 2013). This approach allows the interviewer to interpret the response and to seek clarification (Bernard, 2002; Kvale, 1996; Seidman, 2013). This ensures the designer is obtaining the most holistic understanding of the circumstances presented for solving the problem. Likewise, the researcher took the same approach when interviewing. For both instructional design and research, active listening minimizes the element of bias (Bernard, 2002; Richey, et al., 2001; Van Manen, 1990). Choosing not to ask particular questions based on personal choice or for clarity can result in a fragmented picture of a situation; leading to analysis of under developed data (Corbin & Strauss, 2008; Groenewald, 2004; Van Manen, 1990).

The gain in having this stance, one of active listening by the researcher, is continuity and consistency in gathering data. Not only this, but the collected data will more fully represent the participant, not what the researcher presumed about the participant, following the guiding principles of grounded theory (Corbin & Strauss, 2008; Charmaz, 1983; Creswell, 2009; Glaser & Hon, 2008; Groenewald, 2004). To commence performance of active listening the researcher must establish a relevant population. To that point positionality also influences the selection of the sample for examining and investigating the researcher's inquiries.

Population

To gain appropriate research participants, this study selected a specific graduate instructional design program and class. The course, Advanced Instructional Design (ADVID) is a capstone course in the Masters of Instructional Technology program at a mid-sized university in

northeastern Pennsylvania. Students take this course after completing the pre-requisite course Instructional Design. The Instructional Design course provided foundational information on the principles of instructional design and introduced students to fundamentals in applying the instructional design process. ADVID focused on application of these skills in a contextualized setting.

Students typically take ADVID in their second semester. The same instructor has been teaching the course for nearly 18 years, twice per academic year and once during the summer semester. A predominately face-to-face class, ADVID, provided an online option once a year. The only variations to the course delivery relate to the use of technology. For example, instead of face-to-face team meetings with the instructor for the traditional classroom, students taking the online course met virtually through a synchronous meeting tool of the team's choosing.

The course has followed the same format each semester by introducing the premise of the course, dividing the class into teams, and having each team work with a real-world client on a learning need (e.g., training for employees). The course provides the same standard content, concepts, and activities each semester, keeping the class consistent from semester to semester. The group-based activities encompass teaching to the 23 instructional design competencies, discussed in Chapter 2, which fit into each of the four general domains of the instructional design profession. A restatement of these four areas is: (a) professional foundations, (b) planning and analysis, (c) design and development, and (d) implementation and management. The International Board of Standards for Training, Performance, and Instruction (IBSTPI) is the authority on these standard competencies (Richey et al., 2001).

Students, in general, are of varying ages and professional backgrounds. For example, an entry-level K-12 educator, a seasoned sales representative for a pharmaceutical company, and a

recently graduated graphic designer from an art school could comprise a team for ADVID. During each semester, the student-teams collaborate with their client to create an educational product. For example, training on machinery at a local manufacturing plant. Each team meets with their client to perform the work and to solve the instructional design problem. Meetings surround project planning, designing and developing the product, reviewing the developing solution, and gaining sign-offs or approvals on tasks completed. Student teams also require meetings with the instructor to provide status updates and to receive guidance as needed. Students might for example, seek direction on how to perform a task, such as gathering data about the learning population or how to handle team-dynamic issues. Then, each team researches and develops an answer to create a usable product from their solution. Because projects come from actual clients with a true learning need, the experience provides students the ability to study and devise a solid solution to a real-life work situation. At the end of the semester, teams provide a final product to their respective client and a final deliverable of the entire project to the instructor. Typically, the submitted final deliverable includes an indexed binder containing information on the execution of each phase in the instructional design process. For example, project planning, implementation processes and evaluation findings.

Individually, students in the course also worked on particular skills aligned with competencies under the Professional Foundations as defined by IBSTPI. These included competency 1: Communicate effectively in visual, oral and written form and competency 3: Update and improve one's knowledge, skills, and attitudes pertaining to instructional design and related fields (Richey et al., 2001). For example, students must have contributed equally to the project as a responsible team member. In addition, they also needed to work independently to

complete their assigned tasks and to communicate their progress and needs for the project with their team and the client.

Based on the evaluation of research presented in the literature review about teaching instructional design and cultivating the skills of novice instructional designers, the learning strategies in this course are reflective of these best practices (Ertmer et al., 2008; Quinn, 1994; Rothwell & Kazanas, 2008; Rowland et al., 1995; Stepich & Ertmer, 2009; Tripp, 1994). The course design ensures students have many opportunities to apply their skills, self-contemplate, and be facilitated and coached by the instructor. In addition, the class provided scaffolding for the students to use when identifying their experiences through self-reflection and application to their project (Ertmer et al., 2008; Quinn, 1994; Rothwell & Kazanas, 2008; Rowland et al., 1995; Stepich & Ertmer, 2009; Tripp, 1994). A common scaffolding used by students is the instructional design process known as ADDIE or Analysis, Design, Develop, Implement, and Evaluate. The design and content of the course made it an appropriate venue for this inquiry. The researcher solicited approval from the instructor to seek participants to be part of the study. An explanation of the process and details of the executed study are in the next section.

Procedures

To gather data from the specified population to use in analyzing the research questions, the developed study incorporated a set protocol to first gain approval to perform research and then solicit participants. The final steps in the study procedure executed the pre-/post-tests and the interview series. Institutional Review Board (IRB) approval for this study came from both the affiliated university and the identified university for the participant population and sample. Permission was also obtained for the use of the Problem-Solving Inventory (PSI) Instrument (Heppner, 1988), described later in this chapter, and from the instructor of the course, Advanced

Instructional Design, where the sample was taken. Appendix A provides the original PSI and Appendix B includes copies of the two noted approvals. The time frame for this study was defined by the respective semester, which in the summer session was 12 weeks and in the Fall session, 15 weeks.

To commence data collection each semester, solicitation of the population occurred through the researcher presenting to the class. After the presentation and prior to administering the survey, students received an e-mail (See Appendix C) that included a link to the PSI in Qualtrics as well as the informed consent. Students needed to either enter their name beside a statement of agreement to participate or a statement declining participation as proof of consent. Upon agreement to participate data collection commenced for the Summer 2014 semester starting the week of May 19th and ending the week of August 4th of 2014. The Fall 2014 semester started August 25th and ended the week of November 24th. At any point, students had the opportunity to discontinue their participation. To discontinue participation, the student needed to contact the researcher to declare his or her intent not to participate. Another way was through declining to complete the PSI or if the student was not interested in being interviewed he or she was not included in the sample. If a participant missed any part of the study, whether survey or interview, he or she was removed from the research.

After giving consent, participants in both semesters took the pre-PSI test in an online format. Conversion of the traditional paper-based PSI inventory into an online survey using Qualtrics allowed for ease of administration and access to all students in both semesters (online and F2F). Students had one week (7 days) from the date of the first class to complete the initial survey. An e-mail reminder was sent mid-week. After completing the pre-PSI test participants were directed to the Interview Scheduling Intake Survey where they provided contact

information, days, and times of availability (Appendix D). Scheduling of the interviews occurred via individual e-mails to the participants after each had provided availability.

After this, another e-mail sent to participants confirming all interview dates, times, and locations and served as the first interview reminder. Participants then received e-mail reminders two days prior to subsequent interviews. Appendix E includes samples of all e-mail communications provided to the population and/or the participants. The interviews occurred at the beginning of the semester, mid-point, and prior to the class concluding. Interviews were held via telephone and in-person based on the participant request. Voice Memos, an iPhone application, recorded all interviews. Each interview varied in length from twenty minutes to an hour and a half, depending on participant responses. Distribution of the post-PSI test, e-mail notification, and reminders happened one week prior to the final interview. Solicitation of participants for this research occurred through a purposive sampling strategy elaborated in the next section.

Sampling Strategy and Sample

The unit of analysis under examination was graduate instructional design students in both an online and face-to-face version of an Advanced Instructional Design (ADVID) course. Given the pre-established criteria of the population, this study employed purposive sampling (Mack, Woodson, MacQueen, Guest & Namey, 2005). This was due to all students experiencing the central phenomena under examination (Mack et al, 2005). The recruitment strategy was a basic class presentation to explain the purpose of the research and to solicit participation. The presentation to the classes varied in format based on the educational setting. The online course used Saba Meeting, an online classroom collaboration tool. The audio features in Saba and a

PowerPoint slide deck guided the presentation. The researcher attended the face-to-face class in-person and used the same presentation.

Thirteen students participated in the study, six of the participants were part of the Online group and the remaining seven were part of the Face-to-Face (F2F) group. Safety measures, discussed below, provided a level of security to not only these participants, but also to the collected data.

Confidentiality, Anonymity, and Data Protection

During presentation and through the written consent form an explanation about participant confidentiality and anonymity provided awareness of identity protection. However, the interview process and use of a pre-/post-test (the PSI Inventory) required the researcher knowing, at a minimum, the participants' first name for purposes of analysis. Personally identifying information was limited to this single facet. Anticipating future publication of the study results, participants had the choice to have their name withheld or changed. Chapter 4 uses pseudonyms to identify all participants as requested. Collection of demographic information focused on number of classes taken only. This assisted in describing the sample during analysis. Identification of participants by program track within the degree, occupation, or age were not relevant to the study and therefore was not part of data collection process. This increased the anonymity of the participants.

With respect to the collected data itself, the institution at which the researcher is enrolled as a doctoral candidate, utilizes Internet protocols to protect all data and results, including password protection of Internet access, personal identification, and password protection for Qualtrics. A complete backup of all data will reside on an encrypted external hard drive. Access

to the hard drive requires a password key. The implemented safeguards to the research procedures protected the participants and collected data.

Data Collection

In order to gather the detail rich data needed to assist in the emergence of explanations to the research questions two data collection methods were used; a survey/inventory and interviews.

Pre-/Post-Test Inventory

The Problem-Solving Inventory or PSI (See Appendix A), has been used over 120 times in research in over thirty years covering subject areas such as mental alterations, coping, academic, and career-based issues (Heppner, et al., 2004). In addition, Woods (1994) and Kapp et al. (2002) have used this instrument in conjunction with a problem-based learning curriculum, much like what occurred with this research (Heppner & Baker, 1997; Kapp et al., 2002). In the previous studies, each researcher attempted to examine problem-solving skills used to address ill-structured problems, technical engineering, and instructional design challenges respectively. The Problem-Solving Inventory, for purposes of this study, assessed an instructional designer's problem-solving capabilities (Heppner & Lee, 2009).

The thirty-five item self-reporting instrument consists of three scales derived from factor analysis: problem-solving confidence, approaching-avoidance style, and personal control (Heppner, 1988). Heppner (1988) found the reliability estimates for the original PSI to indicate internal consistency of these three factors. Several studies established the estimates of concurrent, discriminate, and construct validity (Heppner, 1988). Three sub-scale factors: problem-solving confidence, approach-avoidance style, and personal control comprise the PSI score (Heppner & Lee, 2009; Heppner et al., 2004). Problem-solving confidence refers to an individual's assertion that they can solve a problem and directly correlates to the ability to cope

while solving a problem (Heppner & Baker, 1997). The approach-avoidance style refers to the individual's propensity toward how he or she will handle solving a problem. Each dilemma, given its complexities, may be a problem the individual chooses to solve or avoid (Heppner & Baker, 1997). Finally, the third dimension is the individual's capacity for managing his or her emotions and behaviors as he or she solves the problem. Management is two-fold as the individual must assess, react, and then control his or her emotions accordingly (Heppner & Baker, 1997).

Though the PSI's application is predominately designed for measuring psychological health and how one copes with personal problems, Heppner & Baker (1997) proposed there are other more specific uses for this instrument. Woods first used the PSI in 1994 to determine if his engineering students' perceptions of their problem-solving abilities changed in conjunction with his problem-based learning curriculum (as cited by in Heppner & Baker, 1997). Kapp et al. (2002) later used this instrument in an adapted form where participants in the study used the PSI to report their perception of their ability to solve instructional design problems (Kapp et al., 2002). The only change made was to the instructions. The modified inventory from the Kapp et al. (2002) study used for this research had an additional revision in the means of distribution. For this research, the participants (both online and F2F) filled out the PSI in an online format as opposed to a tangible, paper-based format. For a copy of the instrument in its online format, refer to Appendix F.

As the reader of this research continues into the results section of the document, the scoring of the PSI might appear confusing, as the method of scoring seems somewhat counter-intuitive. When examining the PSI scores to determine the findings of the self-appraisal, a decrease (-) in score from the pre- to post-test would indicate an improvement in an individual's

perception of his or her problem-solving capabilities. Inversely, an increase (+) in score would imply a decline in an individual's perception of his or her ability to problem-solve. However, these scores were not the sole source of analysis for this study. Administration of the inventory occurred in conjunction with a series of interviews where the pre-test transpired prior to the first interview and the post-test happened prior to the third (final) interview.

Interviews

As previously explained, this study used a combination of three semi-structured interviews and a pre- and post-surveys to gain the detailed information needed for analysis. A semi-structured interview includes a set of topics and associated questions covered in a particular order, yet provides flexibility for following leads or probing further on a response (Bernard, 2002). Using these in combination with the three-interview series recommended by Seidman (2013) aided in gaining the detail-rich information that the researcher sought. The interview series allowed opportunity for exploration into the participant and the meanings behind his or her lived experiences (Seidman, 2013). Each interview in the series focused on a specific topic. The first interview concentrated on gathering life history, the second on gaining details of the experience, and the third garnered reflections about the meaning of those experiences (Seidman, 2013). The interview structure used in this research followed those processes.

One element to note in designing the interview guides and series are the adaptations necessary to meld the varying approaches of Bernard (2002) and Seidman (2013). In particular, Seidman's (2013) recommendations stem from performing phenomenological studies and discourages following leads. He indicates this can reduce the intent of the interview and its purpose in collecting the whole picture of a participant and his or her lived experiences (Seidman, 2013). Given interest in finding possible explanations for how problem-solving skills

develop, this study does not seek to describe the meanings behind the lived phenomena, which strays from the purpose behind Seidman's approach (Lindlof & Taylor, 2011; Strauss & Corbin, 1994).

However, the guidance on what to obtain per interview lent insight into how to replicate the three interview series for data collection purposes of this study. The first interview in this grounded theory research gained educational history and context; the second began gathering the particulars of the noted experiences, and the third provided an opportunity to reflect on those experiences (Seidman, 2013). Using a general script focused on the research questions, open-ended inquiries gave participants ample ability to voice their responses in a manner they preferred (Bernard, 2002). Bernard's (2002) suggestion for flexible structure allowed for efficiency in performing the interviews while still maintaining reliable qualitative data for comparison. Appendix G provides samples of the semi-structured guides used in the interview series.

Generating a semi-structured interview guide prior to each of the three interviews assisted in addressing all relevant topics. The guides included structured questions that combined Seidman's recommendations and semi-structured prompts to evolve the central inquiry of the study (Bernard, 2002; Charmaz, 2014). For example, at the beginning of the semester the first interview in the series asked participants to quantify how many classes they had taken online versus F2F. This aspect lends to gaining focused history (Seidman, 2013).

Within the same interview participants were also asked to describe how they problem-solve when dealing with instructional design problems. This is not only an example of a flexible interview design from an inquiry perspective but also illustrates lack of order to the questions, which embodies the main trait of semi-structured interviews. New leads and ideas could arise

from the open-ended design providing additional data for analysis, but also recognizes the interviewee may answer another prompt through the initial response negating the need to ask a question directly (Bernard, 2002; Corbin & Strauss, 2008; Seidman, 2013). This further exemplifies the semi-structured nature of the interview guide. As the interview series progressed, the guides included questions for detailing the participant's experiences, opinions, and ideas while maintaining flexibility with respect to respondents.

The interview series began with the researcher gaining a profile of the participants and their experiences in taking classes in online and face-to-face environments. In addition, the interviews gathered information on the ways these students interacted with those environments and solved instructional design problems. The second interview focused on two main discussion points. The first was around the nature of the problem the participants were solving respective to their team's project for the ADVID class. The second element was the type of interactions and challenges they (the participants) were having in solving those problems. The final interview provided additional discussion around the problem, interactions, and challenges, but also provided an opportunity to review the PSI pre-and post-survey results with the participants. The third interview concluded the series by asking self-reflective questions about the PSI results and the participants' experiences in being a part of the research while taking the class. As discussed previously, Charmaz's (1983, 2014) constructivist grounded theory approach was applied as the primary scaffolding to the research design and subsequent analysis. Once the researcher determined theoretical saturation, data collection stopped and the analysis continued to determine the emerging theory. Outline below is this analytical approach.

Data Analysis

Earlier in this chapter, Charmaz's four strategies to approaching constructivist grounded theory were outlined. They are provided here again to re-establish discussing the last three of these strategies: a.) gaining theoretical sensitivity, b.) gathering data in a manner which evolves the process and product, c.) verifying emerging ideas using a systematic method, and 4.) the resulting data is open to additional interpretation. Her four strategies offer a platform for methodically examining a line of inquiry that allow meanings and relationships to surface through the acquired data. The openness and fluidity of Charmaz's method provided opportunity to incorporate additional analysis of data through different means, while still achieving theory generation or an explanation of the lived experiences of the participants (Van Manen, 1990). Performing a secondary line of grounded theory analysis using Glaser & Hon's (2008) quantitative method corroborated the qualitative strand and generated additional discoveries. Again, the perception of linearity is discouraged with these analytical strategies, as they are interrelated, iterative methods for assisting in examining the multiple layers and dimensions of the collected data (Corbin & Strauss, 2008; Glaser; 1998; Lindlof & Taylor, 2011). Elaboration of each approach assists with noting their respective interplay.

Grounded Theory Analysis – Qualitative and Quantitative

To once again address the research process utilized in the study, to gain theoretical sensitivity a review of the literature (Strategy 1) and gathering data in an organic manner evolved the data collection process and resulting codes. Grounded theory codes and coding start the conceptualization of potential explanations for the meanings within the data (Charmaz, 2014). The coding process achieved mainly by constant comparison allows the researcher to develop the abstract codes to more refined categories, which have defined dimensions or subcategories

(Charmaz, 2014). Eventually refinement of these codes and categories through theoretical saturation allows for emergence of a central category or theme that explains the relationships between the aggregate, resulting in a theory or explanation (Charmaz, 2014, Glaser, 1997). Theoretical saturation is the point at which all properties were gathered from the data (Charmaz, 2014, Strauss & Corbin, 1994). The themes that emerge come from the discovery of recurrence and repetition within the codes and categories (Owens, 1984). Coding as an iterative process varies given which grounded theorist guides the research as each note a different procedure to coding (Charmaz, 2014; Glaser, 1997; Strauss & Corbin). This study utilized Charmaz's coding process in keeping with her suggested analytical approach to performing grounded theory (Charmaz, 1983, 2012). Full details of this process are below.

Returning to Charmaz's strategies for implementing grounded theory, the second strategy, as used in this study included sequentially performing initial and focused coding which commenced data analysis. This process began to conceptually organize and sort the data collected in this investigation. Initial coding happened by studying the evolving data through asking questions (Charmaz, 2014; Corbin & Strauss, 2008; Owen, 1984). For example, "Does the data suggest anything?" or "What is the point of view in the data?" This line of inquiry removed a concern for describing the data as opposed to analyzing the data (Charmaz, 2014; Corbin & Strauss, 2008; Glaser, 1998).

The focused coding process provided this researcher a method for refining data classification by determining sub-categories (Corbin & Strauss, 2008; Glaser, 1998). For example, in interviewing participants for this study they spoke of interacting with the instructor to ask questions. This became a category, instructor inquiry, which was then broken into various sub-categories. Three sub-categories became apparent to the larger category (instructor inquiry);

where (e.g., in or out of class), when (after the participant had exhausted all other resources) and how (e.g., in-person, e-mail, via phone) the participant decided to ask questions. This process further supports analysis of the data as opposed to researcher-based descriptions of it (Charmaz, 2014; Corbin & Strauss, 2008, Glaser, 1998; Van Manen, 1990). Table 1 represents examples of both types of codes generated from the transcripts of the participant interviews. The initial coding, in the left column, demonstrates the line-by-line review of the transcript and subsequent analysis of the noted actions the participant described. The focused coding in the middle column refined the data classification from the initial coding by determining sub-categories.

The third and fourth strategies discussed using systematic methods to verify emerging ideas

Table 1

Initial and Focused Coding Examples

Initial Coding	Focused Coding	Interview Response
Describing interaction type; Communicating in different formats; Elaborating reasons for variance in interactions; Differentiating interactions between LE's based on approach to communicating; Reflecting on peer interactions	Defining interaction methods Elaborating interaction preferences	Interacting with peers and classmates I guess would be, I would almost say better in the sense that there's better communication that goes back and forth. If two people are talking ... It seems like whenever I'm sitting in class, sometimes people are talking and then they get off on tangents faster, and it also seems like sometimes if it's something heated they talk over each other more. Whereas when there's things on a blog or something you have your time to think, and prepare, and understand what you want to say. It's not something that just comes out, it's something that you carefully plan and articulate.
Listing characteristics of preferred LE; Rationalizing between LE's; Denoting life dynamics	Discerning preference for LE Qualifying decision for LE selected	That being said, I [inaudible 00:05:44] feelings wise enjoy the face-to-face class better because I like being able to see people, I like being able to talk to people. I don't particularly enjoy doing that stuff online, but it's simply more efficient. When I look at things like okay well do I drive an hour to class or do I go downstairs to the basement and fire up the computer. It saves a lot of time in my personal life which is the reason I gear towards more online classes.

(Strategy 3) and allowed resulting data to be open for additional interpretations (Strategy 4). Charmaz's (1983) interpretation of analysis verification (Strategy 3) discussed comparing observations systematically to help refine emerging categories in the data. This iterative process starts with a round of data collection and then analysis, including initial and focused coding and memoing. Additional data gathering through interviews occurred based on the analysis of what was initially collected (Charmaz, 2014). This process provides the ability to expand the developing theory or theories currently under investigation. Memoing and theoretical sampling used in this research helped to further cultivate a structure to the various codes and determine the depth and breadth of the emergent relations if any (Charmaz, 2014; Corbin & Strauss, 2008; Owen, 1984). As mentioned previously memoing is a reflective method for conceptualizing developing ideas and relations in the data. While theoretical sampling assists in generating all possible data surrounding a developing idea.

Memoing, for this study, advanced the line of thought under examination surrounding problem solving (Charmaz, 1983, 2014). Memos are the written interactions with the data and derived from analyzing the initial and focused codes from the data (Charmaz, 2012). Memo-writing also provides an initial structure to drafting research findings by formulating categories from analysis (Charmaz, 2012; Strauss & Corbin, 2008). Using the example above, the defined category of instructor interactions was compared to other categories, such as peer interactions, in an attempt to unearth a new relationship or line of inquiry. Looking at the codes and categories in different and new ways can prompt additional data gathering and further analysis otherwise known as theoretical sampling (Charmaz, 2014; Corbin & Strauss, 2008; Glaser, 2008). Elaborating further, an examination of all four-interaction types identified in this study as categories yielded ideas about how the participants approach problem solving.

To assist in examining these four evolving memos, during subsequent interviews, inquiry occurred into how the participant problem-solved through their interactions and the learning environment. This drilling into aspects of the research to gain a full understanding of the properties within a category, known as theoretical sampling, helped to flesh out the categories. (Creswell, 2013; Glaser & Hon, 2008). This phase of iterative data collection and analysis continued until achievement of theoretical saturation or when the elicitation of new properties from gathered data stops (Charmaz 2014; Corbin & Strauss, 2008; Glaser 2008; Owen, 1984).

Another demonstration of the interplay of memoing and theoretical sampling was the use of the PSI scores. Scoring of the pre- and post-PSI surveys transpired prior to the third interview. Analysis happened on each participant's scores using the quantitative grounded theory method of Glaser & Hon (2008). With this review of the PSI scores combined with the memoing from the interviews, relationships between goal setting and score changes emerged as a tentative category. Memos showed inquiry into participants' goal setting and whether they had purposefully set goals for the class or if these were personal and/or professional goals. Gathering further data came through asking each participant about his or her PSI scores upon presentation of the findings. After each participant had time to contemplate his or her scores and ask questions about the results, the researcher asked a few introspective questions. Saturation came from probing on these points but yielding now new paths about which to inquire (Glaser & Hon, 2008). The final step in Charmaz's third strategy (1983) comes from examining the saturated categories to find meaning and relation between them, thus developing a theory or explanation. In other words, the theory emerges from the systematic approach to collecting and analyzing data (Corbin & Strauss, 2008).

The final or fourth strategy Charmaz (1983) discussed was the ability for resulting data to be open to additional interpretation, something also promoted by Glaser & Hon (2008). Each posits that grounded theorists were not seeking to finalize an interpretation of the data, but to continue to develop new perspectives and understanding. Grounded theorists do this through either working further on their own data or another researcher's data set (Glaser & Hon, 2008). Using quantitative grounded theory on the PSI survey scores in this study, analysis brought forth further explanations (Glaser & Hon, 2008). A first review sought to find relationships across the quantitative data. Then as Glaser & Hon (2008) suggest, the creation of indices helped to determine if any relationships formed between the noted indicators. A comparison of these associations to the coded and memoed findings from the qualitative analysis discerned if theories generated through the quantitative method supported the explanations derived from the qualitative grounded theory analysis process.

As the analysis of gathered interview artifacts and survey data continued in refinement from the standpoint of Charmaz's (1983) strategy three, it became evident when moving to the fourth strategy that a reciprocal aspect between the two approaches used in this study had developed. At times, the qualitative coding cued an inquiry to look at the quantitative data for potential relationships and meanings and vice-versa. This created an even more defined iterative process than Charmaz (1983, 2014) suggests as constant comparison occurred within and between both qualitative and quantitative data. Even theoretical sampling, guided by memoing, was part of the reciprocity of these final stages of analysis. As both Charmaz (2014) and Glaser & Hon (2008) posit, data in grounded theory is open to more than one interpretation.

To elaborate further, an early memo (see Table 2) on the interactions participants in the study had with the instructor of their graduate instructional design course led to examining the

qualitative strand more deeply for descriptions of those interactions. Specifically triggers for asking questions to the instructor, timing of inquiry, and method of inquiry sought to provide additional details. Using theoretical sampling assisted in gaining further understanding about these dimensions. To accomplish this, clarifying questions occurred throughout the rest of the interviews when participants discussed interactions. One of these elaborative inquiries yielded quantitative data by asking for the priority of the interaction types. Thus bringing about a full circle of data collection, analysis, interpretation, additional development of inquiry and data collection and then back to analysis. This perpetuated the formation of the emerging codes, categories, and the relations within and between both strands of data (Charmaz, 2014; Glaser & Hon, 2008).

Table 2

Example of Memoing

Memo(s)	Interview Response
This is a very telling statement about how a learner determines when and why they interact. What creates the circumstances under when, how, what or why a student will interact? Does the interactions have to do with how confident they are overall? Another participant mentioned not wanting to look dumb in front of the class. Also another thought it was wasting the time of the class and another made comment about it being the job of the instructor to answer the question so they would ask right there and then. There was one other that made comment about asking in case there were others in the classroom that had the same inquiry. What are deterrents and what are triggers to asking questions? Are the other interaction types discussed to this level of detail? Can I determine the dimensions of all interaction types from these interviews?	For the most part for me, let's say if I'm in class and I have a question, I wait longer to see if he can answer it, or if she can answer it without me asking it. Maybe she just vaguely assumed that someone's confused whereas if I was in class I would probably immediately raise my hand and ask the question. That's always because for me I feel like online my question may slow the class down. Although I know we are equally as students to a certain extent I feel like maybe I should just wait. I will email them my question or I'll stay after class and ask my question. Sometimes I just say I won't ask the question, if it's not too much of a complicated question I will try to figure it out myself. Once I reach confusion I will sit there and email the professor, call the professor right there on the phone line, however I need to communicate with them.

In order to assist in clarifying quantitative grounded theory and its analytical part in this study, the use of the interaction priority example from the paragraph above interweaves with this explanation. Quantitative grounded theory provides the ability to conceptualize general relationships of direction between codes and categories using indices for analysis to generate what is termed as a core index (Glaser & Hon, 2008). Glaser & Hon (2008) liken a core index to that of an emerging theme in qualitative analysis (Glaser & Hon, 2008). In this study, the core index was the priority of the interaction types. These relationships are typically a comparative dichotomy such as positive or negative, high and low, or even response based (e.g. yes or no) (Glaser & Hon, 2008). However as Glaser & Hon (2008) explain the researcher must identify two variables, also known as indices, that fit to this dichotomy and then select a third variable to evaluate against the first two. Examined indices for this research were the participants' interaction types based on prioritizations (highest vs. lowest) against learning environments (online and F2F). Evaluation ends in either determining a lack of relationship or establishing a relationship. Establishing a relationship generates a theme or emergent theory (Glaser & Hon, 2008).

To continue with this example, the indices of ordering interaction types by participant priority commenced analysis with Glaser & Hon's method. First, the researcher created a table that provided the total sample's priority of the interaction types (e.g., instructor, peers, content, learning environment). From this initial table the highest priority (variable or index one) for interaction and the lowest priority (variable or index two) were determined to be the emerging concept and relation as the two established a comparative dichotomy. This is considered theoretical sampling with quantitative data, which is then further perpetuated through constant

comparison against other variables (variable three), like an educational setting (Glaser & Hon, 2008).

By considering this study's inquiries about alternate learning environments (e.g. online and F2F) the research created two additional indices to reflect how online participants prioritized interactions vs. F2F participants. This allowed for a different assessment of the emerging concepts for additional relationship generation. Comparison of the highest interaction priority to the lowest priority within each learning environment happened first. This same comparison happened again, by using the overall sample to look for variation in interaction priority and to determine whether it yielded additional emergent meanings.

To derive all potential meaning, performing comparisons across every priority established whether additional relationships existed in the data. This in turn developed the initial theories or potential explanations from the comparative analysis. The final step prior to the written findings from quantitative grounded theory was elaboration analysis (Glaser & Hon, 2008). This pass on the data helped to build the variables in a more descriptive manner which similar to Charmaz's process for memoing (Glaser & Hon, 2008). Referring back to the example of the prioritized interactions, data analysis of the core index against the third variable(s) determined potential conditions that created the preference for how participants prioritized interactions. With these conditions established inquiries, such as, did one of the interactions not prioritized as the highest or lowest alter priority of all interactions? Alternatively, did a particular circumstance or set of circumstances generate the presented interaction priorities? These attributes helped to define and elaborate the conditions that produced the resulting relations and ultimately solidified the generated theories resulting from the quantitative data (Glaser & Hon, 2008).

With a full picture of the methods and processes used to generate the analysis a discussion on how triangulation and saturation played a part in supporting validity of the data will conclude this overview of analysis.

Grounded Theory Analysis – Triangulation and Saturation

The use of two methods to collect data for grounded theory analysis (interviews and pre-/post- surveys) assisted this researcher in triangulating the data and gathering the generated meanings and relations from within it (Charmaz, 2014; Glaser & Hon, 2008; Guion et al., 2011). The use of multiple research methods strengthened the validity of the data collected from the two education settings used in this research (Guion et al., 2011; Jensen & Jankowski, 1991). This assisted with achieving theoretical saturation, where no additional dimensions or associated relationships were uncovered from the iterative collection and analysis of the data (Charmaz, 2014; Corbin & Strauss, 2008). The study's artifacts gained this in-depth detail through methodological and environmental triangulation. Presented next is the elaboration of the triangulation methods used, attainment of saturation and their respective interplay.

Evidence of methodological triangulation occurred using the quantitative pre-/post-test, and the qualitative interview series (Guion et al. 2011). These methods assisted in determining whether results had similarities, which if alike, would then establish validity in the findings (Charmaz, 2014; Guion et al. 2011). Environmental triangulation examined how the setting affected the collected data (Guidon et al., 2011). With respect to this study, the environment itself was a main component within the line of inquiry. This provided consideration to whether or not an online or a face-to-face environment influenced a learner's capacity for problem solving. Through this approach, to establish validity, the concluding results are determined to be the same or similar across the environments (Guion et al., 2011).

In the context of qualitative research and in particular grounded theory, it is also valuable to recognize that validity is a debatable point (Corbin & Strauss, 2008; Glaser, 1998; Glesne, 2011). Rather than the word “validity, terms such as “trustworthiness”, “credibility”, and “plausibility” are more apt to be found and discussed by authors of qualitative research and, in particular, grounded theorists (Charmaz, 2014; Corbin & Strauss, 2008; Glaser, 1998; Glesne, 2011). Triangulation is one of the proposed methods viewed as lending to trustworthiness (Glesne, 2011).

The established line of inquiry for this research, in some respects, goes against the presented stance on qualitative triangulation. With respect to methodological triangulation, comparison of different data types supported the building of credibility in presented results, and consequently assisted in uncovering additional meanings and relationships (Jensen & Jankowski, 1991). For example, some of the qualitative data provided quantitative information with respect to prioritizing interactions when problem solving. Three tables were designed (sample overall, online participants, and face-to-face) during analysis to examine the quantitative priorities and then to compare them to note any potential associations.

Methodological triangulation played a large part in providing another interpretative lens to the individual strands of data and the data as a whole. The methodologies of qualitative and quantitative used in this study did not necessarily corroborate all data, but ensured that all meaning from the data was uncovered as related to the research questions. This in turn lent to saturating all theoretical categories by exhausting the data of its theoretical insights to the emerging meanings (Charmaz, 2014; Corbin & Strauss, 2008; Creswell, 2013; Glaser, 1998). Environmental triangulation also built credibility by expanding the depth of the examination of the data. As participants described their interactions with the respective learning environment,

theoretical sampling aided in saturating the theoretical categories. The iterative method of sampling used to analyze data perpetuated further inquiry, providing opportunity to elicit additional findings. This also assisted in saturating established theoretical categories (Charmaz, 2014; Corbin & Strauss, 2008; Jensen & Jankowski, 1991). To some respects, the use of these approaches was more about augmenting then complementing. In summary, triangulation did not limit interpretation of the data, but was a method for expanding and diving deeper into it for purposes of saturation and trustworthiness (Glesne, 2011).

Lastly, a final step in building credibility of the noted methods for data analysis was to use analytical software. NVivo, a predominately-qualitative analytical tool, helped to find additional emergent meanings from the qualitative and quantitative data strands. The software assisted in confirming researcher generated categories and their respective attributes and dimensions. The software also provided the opportunity to cross-examine codes and categories to determine if additional relations and meanings could be uncovered.

Conclusion

Using grounded theory, this research examined how interactions within a learning environment shaped the novice instructional designer's perception of his or her problem-solving abilities. A problem-solving inventory used in a pre-/post-test format along with a three-part semi-structured interview series gathered these novice designers' experiences. Qualitative and quantitative analysis using grounded theory strategies yielded codes that were refined into evolving categories through constant comparison. These conceptualized categories, through recurrence and repetition, illuminated an emergent explanation to the study's research inquiries. The next chapter will present the findings and analysis of the performed study, which ran from late May 2014 until early November of 2014.

CHAPTER 4

FINDINGS

Introduction

As stated previously, the purpose of this grounded theory study was to gain insight into the perceptions, processes, and interactions used by graduate-level instructional design students to solve ill-structured instructional design problems in online and face-to-face (F2F) learning environments.

The presented findings below come from data analysis of a three-part interview series and pre-/post-test survey of perceived problem-solving abilities as described in Chapter 3. Presentation of results comes through first discussing characteristics of the sample, including pre- and post-test scores from the Problem Solving Inventory (PSI). A participant synopsis, using pseudonyms, grouped by learning environment, online and F2F follows the sample summary. Each synopsis provides a participant's self-description of his or her characteristics and preferences as a learner and as a problem-solver. This is also where the participants ranked the order of the interaction types (instructor, peers, content, and/or learning environment) with how they solve problems related to instructional design. Finally, results are detailed in conjunction with the study's research questions answering the why, what, and how of novice instructional designer's interactions with their respective learning environments as they problem-solve.

Overview of Participants

Sample Characteristics

Thirteen individuals participated in the study through interviews and a pre-/post-test survey. The following data, derived from using descriptive statistics, provides a set of basic characteristics about the sample. The total participants broke down to n=7 F2F, n=6 Online

(n=13). Of this total, five participants were male (n=5, 38.46%) and 8 were female (n=8, 61.54%). A minority of participants (n=6, 46.15%) were part-time in the instructional technology graduate program whereas the majority (n=7, 53.85%) were full-time.

The following data was based on information collected as part of the first interview. At the time of executing the research, the average amount of time participants had been in the graduate program was 3.38 semesters and they had an average of 1.76 semesters remaining prior to graduating. The average number of online classes participants had taken in the graduate program were 4.00 and F2F was 2.69. A minority of participants (n=5, 38.46%) had not taken any courses F2F. Additionally a small minority (n=1, 7.69%) had not taken a class online. Table 3 provides a summary of these noted participant characteristics.

Table 3

Summary of Participant Characteristics

Participant (P) (F=F2F O=Online)	Program Status (FT=Full time PT= Part time)	Semesters in Program	Semesters to Graduation	Classes Online	Classes F2F
Adam (OP1)	PT	4	1	7	2
Beth (OP2)	PT	4	5	5	0
Carla (OP3)	PT	4	2	5	0
Devon (OP4)	PT	7	3	7	0
Evan (OP5)	PT	4	1	8	0
Faye (OP6)	PT	4	3	7	0
Greg (FP1)	FT	3	1	5	3
Helen (FP2)	FT	2	1	1	5
Ivana (FP3)	FT	3	1	3	6
Julie (FP4)	FT	2	1	1	4
Ken (FP5)	FT	3	1	3	6
Laurie (FP6)	FT	2	2	1	4
Mike (FP7)	FT	2	1	0	5

Having described the participant population, the presented results of this study now turn to a review of scores on the Problem-Solving Inventory (PSI). The scores presented below include one overall score and three respective individual scores, Problem-Solving Confidence, Approach-Avoidance Style, and Personal Control (Heppner, 1988). Per Heppner's (1988) instructions for calculating scores, the researcher excluded three filler questions from the 35-item assessment tool. With these removed, the highest overall score a participant could achieve was 192 and the lowest was 32. Looking at each of the individual factors of the PSI, through five items related to Personal Control the most a participant could score was 30 and the lowest was 5. The maximum score for Approach-Avoidance Style was 96 and the minimum score was 16 using sixteen items from the self-assessment tool. Lastly, for the factor of Problem-Solving Confidence there were eleven items with the highest score being 66 and the minimum being 11.

As for interpretation, the Heppner's original PSI inventory did not provide explicit instructions on how to interpret the scores. For purposes of this study, the researcher utilized a score spectrum expressed by Heppner et al. (2004). The PSI scores were operationalized as an opinion held by participants of how effective and/or ineffective they were in their ability to problem-solve. Participants determined this by either scoring toward one end versus the opposite end of a continuous range (Heppner et al. 2004). Figure 2 illustrates the PSI Inventory score bars using a continuous range starting at zero. Each bar represents one of the three factors (Problem-Solving Confidence, Approach-Avoidance Style, and Personal Control) and the overall score presented last. The ends of the bars signify the extremes of each factor or overall score. For example, Problem-Solving Confidence would have "confident" on one end and "not confident" on the other.

The PSI also reads opposite of typical scored items. Having a high score on any of the factors or the overall score signifies diminishing capability and a low score indicates increasing capability (Heppner, 1988). For example, if the participant in this study scored a 57 (out of a possible 66) on Problem-Solving Confidence this would indicate the participant is not very confident in solving problems. The mid- point of each factor's score range and the mid-point

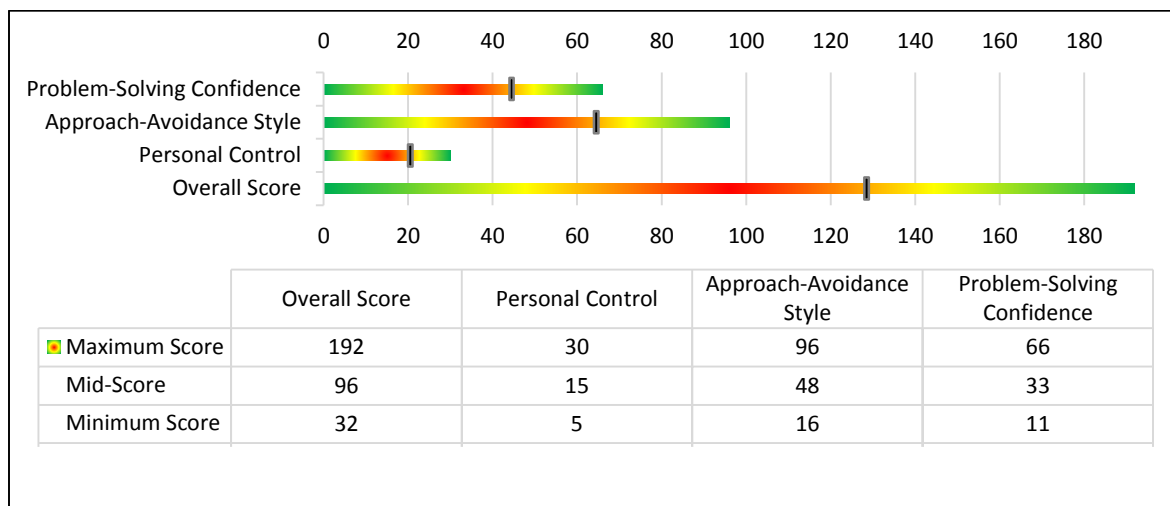


Figure 2. PSI self-assessment and associated total possible scores.

of the overall score range define a neutral position. For example, the mid-score of Personal Control is 15. If a participant scored a 14, they would view this as being neither well controlled or out of control with respect to emotions and behavior. Additionally, when using the PSI in a pre-/post-test format a reduction in score (-) indicated a perceived increase in an individual's problem-solving abilities. Likewise, an increase (+) denoted a perceived decrease in an individual's capacity for problem solving. Lastly, small decreases and increases were not significant or telling given the idea of neutrality of the mid-score range.

To contextualize this explanation we can look at the scores for Adam (OP1) in Table 5 under the Participant Synopsis – Online section. “Adam” perceived himself to be an effective problem-solver given his overall pre-test PSI score of 52 out of a possible 192 points.

Associating this to the post-test score, Adam remained relatively the same with only a one-point reduction in score to a 51. In comparing the pre-and post-test scores there was also an increase in score on one particular factor, approach-avoidance style. Adam's initial score in this dimension was 26 points out of a possible 96, again indicating a strong perception of being able to approach problems. Even with the five-point increase to 31 points in the post-test score Adam still perceived himself as someone who approached problems as opposed to avoiding them.

Table 4 summarizes each participant's overall PSI pre- and post-test scores and the decrease (-) or increase (+) in score. The next section of these results provides combined qualitative and quantitative data about each participant. Starting with the online group, each synopsis shares a description of the participant based on his or her responses during the first of the three interviews conducted for this study. The associated table shares the results from each participant's pre-/post-PSI survey.

Table 4

Summary of Participant Pre-/Post-Test PSI Overall Scores

Participant (F=F2F O=Online)	Pre-Test Total	Post-Test Total	Difference Total (-/+)
Adam (OP1)	52	51	-1
Beth (OP2)	92	74	-18
Carla(OP3)	105	76	-29
Devon (OP4)	70	59	-11
Evan(OP5)	53	36	-17
Faye (OP6)	79	46	-33
Greg (FP1)	71	64	-7
Helen (FP2)	73	64	-9
Ivana (FP3)	71	36	-35
Julie (FP4)	72	57	-15
Ken (FP5)	101	53	-48
Laurie (FP6)	70	76	+6
Mike (FP7)	54	51	-3

Participant Synopsis - Online

At the time of data collection, Adam was taking online classes; he thought the interactions with peers were better because there were no other distractions in an online setting. Adam believed the social conversations in a F2F environment took away from the ability to learn the material in class. Adam was a part-time student who took seven online courses and two face-to-face classes in the last four semesters. In solving problems, Adam used content first, the instructor second, peers third, and the learning environment last. Pre-/post-test PSI scores for Adam are listed in Table 5 below.

Table 5

Summary of Participant – Adam (OP1)

FACTOR (Possible Score/Half-Score/Low-Score)	PRE	POST	DIFFERENCE (+/-)
Problem-Solving Confidence (66/33/11)	15	12	-3
Approach-Avoidance Style (96/48/16)	26	31	+5
Personal Control (30/15/5)	11	8	-3
Total (192/96/32)	52	51	-1

Like Adam, “Beth” (OP2) was a part-time student who had taken all five of her classes over the previous four semesters in an online format. She did not take any courses face-to-face in this graduate program and identified herself as a visual learner. Beth used the instructor as a last resort when solving problems as she preferred to exhaust content interactions first, then the learning environment, and next her peers. Table 6 provides the pre-/post-test PSI scores for Beth.

Table 6

Summary of Participant – Beth (OP2)

FACTOR (Possible Score/Half-Score/Low-Score)	PRE	POST	DIFFERENCE (+/-)
Problem-Solving Confidence (66/33/11)	19	15	-4
Approach-Avoidance Style (96/48/16)	52	41	-11
Personal Control (30/15/5)	21	18	-3
Total (192/96/32)	92	74	-18

Very similar to Beth, in four semesters, “Carla” had taken five classes online and none face-to-face. This part-time student believed she learned better when she was interacting with people in a face-to-face setting. Carla also denoted liking the option to chat in a text box with peers because it was faster than e-mailing a classmate. Using content first to assist in solving a

problem, Carla would then turn to the learning environment second, her peers third, and the instructor last. A list of pre-/post-test PSI scores for Carla are in Table 7.

Table 7

Summary of Participant – Carla (OP3)

FACTOR (Possible Score/Half-Score/Low-Score)	PRE	POST	DIFFERENCE (+/-)
Problem-Solving Confidence (66/33/11)	30	20	-10
Approach-Avoidance Style (96/48/16)	56	43	-13
Personal Control (30/15/5)	19	13	-6
Total (192/96/32)	105	76	-29

Much like the last two participants, with seven online classes taken in seven semesters, “Devon” was a part-time student with zero face-to-face courses. She found her experiences in online learning to be positive, but occasionally the experiences frustrated her with respect to response time of the instructor when seeking clarification or posing an inquiry. When asked during her interview, Devon prioritized interacting with content first when solving a problem and then secondly with her peers. She used the learning environment third and the instructor as a last resort. Below, in Table 8, is a presentation of the pre-/post-test PSI scores for Devon.

Table 8

Summary of Participant – Devon (OP4)

FACTOR (Possible Score/Half-Score/Low-Score)	PRE	POST	DIFFERENCE (+/-)
Problem-Solving Confidence (66/33/11)	18	12	-6
Approach-Avoidance Style (96/48/16)	45	38	-7
Personal Control (30/15/5)	7	9	+2
Total (192/96/32)	70	59	-11

Participant “Evan” was a part-time student who had taken all eight of his classes online and none face-to-face in the four semesters he was in the graduate program. Evan believed there was more participation in the online courses compared to face-to-face courses he had taken as an undergraduate. When solving problems Evan interacted with his content first and then the instructor second, peers third and the learning environment fourth. Table 9 provides pre-/post-test PSI scores for Evan.

Table 9

Summary of Participant – Evan (OP5)

FACTOR (Possible Score/Half-Score/Low-Score)	PRE	POST	DIFFERENCE (+/-)
Problem-Solving Confidence (66/33/11)	16	12	-4
Approach-Avoidance Style (96/48/16)	23	18	-5
Personal Control (30/15/5)	14	6	-8
Total (192/96/32)	53	36	-17

Unlike Evan, the final online participant, “Faye”, believed some online classes were a bit lecture heavy during the synchronous sessions and less application focused. In four semesters as a part-time student, she had taken seven classes online and none face-to-face. Faye preferred application based classes even in the online environment. She also favored interactions with the course content first when problem solving, then utilized the instructor second, the learning environment third, and her peers last. Table 10 provides the pre-/post-test PSI scores for Faye.

Table 10

Summary of Participant – Faye (OP6)

FACTOR (Possible Score/Half-Score/Low-Score)	PRE	POST	DIFFERENCE (+/-)
Problem-Solving Confidence (66/33/11)	23	16	-7
Approach-Avoidance Style (96/48/16)	38	21	-17
Personal Control (30/15/5)	18	9	-9
Total (192/96/32)	79	46	-33

The online participants as a whole were part-time students who had taken online classes in the majority. Only a few online participants had experienced face-to-face classes in the program. However, in providing the participant synopses of the F2F group they were all full-time students who had taken a minimum of one course online, except one participant. The following section summarizes the characteristics of each of the F2F participants.

Participant Synopsis – Face-to-Face (F2F)

The first participant, “Greg” was a full-time student who had been in the graduate program for three semesters, including the semester when he participated in this study. Greg took the majority of his classes online, but preferred face-to-face courses, as he believed he could make better connections to his peers and the instructor. He indicated that when solving a problem he utilized the course content first, then the learning environment, followed by his peers and finally his instructor. A presentation of Greg’s pre-/post-test PSI scores appear in Table 11.

Table 11

Summary of Participant – Greg (FP1)

FACTOR (Possible Score/Half-Score/Low-Score)	PRE	POST	DIFFERENCE (+/-)
Problem-Solving Confidence (66/33/11)	24	21	-3
Approach-Avoidance Style (96/48/16)	36	35	-11
Personal Control (30/15/5)	11	8	-3
Total (192/96/32)	71	64	-7

Unlike Greg, the majority of “Helen’s” classers were F2F. Helen was a full-time student in her second semester and had only taken one class online in the graduate program. During her interview, she explained that she mainly interacted with the instructor within the learning environment. Her approach to solving a problem related to the class was to first review the content, then approach the instructor if necessary, then the learning environment, and lastly her peers. Table 12 shares Helen’s pre-/post-test PSI scores.

Table 12

Summary of Participant – Helen (FP2)

FACTOR (Possible Score/Half-Score/Low-Score)	PRE	POST	DIFFERENCE (+/-)
Problem-Solving Confidence (66/33/11)	24	19	-5
Approach-Avoidance Style (96/48/16)	32	32	0
Personal Control (30/15/5)	17	13	-4
Total (192/96/32)	73	64	-9

“Ivana”, like Helen, was a full-time graduate student who had taken the majority of her courses F2F. Only three of her courses in the program were online in the past three semesters. She acknowledged when she was in a face-to-face learning environment she tended to engage

more by participating in discussions and asking questions of the instructor. When solving a problem, Ivana interacted with the content first, the instructor second, her peers third, and the learning environment last. For Ivana's pre-/post-test PSI scores review Table 13 below.

Table 13

Summary of Participant – Ivana (FP3)

FACTOR (Possible Score/Half-Score/Low-Score)	PRE	POST	DIFFERENCE (+/-)
Problem-Solving Confidence (66/33/11)	27	12	-15
Approach-Avoidance Style (96/48/16)	32	17	-15
Personal Control (30/15/5)	12	7	-5
Total (192/96/32)	71	36	-35

“Julie” was similar to the last two participants, as she had taken all of her classes F2F except one in the past two semesters. As a full-time student, Julie is bored with online classes as content presented in class is redundant to what she read to prepare for the online session. However, she enjoyed online breakout sessions where she collaborated with peers. In approaching a problem, Julie interacted first with the instructor if needed, secondly peers, then content, and finally the learning environment. Table 14 gives Julie's pre-/post-test PSI scores.

Table 14

Summary of Participant – Julie (FP4)

FACTOR (Possible Score/Half-Score/Low-Score)	PRE	POST	DIFFERENCE (+/-)
Problem-Solving Confidence (66/33/11)	16	11	-5
Approach-Avoidance Style (96/48/16)	41	41	0
Personal Control (30/15/5)	15	5	-10
Total (192/96/32)	72	57	-15

“Ken disliked” online courses for different reasons than Julie. Ken did not like taking online classes because he participated in them from home. He thought the comfort and amenities of his home had too many distractions to pay attention to class. As a full-time student, Ken had taken three courses online and six face-to-face over his three semesters in the graduate program. When solving a problem, Ken typically engaged with peers first, secondly with the content, then the learning environment third, and the instructor last. A listing of pre-/post-test PSI scores for Ken appear in Table 15.

Table 15

Summary of Participant – Ken (FP5)

FACTOR (Possible Score/Half-Score/Low-Score)	PRE	POST	DIFFERENCE (+/-)
Problem-Solving Confidence (66/33/11)	35	14	-21
Approach-Avoidance Style (96/48/16)	42	23	-19
Personal Control (30/15/5)	24	16	-8
Total (192/96/32)	101	53	-48

Unlike the distractions Ken expressed, “Laurie” would multi-task during the online course due to her familiarity with the content from previous undergraduate courses. She had taken only one class online and four face-to-face as a full-time student in the graduate program. With two semesters completed, Laurie thought she did better in face-to-face courses because she could interact with the instructor when she had questions. Also, Laurie believed sitting in the classroom forced her to actively participate in the class. Content is what Laurie interacted with first when attempting to solve a problem. She then used, in order, the instructor, her peers, and then the learning environment. Table 15 provides the pre-/post-test PSI scores for Laurie.

Table 16

Summary of Participant – Laurie (FP6)

FACTOR (Possible Score/Half-Score/Low-Score)	PRE	POST	DIFFERENCE (+/-)
Problem-Solving Confidence (66/33/11)	15	19	+4
Approach-Avoidance Style (96/48/16)	39	36	-3
Personal Control (30/15/5)	16	21	+5
Total (192/96/32)	70	76	+6

The final participant reviewed in this synopsis is “Mike.” Mike refused to take any classes online in the graduate program and had taken all five of his courses face-to-face over the previous two semesters. As a full-time student, Mike preferred F2F as he liked the person-to-person interactions and admitted to avoiding online classes. He also indicated the priority of his problem-solving interactions changed depending on his location. For example, when in class he would first ask a peer, then the instructor, then used the content, and lastly engaged in the learning environment itself. Below in Table 17 are the pre-/post-test scores for Mike.

Table 17

Summary of Participant – Mike (FP7)

FACTOR (Possible Score/Half-Score/Low-Score)	PRE	POST	DIFFERENCE (+/-)
Problem-Solving Confidence (66/33/11)	16	17	-1
Approach-Avoidance Style (96/48/16)	24	25	+1
Personal Control (30/15/5)	14	9	-5
Total (192/96/32)	54	51	-3

The presented synopsis of each participant and his or her perceptions and preferences provide context to the findings presented in the next section.

Results PSI and Interviews

The framework of a grounded theory study, such as this one, is designed in a manner to elicit rich data for analysis. In analyzing the data of a study, like the presented one, it is hoped that meanings surfaced from the data to become an emergent theory (Charmaz, 2014; Strauss & Corbin, 2008; Glaser, 1998). Grounded theorist scholars utilize the term “theory” for their discoveries though what they have really found is an explanation, idea, or concept (Charmaz, 2014; Creswell, 2013; Strauss & Corbin, 2008; Glaser, 1998). The emergent theory, which resulted in the creation of a new model, describes how instructional design students used an input-output styled decision-making process when attempting to solve a class-based problem. The findings from the analysis of data in this study proposed that problem solving was an iterative process established by the student based on internal (to self) actions, which may or may not result in external actions. The student participants viewed interactions within the context of problem solving interactions as mechanisms to assist in problem solving as needed. These interaction patterns resulted from the initial internal process where the students evaluated the learning environment and determined problem-type and problem-urgency. They then made decisions to interact given their ability to problem-solve. These discoveries resulted in the creation of a new model describing how instructional design students resolve problems in a learning environment.

An additional aspect that resulted from the analysis is a personal learning environment or PLE. Many interviewees discussed the use of personal research, reviewing content, or speaking with peers or the instructor, but not always during the student’s time in the classroom setting. These actions and decisions transpired outside of the previously operationalized term for educational setting. These self-directed actions happened in places like a basement to a family

home or the library, thus defining a PLE. Even though the term, personal learning environment, was not a direct statement made by participants, this was where many of the problem solving decisions and interactions occurred. This discovery re-defined the term “learning environment” to encompass more than just academic institution references, but also personal ones. Given how participants discussed use of interactions to solve class-based problems it was evident students utilized an environment of their own to perpetuate these interactions and solutions.

The analysis of the interviews and PSI pre and post-test scores resulted in the creation of a central or main category titled *Problem Solving in Multiple Learning Environments*, which describes the general process used by students to solve problems related to class work. Five interrelated sub-categories worked together to comprise this central category; a.) *Acknowledging the Learning Environment*, b.) *Evaluating Problem-Type*, c.) *Prioritizing Problem Urgency*, d.) *Reflecting on Mediating Variables*, and e.) *Selecting Interaction Patterns*. Each respective sub-category also included representative information on dimensions and attributes.

The following sections provide details of each of the noted sub-categories that comprise the emergent theory of the input-output decision making process. As stated previously in chapter 3, the theory (or explanation) emerges from the systematic method of collecting and analyzing data (Corbin & Strauss, 2008). The findings reported in the next section begin with a brief overview of the Problem Solving in Multiple Learning Environments process. Then presentation of the five interrelated sub-categories in conjunction with participant responses are next. Within these five sub-categories, the dimensions and attributes of each are elaborated. Explanation of the findings in this order permitted a more logical flow of information rather than reporting the data based on the research questions. Rationale for this format stems from the ability to develop a more concise picture of the input-output decision-making process from the data. Presenting

data based on the research questions diminishes the meaning within the findings and as a whole (Glaser, 1998). However, the final section of this chapter provides alignment of findings to the research questions.

The report of these findings first illustrates how students were *Acknowledging the Learning Environment* when attempting to solve problems. Next, the section *Evaluating the Problem Types* outlines the various problems students seek to have resolved when dealing with team-based coursework. Then, explained next, is a description of *Prioritizing Problem Urgency* to help define its relation to resolving a problem. *Reflecting on Mediating Variables* discusses the nature of an individual's problem-solving capabilities and its impact on *Selecting Interaction Patterns*, elaborated as the final interconnected sub-category. The findings will conclude by returning to discussion of the central category Problem Solving in Multiple Learning Environments.

As students take the sum of their decisions in tandem with their problem-solving capacity they determine the priority of their interactions. Through one or more of these interactions, the student renders a conclusion on the issue closing the process of "Problem Solving in Multiple Learning Environments." This explanation will facilitate comprehension of the interrelated nature of the five categories to solving educational-based problems described below.

The explanation of each sub-category utilizes participant quotes to assist in elaborating upon the emergent theory of the input-output decision-making process. Phrases and words such as "the majority", "mainly", or "many" will refer to elements conveyed by 9 to 13 participants. Words such as "several" or "some" refer to concepts expressed by 5 to 8 participants. While the word "few" and the phrase "in the minority" refer to elements conveyed by 4 or fewer participants.

Acknowledging the Learning Environment

While participants described and elaborated upon experiences within learning environments, they either discussed them based on preference or in conjunction with selected interactions. Several denoted they were a visual learner or they preferred a F2F environment over online, making the first sub-category of these findings apparent.

Cuing, reacting, and comprehending in learning environments. A few participants described verbal cuing or a habit of observing or giving signals with their bodies, usually their face in F2F settings. These were some of the tangible expressions of participants acknowledging their learning environment. Participants were seeking comprehension or demonstrating comprehension through their noted preferences and actions in a specified learning environment. Participants presented this in describing how they interacted in learning environments while some discussed engaging in a preferred learning environment.

In response to an inquiry on collaborative discussions, Carla (OP3) indicated, “Yeah and I think I probably said this before, but I just enjoy talking either face-to-face or where I can at least get verbal or nonverbal cues from people.” Whereas Adam (OP1) stated, “I prefer face-to-face classes in the sense that I like being able to see the instructor and ask questions.” Greg (FP1) echoed a similar comment, “I would definitely choose face-to-face more because I feel like I have that leisure to joke around with the professor and I can see their reaction.” F2F participant Helen (FP2) admitted, “I constantly give non-verbal cues. Nodding, smiling, strong eye contact.”

These descriptions demonstrate a fundamental desire to not only gain comprehension through the learning environment, but a preference for the environment in which the participants perceive they are able to gain the comprehension they are seeking. Participants also associated their preferences to a desire to observe reactions of others within the environment. For example,

cuing to express agreement or confusion were actions participants wanted to observe. As for interactions within the environment by the participant, responses also expressed preferences and comparisons presenting the next sub-category.

Interacting and engaging in learning environments. Several answers elaborated on how the participant involved himself or herself in his or her environment. Again, each participant described either a preference or a comparison of the environments when sharing how he or she engaged in the environment. Ivana (FP3) in particular pointed out her level of interaction given the learning environment:

For some reason I feel like I interact more face-to-face. I'm not sure why. I tend to raise my hand more. I tend to ask more questions. I still go see my professors after class, or I still send emails. In that aspect it was still pretty much the same [with respect to online vs. F2F], but as far as me being active I feel like I'm more interactive face-to-face.

Notice Ivana discussed a preference for engaging F2F using her physical self. She only associated the use of email as holding an equal level of interaction between the two environments. However, Ivana clearly expressed more methods for engagement with the F2F environment over online. Laurie (FP6) also shared a similar perspective when she said, "I just usually do better if it is face-to-face too because I interact. I raise my hand, I answer questions, I ask questions, and I actively participate and sitting in the classroom forces me to do that." Likewise, Ken (FP5) explained, "I feel like there's more activity, I do more stuff when I'm actually face-to-face with a professor instead of being in an online course." Faye (OP6) stated, "I enjoy the face-to-face. Seeing people and watching body language." However she also made a comment to her online preference as an introvert, "What I enjoy about online is I feel like introverts and extroverts are [more equal] . . . The playing field has been leveled."

These latter statements echo Ivana's comments in that participants discuss a preference for an environment in conjunction to interactions. All statements address a quantitative comparison of engaging more in his or her F2F environment over the online one. Like Faye's comment from above, Greg (FP1) also discussed the equality of engagement and interaction by comparing the two environments:

I feel like since you can see a professor you can see how more engaged they are which makes me happier to be there. When we're on a computer screen they're trying to have equality for all the students to make sure everyone is on the same page and I feel like sometimes online that can be hard because you can't see their faces or confusion. For example, I had a class today face-to-face. When I was confused about something the professor immediately look at me and said, '*Can I help you?*' Right there they would stop, make adjustments that needed to be done, but on an online class I feel like that's not capable at all.

Greg's position was that the online environment slowed the progress of the overall class because it was not always evident whether a student was struggling in class. He highlighted an example that explained why he thought F2F had immediacy in resolving moments of student confusion using visual cues. Also, Greg and Faye both re-addressed the notion that there was a link between cues and interactions within environments, but that online could be an equalizer, if not a method of suppressing the amount of engagement by students and even instructor. Similarly, Julie (FP4), who has taken only one online course, discussed her lack of engagement in this environment:

I guess for online class [it] is different, because the only time I would really interact with my professors, is if I raised my hand because I was participating or something. Online for

me, I just feel like I'm listening and unless something is really . . . I feel passionate about something or it really got me and I just feel like I need to say something about it, that's really my only time I'm interactive with my professors.

These participants saw interacting in the online environment as less engaging and interactive when compared to face-to-face environments. F2F was seen as more dynamic from an interaction standpoint whereas online was viewed as more one dimensional and static. A final aspect, noted in the minority, was rationale for selecting an online educational setting, leading to the next sub-category stemming from Acknowledging the Learning Environment.

Choosing online learning environments. Participant discussions under the two previous sub-categories both acknowledged preferences and choices for learning environments with many participants sharing a preference for F2F environments over online. Reasons ranged from the use of visual cues, the ability to react to the instructor, and the amount of opportunities to interact and engage in the environment. Only a few participants noted that online was more of a preference due to life dynamics and distance. As Faye (OP6) shared, "Online works for me from a convenience standpoint." On the other hand, Adam (OP1) discussed efficiency:

I don't particularly enjoy doing that stuff [attending class] online, but it's simply more efficient. When I look at things like okay well do I drive an hour to class or do I go downstairs to the basement and fire up the computer. It saves a lot of time in my personal life which is the reason I gear towards more online classes.

Here again Faye and Adam denoted preferences. Both stated convenience, though Faye explicitly indicated a preference for being online because it was convenient. Adam acknowledged the efficiency of being online for class because it saved time in travel, which is an indirect statement about convenience. Adam also acknowledged a personal space where he

attended class online, his basement. Participants provided insight into these learning environments when sharing thoughts about their interactions for solving problems. This idea of one's ability to determine the location of learning leads to the next sub-category of creating personal learning environments.

Creating personal learning environments. The final discussion on acknowledging learning environments comes from an indirect perspective provided by the participants of a third learning environment. When participants discussed interacting with environments to solve problems they noted research using the Internet, reading or reviewing content, and sending e-mails. These activities happened outside of the online and F2F learning environments. This indicated the participants had an additional learning environment, one of their own creation.

As Faye (OP6) explained:

I do my best to problem solve on my own with material. We have our books, and we have our recordings, and we have Googling, and we have Adobe site, and there's many, many ways to try. I just try to sit at my little computer by myself, figure it out. Then you reach the point where you are screaming. Then I will ask the instructor for assistance.

Faye expressed an exhaustive method of self-resolve and that the instructor was a last resort, which was similar to a process Mike (FP7) described:

What I'll usually do is do research on my own. I will ask a professor, or I will ask fellow students. Whichever is closest at the time. If we're in class, and I have a problem, I have a peer sitting next to me, and we're working on a class exercise, I'll ask them, or I'll ask the professor. If I'm at home a lot of times I will do search engine. Watch videos on YouTube on how to do things.

Faye and Mike both discussed a sequence to how they go about solving a problem. Both indicated that they preferred to start the process of solving a problem with their own resources and research. Each also recognized secondary lines of assistance or variation to seeking assistance. Faye discussed that she sought out the professor if her own efforts did not yield an answer, but only at what appeared to be a point of frustration. Mike on the other hand acknowledged that he would do his own research, but resolution seemed more based on location and proximity. Similarly, Laurie (FP6) echoed aspects from the descriptions provided by both Faye and Mike when she discussed her approach to solving problems:

Usually I try to solve it first on my own. I go my route and then when I don't understand usually I will text somebody and be like, *'Hey, are you having the same problem?'* If they are like, *'Yeah'* usually from here you know it's like, *'Did you talk to the professor yet?'*

'No.'

'I'm in the area so I will go do it and let you know,' stuff like that but usually since I do have friends in the classes and stuff like that, usually I will text other people and see what they found first because it's a lot harder to get in with the professor more than it is your peers.

Laurie's process deviated from Faye and Mike's based on priority of interactions. Though Laurie started out trying to resolve the issue herself, she moved to her peers next for affirmation of her struggle prior to engaging the instructor. Something also to note here is that Laurie did not seek to have her peer address the problem from a solution standpoint. Laurie only wanted to know if the peer experienced the same issue she had and whether or not the peer had sought assistance from the instructor. As evidenced through these quotes, these novice instructional

design students focused little on the environment, but more so on the engagement and interactions they performed in conjunction with a class. When problem solving, these students conversed less about the environment and more about the task. However, non-class based environments were inferred through the participants discussing interactions they used to solve problems. For example, texting a classmate or e-mailing the professor while at coffee shop on a Sunday.

These students established personal learning environments by proxy of completing work for their class. This defined a nomadic aspect to learning environments outside of the academic constructs. In summary, environments appeared to be a backdrop to how participants solved problems. Another aspect that factored into the resolution of a problem was the problem itself and the types of problem the participant perceived. The following section shares participant perspectives on the type of problems he or she encountered, detailing the second of the five interrelated categories, Evaluating the Problem Type.

Evaluating the Problem Type

Problem types reported by these graduate students varied given whether the participant was focusing on something that was problematic only to him or her or whether it was also problematic to his or her team. Based on the content of the interviews, specific terms surfaced that defined subcategories within this process of evaluating the problem type. The dominant subcategories with several respondents were *Clarifying* and *Explaining*. Whereas *Lacking in Communication* was a less prevalent sub-category derived from a few respondents. In looking at problem types and the learning environment, these subcategories also had direct and indirect relationships. As summarized above, the student acknowledged his or her learning environment in conjunction to the problem type and level of urgency for solving the problem through

interaction patterns. This is why both acknowledging the learning environment and evaluating problem types were seen as distinct, but interrelated.

Clarifying. The most common problem type described by several participants was seeking clarification. Clarifying requests may have been for something an individual participant wanted to know for him or herself or the clarification may have been associated with the project the participant was working on with his or her team. The interaction type selected as the main priority for clarifying was the instructor.

Mike (FP7) commented that his asking questions to the instructor during office hours was for clarification. “Clarification for the team/individual. It was something I was individually working on but it was for the team project.” Beth (OP2) indicated a similar statement, “I rarely ask the professors any questions except if there was a real [need for] clarification.” Devon (OP4) also shared her approach to gaining assistance, “I contacted him [the instructor] individually twice about the task analysis, just getting more clarification.” Ivana (FP3) viewed the instructor as the individual who could clarify a point when she was “really having a problem.” She asserted, “I feel like the first thing I do when I’m really having a problem, I go talk to the instructor, and see if they can help clarify anything or help with insight on anything.”

All of these participants shared the notion that the instructor was the individual who could most help them with their current problem. All participants sought clarity to an issue that was specific to the work they were performing in conjunction to their team project, such as a due date or formatting of an assignment. Much like an earlier statement from Faye as she discussed how she interacted within learning environments to problem solve, these responses reflected an idea that the instructor was the authority who could resolve a problem or provide final say. Participants sought clarification due to either exhausting all other methods for resolution to the

problem or their belief that only the instructor could provide the needed clarification. While the terms “clarifying” and “explaining” may appear similar in content, they are differentiated in that participants seeking explanations did not always resolve their problem through using the instructor.

Explaining. Several participants discussed explaining in context of course concepts that affected project tasks. These explanations were not just between participant and instructor, but also with peers and/or the client. Laurie (FP6) talked about locating instructional design terms to use in conversation with her team, “I’ll skim through the book and find them a word so that it’s more pinpointed when I’m trying to explain it instead of all over the place.” An equal amount of respondents denoted that they sought explanations as opposed to giving them. Participants cited both peers and the instructor for providing explanations. Julie (FP4) utilized the online classroom environment to request explanations from peers, “I’ve typed [in the chat box] in the person’s name and said ‘*Oh, could you explain that to me?*’ and they’ll explain it right back there in the chat [box].” She also discussed how she and her team re-grouped on a project and needed to share this with the client, “We have to come up with a new game plan and we have to explain this to them [the client] again.” On the other hand Evan (OP5) sought explanations from peers he considered to be knowledgeable on the topic:

Or, if it was a really [hard] question, I’d either turn to, I had a couple of students that I felt knew things. . . Whether it was in email or in class, but usually I would try to find some kind of supplemental material that might help me figure it out and then I’d start looking for an expert.

Both Julie and Evan presented circumstances where they identified peers as authorities or experts for explaining a concept related to the class. This differed from clarification as

participants were seeking guidance on how to accomplish a task from the instructor, not comprehending an idea presented in the course materials. However, other participants still sought the guidance of the instructor for explanations, even if they asked a classmate. Devon (OP4) noted she and her team received instructor explanations during a meeting time established outside of the online classroom, “He just waited until we had our [online] group meeting on Tuesday at 9:00 to just explain that [task analysis].” She followed up this account with requests for additional explanation, “I asked [the instructor] to explain a little better. At the same time is when I emailed “Erin” and asked her about if she could give me an example of the three-column chart.”

This example demonstrates the desire of the participant to gather more than one resource to assist in gaining comprehension. In addition, there is evidence that study respondents have a need for closure to explanations. Beth (OP2) vocalized appreciation for how the instructor was a sounding board for ensuring an explanation was understood, “He’ll rephrase stuff [questions] to make sure you know that either he’s asking the questions correctly, [or] if we understand something or, [he will say] *‘Oh, let me explain it a different way.’* Adam (OP1) also mentioned the instructor’s efforts to ensure understanding, “He’ll re-clarify or re-explain himself.”

Participants needed explanations to elaborate upon concepts related to the course and in performing work for their clients. Explanations did not come only from the instructor as participants noted peers whom demonstrated comprehension were also acceptable for providing explanations. At times, participants would gather input from both instructor and peers simultaneously. In contrast, participants seeking clarification wanted confirmation from only the instructor and the request for clarification related to more administrative aspects of performing individual work. A factor that affected gaining clarity or an explanation was communication,

specifically the lack of it from the instructor. The following details the relation of this issue to the process of evaluating the problem type. .

Lacking in communication. Several participants described one of two forms of communication problems where the perception of communication was that it was lacking. The first was team communications and the second was instructor communication. “For the most part, for my team, it has been lacking communication,” said Greg (FP1). “Communication is key, but it’s not always key. It’s not always there,” explained Julie (FP4) as she described a struggle she had throughout the semester with her team. Carla (OP3) pointed out the problem of attempting to coordinate team meetings:

I’d say there has just been some communication issue[s]. Just trying to contact either one person or multiple people, just trying to figure out what’s going on. I guess some people in my group don’t always check their . . . email, so it’s more like re-checking back in with people and just making sure that my correspondences was received, or if not, they were just taking their time getting back to me.

Here participants expressed the value of communication and the need for it, while acknowledging its disparity when working with their teams. However, while recognizing the need for communication within a team, participants were even more vocal about the desire to have discourse with the instructor. More so respondents expressed how the lack of instructor feedback affected work or their ability to solve problems.

“That’s been one issue, the lack of feedback from [the instructor]. . . We have yet to receive the graded quiz from halfway through [the semester],” noted Faye (OP6). “Like I said just timely feedback [from the instructor] hindered it [problem-solving] a bit,” stated Devon (OP4). Or as Helen (FP2) explained, “It [a project task] got done and I reviewed it. Again, we

don't have any, we have very little feedback. Even though we turned it in, we don't know if it's right or not.”

Themes of team and instructor communication surfaced as issues of deficiency. With respect to teams lacking communication, it was perceived as a hindrance to work being moved forward by the team, not just by the individual as part of a team. The same held true for instructor feedback, teams sought affirmation of having done work correctly to signify closure to a part of the assignment. Through this process of evaluating the problem type, the students began to determine the urgency of a problem and the need to prioritize the order in which problems would be solved. This separate but interrelated aspect discussed in conjunction to communication issues, leads to the third interrelated sub-category, Prioritizing Problem Urgency.

Prioritizing Problem Urgency

Participants articulated two types of time-sensitive triggers, which prompted them to move to different problem-solving methods, resulted in their inability to move forward on a task or resulted in their inability to achieve deadlines. An inability to move a task or the project forward was circumstantial and variables influencing this aspect were dynamics of the team, the client, the instructor or a combination of these variables. For example, Laurie (FP6) discussed the need to consult the professor about team and project management concerns, “We tried managing it on our own, then we tried seeking help from the instructor, and then we tried managing it on our own some more because that didn't work out so well.”

Laurie expressed a problem that persisted and needed continuous attention due to it being unresolved. Not only this but she also outlined efforts that the team put forward in an attempt to resolve the issue. Though Laurie did not elaborate from a perspective of urgency, she more directly discussed a circumstance of trying to keep a project moving forward. However, Helen

(FP2) talked about timelines and the need to consult the instructor prior to addressing an issue with the client:

I had to ask the client which training they wanted completed because due to time constraints we were not able to do both of what they wanted but first I had to ask [the instructor] if that was okay for me to ask [the client] or if we were required to do both trainings.

Helen's concern was about the general timeline of achieving the project goals and not about keeping momentum with it. She also demonstrates the interplay of needing clarity from the instructor before she and her team could move the project forward. On the other hand, Greg (FP1) discussed an issue with his teammates, meeting deadlines and the amount of work that needed to be completed:

When I came back [from the conference] and I asked them, '*What did I miss?*' They tell me, Oh I didn't miss so much, I didn't miss anything. Then we have a prototype due, a flow chart due and also we have to storyboard and things like that. They didn't keep up with the timeline to know that this is what needs to be done.

Greg's urgency stemmed from the need to have his team complete multiple project tasks that appeared to be out of synch with an established timeline. Greg indirectly expressed the loss of momentum in achieving deadlines as a group given the lack of attention his teammates placed on the tasks and associated due dates. Though Greg focused on the deadlines at hand, he did not focus on resolution. However, other participants expressed seeking assistance when deadlines were looming, as Carla (OP3) stated:

If I am in a time crunch and e-mailing the professor was my last-ditch effort, it just depends on where I am deadline wise. If it's really close to the deadline and there's not

really a chance for me to get an answer before the deadline, then it's not really worth it. I guess it just depends on where I am in the process of completing something, and where I am in problem solving.

Carla acknowledged she may not have enough time to gain a meaningful response from the instructor if she waited too long to seek assistance. She also expressed that the instructor was the last resort to gaining an answer and that her timeframe for completing work influenced how she approached a problem and even how she approached the instructor. Adam (OP1) shared two situations where he would go to the instructor for assistance:

I go to the instructors in one of two situations. The first situation I'll go to an instructor with a problem is when I know it's time sensitive data. In other words, I recognize that something has to be done in three days and if I wait until the third day to try and figure it out and I can't figure it out, that's too short of a time period. That's not enough lead-time. [The second reason] I'll go is if I can't even think of an option [of what] to do. At the point when I've exhausted all other resources is when I'll go to the professor.

Adam defines his interactions with instructor based on deadlines for tasks and for assistance when his own methods for problem solving are spent. Similar to Adam, Devon (OP4) also commented that she used the instructor with respect to deadlines and using the instructor to guide her as the due date drew near:

It's not like I will sit there and struggle and struggle and 24 hours before a project is due or 24 hours before the class and I'm still not understanding, do I then go contact them? I know where my limit is where I'm not going to figure this out, I'm going to need some type of assistance and then I would go contact the instructor.

These comments from Adam and Devon highlight the main types of problem urgency, moving work forward and meeting deadlines. These two participants also discussed the need to solve the problem in context to timeliness and a method for resolution, usually by personal effort or seeking help from the instructor. Though problem urgency appeared to be a minimal component of the overall category of Problem Solving in Multiple Learning Environments, this variable needs consideration especially when determining a solution to a problem. Novice instructional design students recognized urgency and methods for resolving issues affecting deadlines and moving work forward. As students acknowledged the type and timeliness of an issue, and the environmental factors at time of problem, they also accounted for their capacity to address the presented need, bringing into focus the fourth interrelated sub-category, Reflecting on Mediating Variables.

Reflecting on Mediating Variables

In this study, Problem-Solving Inventory (PSI) scores quantified the mediating variable that drives learner's problem-solving approaches. As noted prior, this mediating variable has three constructs: Problem-Solving Confidence, Approach-Avoidance Style, and Personal Control. Combining the three produces the overall PSI score (Heppner, 1988). The lower a score the more apt the learner perceives his or her capacity on a specific construct or in overall problem solving (Heppner, 1988). All PSI scores for individual participants and a summary of the total sample's scores were shared under the Sample and Participant Characteristics section of this chapter.

To bring this sub-category into the fold of the Problem-Solving for Multiple Learning Environments process, the PSI scores were only a visual representation of the mediating variable and cannot explain all actions or decisions made, they can only represent the perception of the

participant's ability to problem-solve. However, participants, when asked about problem solving, innately reflected on their capacity for problem solving using Heppner's three constructs in conjunction with making decisions in a learning environment. Some respondents discussed just one of the constructs, such as problem-solving confidence, where others framed circumstances that took into consideration two of the constructs. In addition, participants explained an interrelated aspect to paired constructs:

Sometimes if something would happen or if I had an idea, I would keep it to myself because I was like, '*I don't know if it's going to be good enough.*' But now I just feel like it's worth a try to give a solution, even if it's the best solution or worst solution. That's what makes me want to approach it more. [Ivana – FP3]

Here Ivana expressed hesitancy and a lack of confidence in her own ideas and how those, in turn, made her avoid speaking up to her team and client. However, she continued on to explain that she has gotten to the point of actually sharing her thoughts and that in doing so it made her want approach more problems. Unlike Ivana, Adam demonstrates confidence in how he approaches problem solving:

I don't avoid problems. I like problems. I treat them as an opportunity for me to grow. If it's something that I already know how to do then it's really not much of a problem it just take the time to solve it. If it's something I don't know how to do, that, to me, is an opportunity to learn to do something better or more. [Adam – OP1]

Both Ivana and Adam expressed elements of problem-solving confidence and an approach-avoidance style. The contrast between these two statements was that Ivana shared her feelings of self-doubt and hesitancy to approach solving a problem due to the lacking of knowing if her solution was acceptable, while Adam embraced the challenge of the problem as a way to

build confidence. However, Ivana concluded her thoughts more like Adam. She came around to the idea that it was worthwhile to make an effort to resolve a problem even with her uncertainty, which increased her likelihood of approaching the challenge.

Looking at responses that focus on a specific construct, Evan and Greg are firm in their belief that they can solve a problem:

It's one thing to be confident if you really don't have anything to support it. You can be confident but really not know anything. The experiences that I had before helps me with this. I think that's why I feel more confident to solve these problems. [Evan – OP5]

Evan backed up his ability to solve problems by establishing that he had prior experiences that allowed him to be confident in stating he could solve an instructional design problem. Evan also indicated that it is possible to be confident without having any relatable experiences to support being able to solve problems. Greg's statement of his own confidence as a problem solver exemplified Evan's comment:

I don't want to seem cocky but I'm confident, I know what I'm talking about, I know what I'm doing. I do know I'm real educated, I feel comfortable to talk to the client, get the information across and ask the questions I need to ask while also getting a response and not making a fool of myself. So far the problems, we just been working together as a team as much as we can, looking for outside sources to try to also help implement [and] answer if we can't figure out about them ourselves. [Greg – FP1]

Evan validated his confidence by denoting his prior experiences were the reason he could solve problems. Greg, on the other hand definitively stated characteristics of himself that comprised his confidence. Another construct that stood independently, but interrelated to the

other two was the capacity for personal control. Respondents also shared circumstances where they acknowledged issues with controlling their emotions as a hindrance to resolving problems:

I guess one of my biggest things that I tried to do is that if I recognize that there is a problem in my face and I'm upset, that if I have the ability to step back for a few minutes and get control over myself emotionally before I try . . . Who can think when they're emotionally charged? Can you? Especially not clearly and especially not in a complex way. You can think one minded, one path, one direction. You can make some really bad judgment calls when you do that. [Mike – FP7]

Mike demonstrated a capacity for realizing his own actions could negatively influence the solution to the problem. Likewise, Laurie explained how her expectations of performance could affect her team's ability to solve project problems:

It's not just me being picky. I understand that I hold myself on a level that's a lot higher than most people perform at. I understand that sometimes I expect that out of my group mates and it's kind of a lot for them. I've been told that a couple times this semester already, and I ease off, but we're not [still] not even meeting minimum. [Laurie – FP6]

Laurie and Mike both saw themselves as obstacles to achieving resolution, but both were self-aware of these facets and both vocalized efforts to minimizing these issues. Mike discussed an emotional aspect of needing to manage himself so that he can focus on solving the problem. On the hand, Laurie spoke to needing to ease off on her expectations of her teammates to keep the project moving. Both Mike and Laurie attempted to control themselves in an attempt to reduce compounding the problem by becoming part of the problem themselves. However, not all circumstances that affected personal control were manifested by the participant, some situations had external factors:

[Getting] Very little feedback from our professor, quite honestly. That's frustrated us a little bit but we've reached the conclusion that we probably know what we're doing and that he's going to get involved if there's a real problem or if a client complains about us.

[Faye OP6]

Faye found the lack of instructor interaction to be trying to her and her team. Yet, for the slight annoyance, the team appeared able to move forward by concluding that the professor was only going to intervene as needed. In summary, participants, when asked, reflected on their awareness of how they problem solved. They acknowledged that for problem solving to occur they needed to be confident, have control of themselves and be willing to approach the challenge. These three factors, though discussed independently or paired, also comprise the constructs of the PSI used in this study. The combination of the three factors provide the totality of an individual's perceived problem-solving capacity (Heppner, 1988). These elaborations helped to establish that the students were thinking about their capacity for solving problems and weighing aspects of themselves as part of the problem-solving process. Even for the descriptions slanting toward one construct over another, respondents reflected on these perspectives and their impact on problem solving.

As respondents discussed how they problem solved some explained their total approach or reflected on a series of interactions they would take to resolve a problem. These statements revealed that students reflect first about a problem and then determine a pattern of interactions, which the following section outlines as the fifth, and final interrelated sub-category within the primary category Problem Solving in Multiple Learning Environment, that of Selecting Interaction Patterns.

Selecting Interaction Patterns

Throughout this study, the resolution to problems occurred through interactions that respondents discussed. Some participants revealed a pattern to their actions where certain interactions had a higher priority than others for assisting in solving the problem. Both online and F2F users, in the majority, indicated content was the first thing with which they interacted when attempting to solve a problem related to their graduate instructional design class. However when not thinking specifically about the classroom environment, participants spoke first of their own efforts to resolve problems. Evan's (OP5) explanation of how he interacted and solved a problem echoed the approach of several other participants:

The first thing I usually do is just step back and look at the situation and say, *'Okay, well what's the real problem here? What are my options?'* Then I start measuring them out, *'Okay, this is probably my best option, let me try that first.'* Then if that doesn't work I'll do this and this. I can't say there's a standard hierarchy other than to not instantly react but to really step back and take measure first.

Evan's description highlighted that he is constantly weighing the best option to make first when solving a problem and that his interactions vary given his evaluation of the circumstance. However, Evan also expressed that he may need to have multiple interactions to resolve the problem. Like Evan, Greg (FP1) had a similar process, which he described as follows:

For me, problem solving is really about me having the information available and me going to get that [information]. Whether that be by looking up on the internet, writing stuff down, writing my thoughts down so that I can know what the solution needs to be and what the questions I need to ask my professor or instructor, or even team member those questions, that way I can figure out how I want to see this.

Adam, Ivana, and Carla also indicated a need to comprehend the problem first. “Yeah, breaking those problems down into steps is something that has to be done but still, that’s not done before you assess the problem. You have to understand what the issue is,” shared Adam (OP1). Ivana (FP3) recounted a similar approach, “I like to first thoroughly know the problem. Then I like to research about it, get more insight on it.” Carla (OP3), an online participant shared, “I think that I normally try to problem solve something on my own before going to the professor. Yeah, just trying to figure out something on my own and then reaching out as needed.” Mike (FP7) discussed that he would “first evaluate what the problem is” while Beth (OP2) explained priority based on concentric circles. “[What] I visualize is like a concentric circles. What the professor says is in the middle more whereas I mentioned like looking at YouTube videos for Multimedia [a class]. That’s one of those outer circles [I use first].”

Interaction patterns all appeared to start at an internal decision-making point with each participant as exemplified above. The majority of respondents clearly indicated a need to assess a problem and resources prior to moving forward with actually resolving the circumstance. The interactions in the beginning appeared to be more for internal edification and resolution as each participant discussed his or her own research, not the use of something within the classroom environment. On the other hand, Devon (OP4) described her interaction preferences for problem solving by explaining the influence of the online classroom environment:

Doing online courses I think tends to make you have to have better problem-solving skills than in class because you’re on your own. Sometimes you don’t get those responses right away from the instructor, so you have to try and figure things out yourself. I taught myself to go out and find materials. With the online program, the whole program being online, I’ve noticed that I use more online tools to try and solve any type of problem that

I have with the classwork or anything. I usually try and do that on my own first, before I contact the professor.

Devon clearly viewed her educational circumstances as the reason she developed her problem solving skills, tuning into the autonomous nature of the online learning environment. To the contrary, Ken (FP5) found being in a face-to-face environment a collaborative method for quickly resolving a problem. He identified problem solving from a more action-based stance describing his prioritization for seeking resolution:

Well first I just go to one of my peers. Let's say we have to finish something in Articulate or Captivate, I just go up to peers and see how they're doing it and if I get in trouble with something [in Articulate or Captivate] then I ask them to see if they know how to do it. If they don't then I actually go to the professor.

Neither participant, Devon or Ken, indicated a negative element to using their environments to support problem solving. They both expressed ways in which the environment influenced the approach they selected to resolving the issue at hand. However, participants in the majority sought to use content first before their learning environment when solving problems as organized in Table 18. Notably, online participants were unanimous in this decision whereas F2F participants, in the majority held the same view. F2F participants also denoted peers and the instructor as possible first priority interactions for resolving problems.

Table 18

Prioritization of Interaction Types for Solving Problem Totals (n=13)

Interaction Type	Uses 1 st	Uses 2 nd	Uses 3 rd	Uses 4 th
Instructor	1	7	0	5
Peer	2	2	7	2
Content	10	1	2	0
Learning Environment	0	3	4	6

One definitive result of this study is that student prioritized the educational setting as the lowest priority when making decisions about how to solve an instructional design problem. Participants unanimously prioritized this last out of the four interaction types associated to the educational setting. Yet, participants still considered their environment as a source to resolving a need as evidenced by Devon and Ken's accounts from above and also Evan's (OP5) explanation:

It depends on what it is. If it's something where maybe I just don't understand something I'm reading, I'm going to look for another resource first and try and understand it that way. Mainly because ... [how do] you know those people [are up] at midnight? I want to know if I have a question. I want to know the answer now.

Here Evan indicates an aspect of his environment, time of day as opposed to location, whereas Devon and Ken actually discuss a direct environment, their classroom setting. Both are considerations to resolving a problem, but are not viewed as the only attribute that will resolve the problem, it is just a factor that the participant must consider as they solve his or her problem.

The analysis of these five interrelated categories of Acknowledging the Learning Environment, Evaluating the Problem Type, Prioritizing Problem Urgency, Reflecting on Mediating Variables, and Selecting Interaction Patterns leads to the concluding section of the

findings on this research and brings the reader back to the central category defined at the start of the section, Problem Solving in Multiple Learning Environments.

Problem Solving in Multiple Learning Environments

The sum of these five interrelated categories comprises a decision-making process that the researcher calls *Problem Solving in Multiple Learning Environments*. This model was developed using methodological triangulation of the data collected from the three interviews and the PSI pre and post-survey scores. As introduced earlier in this section, participants described problem solving from an iterative stance of internal or individual steps that, as needed, were supported by external steps. Instructional design students tend to evaluate the type of problem and then its level of urgency. They also considered the environment they were in when they evaluated these two aspects of the problem. Then, given these considerations, the individual used his or her perceived capacity for problem solving to make a decision about the interactions they used to resolve the issue at hand.

Participants outlined interaction patterns as needed, but based on the interplay of the problem-type and problem-urgency. Interaction types and patterns of interaction used were generally discussed and associated to solving problems. Out of all interaction types, the learning environment appeared only minimally related to problem solving. The educational setting was not necessarily where the problem remained. Students took problems outside of the educational classroom setting, whether online or F2F, and placed them into a personal learning environment they created.

The researcher designed Figure 3 to illustrate the Problem Solving in Multiple Learning Environment Process. View this basic input-output decision-making process as iterative. First, a student assessed the type of problem he or she encountered and its level of urgency. Then the

student would factor his or her environment, such as location, time of day, and accessibility to additional resources. These external aspects were evaluated against the individual student's perceived capacity for problem solving, which was derived from the PSI inventory. The combination of all of these elements helped the student derive a decision of how to resolve the presented problem. The outcome of that decision was an interaction, such as with course content or a classmate (peer). A pattern of interactions resulted when a student could not solve the

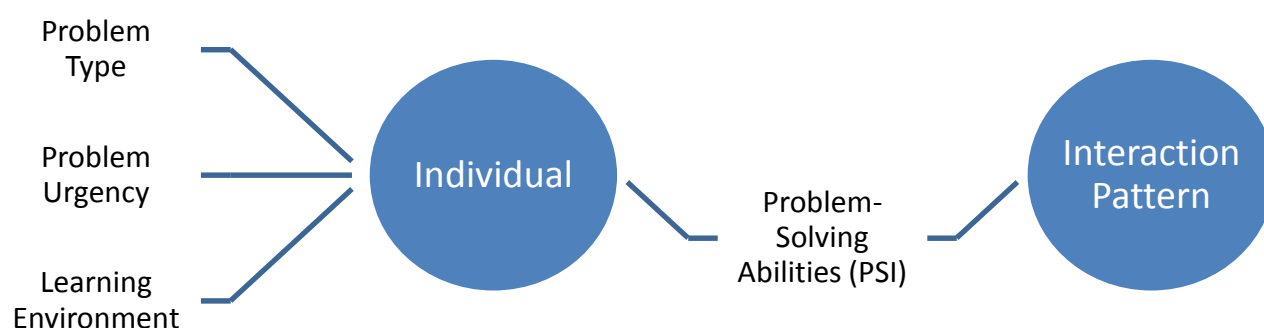


Figure 3. Problem solving in multiple learning environments process.

problem through the first interaction. Priority was given to the interaction type (e.g., self-research, course content, instructor, peer, etc.) based on what the student believed would resolve the problem the quickest. This process occurred each time students evaluated a circumstance associated with their coursework and whether they viewed the issue as one in need of being resolved. This process appeared to play out for all matters or problems both individual to the learner and team-based. The basis of the process did not factor priority or urgency, as these facets were a part of the evaluative process to determining next steps. Interaction patterns and the priority of interactions to resolve a problem aligned to both the student's perceived ability to problem-solve and the evaluation of the learning environment, problem-type, and its urgency.

The pattern of interactions was also viewed as dynamic given that the other aspects of the problem-solving process can shift as well.

An example of this shift occurred when a student may have determined a need for clarification on how to approach completing a task for the project. The deadline was a few weeks out for the task; therefore, the perception of urgency was minimal. In addition, the student determined these aspects at home, away from the learning environment, while reviewing responsibilities for the project. In addition, the student had a strong perception of his or her ability for problem solving given a low PSI score. With these factors, he or she chose to first utilize the class content to determine if the individual could resolve the problem. If the student resolved his or her own issues through this effort then the process stopped, but with an unmet resolution, reapplying the entire process did not always happen, unless one of the input aspect's dimensions had changed. The products of the process were the interaction types students exhausted, as needed, to resolve their problem.

The discussion of these findings presented in the preceding pages, sought first to explain the nature of the data collected and categorize that data based on the participants' comments. Grounded theory analysis, in both qualitative and quantitative formats, provided the platform from which the presented categories and terms emerged. As the intent of grounded theory research is to gain comprehension through a discovered explanation, aligning this content to the study questions can fragment the holistic picture of the described theory's input-output decision-making process. However, that does not infer an inability to address the research questions. Having analyzed the Problem Solving Inventory Scores and interview responses of the participants in this study, the research now positions the findings of the study against the original research questions.

Findings by Research Questions

The overarching inquiry presented in the study was: *As novice graduate instructional design students describe how they problem-solve, what interactions do they refer to given the learning environment?* Five specific queries on the how and what of interactions and problem solving, given the learning environment, elaborated the initial inquiry. The following summary of findings aligns and answers each of the five research questions.

Throughout the interviews, participants in the study minimally discussed association of their interactions in relation to problem solving with a given learning environment. More so participants discussed problem solving and interactions based on a personal process or method they described as evidenced by their own statements. This sheds light on research questions 1 and 2:

RQ1: How does a novice graduate instructional design student describe how they problem-solve in an online learning environment?

RQ2: How does a novice graduate instructional design student describe how they problem-solve in a face-to-face learning environment?

Ivana, a face-to-face (F2F) participant, stated, “As far as problem solving goes for whatever, I feel like I'm pretty much the same. I like to first thoroughly know the problem.” Another F2F participant, Julie, also commented on her process being static, “I just feel like my problem solving, it goes with me everywhere. I don't change it up when I'm in a group, it stays the same.” Evan, an online participant, denoted, “I kind of approach problem solving to everything the same way.” Adam, another online participant, shared, “I always assess the problem first. I try and figure out what in the world is my biggest issue.” Mike, another F2F participant, also discussed his general method:

That's how I approach problem solving in general. I tend to ask, "What's happening? Let's sit down and think about all the reasons why this is happening. Let's ask why. As many times as we can. Try and figure out why." Get to the root of the problem or the cause or the roots. Then try and take it from there. Now that we've established why, let's see what we can do to fix the why.

Whether online or face-to-face respondents utilized a self-defined set method for approaching and solving problems. Interactions they selected as part of that process did not necessarily start within the educational setting. As presented above, several participants recounted an initial first step where they assessed the issue at hand and/or used resources not necessarily associated to the learning environment itself. These findings reflect the line of inquiry in research questions 3 and 4 where the majority of participants discussed interactions they used when solving problems:

RQ3: What interactions do novice graduate instructional design student describe when problem solving in an online learning environment?

RQ4: What interactions do novice graduate instructional design student describe when problem solving in a face-to-face learning environment?

As Faye conveyed: "I do my best to problem solve on my own with material. We have our books, and we have our recordings, and we have Googling, and we have Adobe site, and there's many, many ways to try." Faye expressed use of her own methods for interacting with technology, such as a website and with course content, such as a book. She also asserted that she had multiple options for attempting to solve a problem. Similarly, Greg discussed his process as an interaction of reflection and personal research prior to engaging with the instructor or his teammates:

For me, problem solving is really about me having the information available and me going to get that [information], whether that be by looking up on the internet, writing stuff down, writing my thoughts down so that I can know what the solution needs to be and what the questions I need to ask my professor or instructor, or even team member those questions, that way I can figure out how I want to see this.

Ivana also had a need to comprehend the problem first. “I like to first thoroughly know the problem. Then I like to research about it, get more insight on it.” Carla, an online participant stated, “I think that I normally try to problem solve something on my own before going to the professor. Yeah, just trying to figure out something on my own and then reaching out as needed.”

Here again a process was expressed, but included within are types of interactions that the participant saw as relevant to helping him or her resolve the problem at hand. As respondents explained how they solved a problem, a few shared thoughts about their environment and how it played a part in determining a resolution. Only three of the 13 participants addressed their response with other details that related to the learning environment. Leaving the fifth research question with limited support from these findings:

RQ5: How do the descriptions of problem solving and the interaction types expressed by novice graduate instructional design students in an online learning environment compare to novice graduate instructional design students in a face-to-face environment?

Mike, an individual who avoided online classes, elaborated:

It would basically be, depending on the environment I'm in during the time that I have the problem. If I'm at home I tend to lean more toward trying to solve the problem myself first whether it be through books or material. Rereading the material. Reworking through it. Google searches for videos on how to's. Things like that. Something to better clarify an

explanation for me. When I'm in the classroom environment, I tend to lean more toward asking peers or professors for help before I'll go the other direction. Depending on the environment in which I'm in when I have the problem depends on which approach I take usually. Which [one] is more accessible or readily accessible, if that makes any sense?

Mike clearly factored his environment as part of how he approached solving a problem. His explanation presented the idea that he could problem solve in any type of environment and that he assessed the environment for how he could interact and resolve his issue. Like Mike, Devon made an effort to solve the problem first. As a participant who had taken all her classes online for this graduate program, Devon, expressed her thoughts on being a problem-solver from the perspective of her online experiences:

Doing online courses I think tends to make you have to have better problem-solving skills than in class because you're on your own. Sometimes you don't get those responses right away from your instructor, so you have to try and figure things out yourself. I taught myself to go out and find materials.

Faye echoed Devon's experience as she also participated in all of her graduate classes online. She explained, "That is probably when it's the most challenging to be a distant learner. You really would like to be able to sit down [face-to-face] with the instructor and go through it, a problem." Here again respondents expressed recognition of environment and preferences in relation to problem solving. Though learning environments play a role in attempting to solve a problem, they are one of three variables that are considered in tandem with a student's perception of how they problem-solve. The learner's decision determines the interaction type and selected pattern of interactions.

Conclusion

Problem solving and interactions within learning environments were decisions made by the student through a basic input-output process as illustrated by the researcher's original model shown in Figure 3. The learner first made internal determinations about key aspects of the issue. Then his or her perceived problem-solving abilities helped in choosing which interactions to use for resolving the problem. Students solved the problem entirely themselves with no external interactions or they chose a pattern of interaction. Students prioritized the pattern of their interactions based on what they thought would bring about the quickest resolution to their issue. The most common priority was through an individual's personal research. This was performed using resources not directly related to either online or F2F environments such as search engines or through content associated to another course.

To conclude this study, the researcher now must reflect on the nature and significance of these noted discoveries. The final chapter provides those reflections, further addressing the emergent theory, through discussing relevant theory, limitations of the study, and future opportunities for research.

CHAPTER 5

DISCUSSION

Introduction

From the start of this inquiry so many years ago, to the execution of this research, the focus has been on gaining insight to the complex nature of problem solving. Particular interest lies with knowing the what, how, and why of a novice instructional design student's approach to solving problems in his or her learning environment. Findings emerged from the rich set of data illuminating explanations for interactions toward problem solving and the interplay of those interactions with the novice instructional designer's perceived problem-solving capabilities. These foundational discoveries provided conclusions to sought-after answers, generated new questions, drew out limitations, and suggested opportunities for future research. All of which are discussed in this final chapter. To commence this discussion a brief recap of the purpose of the study and research design follows.

Summary of Study

Through review of the scholarly literature, there is minimal research on the meanings and relationships between types of learning environments, a learner's problem-solving abilities, and educational setting interaction types used in solving problems. In light of insufficient understanding about this noted interplay, this grounded theory study examined all three factors. The main exploratory element defined in this research was the perceived capabilities of an instructional design student to problem solve in various learning environments through his or her interactions associated with the educational setting. This study presented an opportunity to build an understanding of how and why students engage with their educational setting, which can inform curriculum development practices for supporting the growth of problem-solving

capabilities. From the larger academic sphere, the examination of the types of interactions provided foundational research for further understanding effective learning environments for skill development.

To revisit the performed study, this research centered on second-semester novice instructional design graduate students tasked with solving an instructional design-based problem for a real-world client. The population sample for this study was thirty-two graduate instructional design students enrolled in the Advanced Instructional Design course during the Summer (online) and Fall (face-to-face or F2F) semesters of 2014. Sixteen students participated in the study, six of the participants were part of the Online group and ten participants were part of the Face-to-Face (F2F) group. Two F2F individuals did not complete the post-study, and were removed from the analysis. Omission of a third F2F participant happened due to inaudible interview recordings. This brought the total to seven F2F ($n=7$) study participants and six Online ($n=6$) for a total sample of 13 ($n=13$).

A rich set of data for analysis emerged from a three-part semi-structured interview series and a pre-/post-survey on problem-solving capacities with the students. Using a four-phase qualitative and quantitative grounded theory approach to gather and analyze data, meanings emerged regarding novice instructional design students' problem-solving capabilities and their interactions with their learning environment(s). Close examination of the data revealed students determined which interaction(s), if any, they would take using a decision-making process known as the Problem Solving in Multiple Learning Environments explained and illustrated in Chapter 4, Figure 3. The following section addresses the significant findings and the researcher's reflection upon them.

Conclusion of Findings

This research expanded the current bodies of scholarly literature on the following fronts: (a) comparison of two learning environments based on a student's interactions with the educational settings for solving a problem, (b) incorporation of a mediating variable (problem-solving abilities) into the examination of educational settings, and (c) examination of the interchange between problem-solving abilities and student interactions within the learning environment. The most significant findings that resulted from this study were the students' use of the Problem-Solving in Multiple Learning Environments model created by this researcher to explain the students' decision-making process for problem solving. The model, as explained in Chapter 4 and as illustrated in Figure 3 supports the discovery of a consistent process used by participants to solve problems no matter the learning environment. Students based their interaction decisions and priority of their interactions on four key variables, one intrinsic to the learners (problem-solving ability) and three extrinsic to the learners (problem type, problem urgency, and the learning environment). Additionally, another substantial finding to this process was how the students created interaction patterns based on evaluation of the current problem they were addressing. Outside of course content, students considered their own self-directed efforts as the interactions that would most likely resolve their problem. A final noteworthy aspect to this process was the low priority of educational settings for resolving a problem, but more importantly, the inclusion of non-class learning environments. These non-academic settings are termed personal learning environments, which are more fully explained later in this chapter.

The implications of these findings are multifaceted and have the potential to serve not only the academic sphere, but also a professional one. To support the forthcoming explanation, the researcher designed a diagram to represent the two paths of research implications in Figure 4.



Figure 4. Paths of research implications.

Both spheres start with a nucleus focused on the novice instructional designer (the student) this nucleus expands into broader concentric circles. As each ring in the circle becomes larger, specificity and homogeneity diminish; the population becomes more general and heterogeneous. Looking specifically at the academic sphere, potential applications begin with the participating graduate instructional design students within the class and graduate program examined in this study. From there research implications can expand further to investigate applicability to other fields of study that deal with ill-structured (messy) problems, such as engineering or nursing. The next ring is even larger and more extensive, covering all students in any field of study. Likewise, the professional sphere would follow a similar path where the research implications start with the novice instructional designer and broaden out to the instructional design field itself, then to other professions dealing with complex problems, and then to all professions. Discussion of the key findings and the value of each in conjunction to these two noted paths highlight the significance of the research.

Problem Solving in Multiple Learning Environments

Based on the results of this study learners selected how to interact to solve their problem by acknowledging the type of learning environment, evaluating the problem-type and the level of urgency in solving the problem. Through reflection on these elements as well as factoring their capacity for solving problems, learners then did one of two things. They either solved the problem entirely themselves with no external interactions or determined a pattern of interactions. For example, reviewing course related content and then contacting a peer or asking a question in class. Instructional design students prioritized the pattern of their interactions based on a desire to resolve the issue quickly. Typically, the student's first priority was to use personal research efforts, where they leveraged personally found resources and/or reviewed materials associated with the course. The student rendered a conclusion based on one or more of these interactions, closing the decisions-based process labeled in this research as Problem Solving in Multiple Learning Environments, a model developed as an outcome of this research.

What is not evident from the participants' descriptions of their problem-solving approaches was if they were truly unique. Data was not collected that confirmed whether this approach was a general method of problem solving instructional design students used for all issues they encountered or if this method was only related to this specific class. Furthermore, this lends to inquiry on whether the approach to problem solving described was one that was prescriptive of more than instructional design students. Would this description fit any student dealing with an ill-structured problem like an engineering or nursing student? Perhaps this description relates to any academic context. In addition, it was unclear if this noted process was one that flowed over into the professional world. Would an expert instructional designer, nurse, or elementary educator describe the same type of approach?

Previous research indicated that perhaps a student's problem-solving approach was unique to the context of solving ill-structured problems. Hardre & Kollman (2013) looked at this specifically through examining how and why instructional design students interacted within the learning environment for problem-solving skill development. Interestingly their discoveries about intrinsic variables of the learner echoed the constructs of Heppner's (1983) Problem-Solving Inventory (PSI), though Hardre & Kollman (2013) did not use the PSI in their study. For example, these researchers described elements of risk-taking and stretching beyond what the student already knows, which are characteristics of problem-solving confidence and approach-avoidance style outlined by Heppner. In addition, participants in Hardre & Kollman's study (2013) were more willing to take critique and feedback, which aligns to personal control. Hardre & Kollman (2013) also noted greater self-efficacy, which aligned to the totality of perceived problem-solving abilities, also described by Heppner. Similarly, the descriptive statistics gathered from this dissertation study corroborated the discoveries of Hardre & Kollman (2013). The PSI scores for all participants, in this researcher's study, showed growth on either one, two, or all three constructs. The difference between this researcher's study and the Hardre & Kollman study (2013) was the focus on multiple facets of developing instructional design competence. These included aspects of pedagogical practice, instructional strategies, and the interplay of feedback. They also included the learners' perceptions of how they problem solve, which was one of the two main inquiries of this dissertation research. Though this dissertation research and Hardre & Kollman's 2013 study both looked at learning environments, this researcher comparatively investigated the type of learning environment as a location for learning, not for how the design of the environment fostered and supported learning.

Likewise, this dissertation research echoes findings from the work of Stepich & Ertmer (2009), who designed a conceptual model of instructional design expertise that focused on the process of how experts problem-find and problem-solve. As described by Stepich & Ertmer (2009), these two components and their respective sub-components are interrelated, but problem finding, they believed was the keystone to problem solving. Stepich & Ertmer (2009) posited this framework as a method for teaching and guiding novice instructional designers in an effort to accelerate the student's ability to achieve more expert-like skills. Stepich & Ertmer's conceptual model also embodies two distinct processes, one for problem finding and one for problem solving. However, their processes did not align with the Problem Solving in Multiple Learning Environments model explained in Chapter 4. This researcher's conceptual model, Figure 3 in Chapter 4, focused on how novice instructional designers actually attempt to solve problems given their educational environment, not whether they were mirroring expert instructional design skills.

The examined research draws out problem solving and skill development that perpetuates the competencies of the novice. In addition, this study expanded on previous research in that Hardre & Kollman (2013) and Stepich & Ertmer (2009) examined the learning environment only from the standpoint of facilitating and supporting learning. This research investigated the learning environment based on student interactions and whether the type of learning environment influenced how and with what students interacted. A new discussion point arises about the learning environment and the significant findings drawn from this research. The findings are two-fold and focus on the use of interactions within personal learning environments and the influence of learning environments.

Interactions and Learning Environments

This research did not account for the discussion of interactions beyond the classroom setting, whether online or F2F. However, it is realistic and natural for students to perform work for class and have problems arise outside of the academic learning environment. Much like the research performed by Kanuka (2011), where she asserted, no matter the learning environment, all interactions were interrelated. She derived this from evidence in her research that the interactions of the learners with the content, instructor, and their peers were interdependent within the educational setting (Kanuka, 2011). All interactions in Kanuka's study (2011) were viewed as distinct, but also having a common thread woven between all types of interactions (e.g. content, peers, instructor). The same can be noted for the research performed for this study. The focal point for participants in this researcher's study was the current problem that needed to be resolved. The participants factored not only their environment to determine an interaction, but they also considered their own resources or content from the course. The participants interwove the need to resolve a problem through all interaction types. To further support Kanuka's claims, participants in the dissertation study did not recognize the learning environment as just simply that, their environment. Participants in this research assessed their environment in more general terms, as in, "Where am I?" and "What time of day is it?" This allowed them to make decisions about how or with what they would interact with first to resolve their problem. This is another example of the distinction of environment, but its interconnected nature to the other interaction types such as content or peers.

The majority of participants in this research first solved problems with self-directed efforts that fell outside of the academic learning environment indicating the use of a personal learning environment (Atwell, 2007; EDUCAUSE, 2009). A personal learning environment or

PLE is a self-designed platform of resources and tools learners uses to guide their learning (Atwell, 2007; EDUCAUSE, 2009). Though the intent of this research was to compare just the online and F2F environment for interactions, data provided evidence of this third environment. Analysis of data indicated participants discussed this element more often for interacting than the defined academic environments, online or F2F. The key difference between interactions within an academic and personal environment was the aspect of the student performing his or her own research in an effort to solve the problem. This also lent to additional questions arising from this noted discovery. For example, do instructional design students and instructional design professionals have similar interaction patterns given their respective environments? This study examined the content, the instructor, peers, and the environment itself. Professionals also have the ability to examine content, consult with peers, and consider their environment. Differences between students and professionals come down to the element of authority, which for a professional could easily be his or her supervisor or even the client. Also, content would not be the books and materials of the class, but resources provided to or gathered by the professional.

Continuing this line of thinking and inquiry, a final point to make is that when the environment was not solely academic but became one that was personal, the participant discussed self-directed efforts. Hardre & Kollman (2013) and Stepich & Ertmer (2009) also discuss the self-directed efforts of expert instructional designers as they solve a problem. Relating this back to environment again, a possibility exists that interaction types are universal. Interaction patterns might be more universally labeled as resources (e.g., content, personal research), authority (e.g. instructor, client, boss), interpersonal (e.g. peers or work colleagues), and environment (e.g. class, PLE, work). This all then goes back to a previously stated query on

whether or not the presented model, Problem Solving in Multiple Environments Process, may also be more general.

The potential generality of the discovered process brings about the final significant finding from this research. The fact that participants did not prioritize the learning environment as anything but another factor in their equation of how to solve a problem supports the work of Clark (1994) and Richey, Klein, & Nelson (2004). Both studies advocate that the learning platform does not influence the capacity of the learner, but the methods used to teach content and materials do. These researchers argue that intrinsic variables, such as motivation or self-efficacy, are rarely examined and influence the capacity of a learner to acquire knowledge and skills through learning environments. This dissertation research buttresses the work of Clark (1994) and Richey et al. (2004) by designing a study that examined these aspects in a non-empirical method as these researchers suggested. Again, future research, discussed later in this chapter, lends itself to specificity or universality given the noted significant findings of this research.

A final implication to this presented study stems from the theoretical side. However, theoretical sensitivity, though established at the beginning of this research, has not addressed the theoretical standpoint(s) to this research's findings. The next section elaborates possible theoretical underpinnings to this study.

Evaluation of Theory

In re-examining the presented literature in this dissertation, the researcher's presented explanation for problem solving closely aligned to social cognitive theory (SCT). The interplay of the noted categories of Interaction Patterns, Reflecting on Mediating Variables, and Acknowledging the Learning Environment, in the decision making process from the study findings are also explained through Bandura's Model of Reciprocal Determinism which defines

the core concepts of SCT. SCT centers on the learner and promotes the idea of acquiring behavior and knowledge as dependent on the learner's self-efficacy, or belief in his or herself. Albert Bandura expanded the idea of social learning theory with his research of observational learning and modeling in a network of reciprocal interactions (Bandura, 1977). The decision making model designed by this researcher clearly aligns to the three constructs of Bandura's model: behavior, environment, and personal factors as depicted in Figure 5.

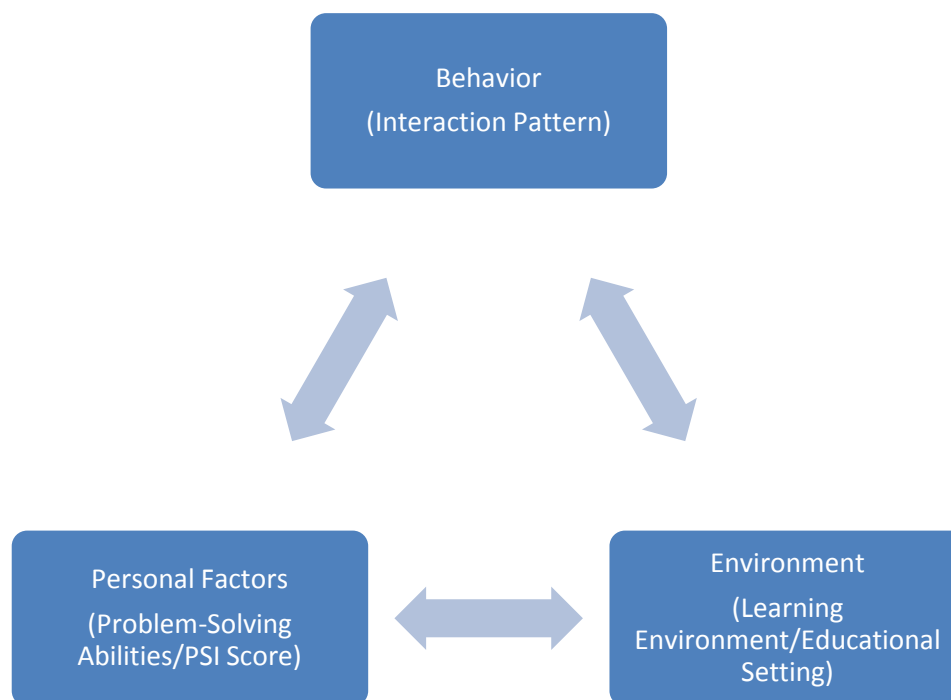


Figure 5. Bandura's model and problem solving process in multiple environments combined.

To elaborate further upon the relationship between Bandura's model and the findings of this study, behavior aligns to the interaction patterns of the learner. Likewise, personal factors and the problem-solving inventory, such as the dimension of problem-solving abilities are associated. Lastly, the environment lines up with the learning environment or educational setting.

Bandura posited that the environment, behaviors, and personal factors work together in a reciprocal network to influence behavior change in a regulated manner as opposed to a reactive or behaviorist manner (Bandura, 1986; Fletcher, 2005). Similarly, participants in this study

demonstrated regulation through the Problem Solving in Multiple Learning Environments process. The students decided how to interact or behave based on acknowledging the environment, recognizing the problem type, and prioritizing the sense of urgency, while also factoring their capacity for solving problems. The learners, subsequently affected by this resolution, incorporated the interaction as part of the decision-making process.

A final noteworthy aspect to discuss is Clark's (1994, 2001) inference that new theories will emerge by examining problem solving and technology in a metacognitive manner. He derives his stance from the current the lack of inductive and deductive research progressing prevailing theory and discourse in learning transfer. In this study, opportunities to reflect on the findings and develop meaning came from generating a detail-rich data set using grounded theory. However, as discussed, existing theory appears to align to these research findings even though the design of this study incorporated a more holistic view on the subject of problem solving, the use of technology, and mediating variables of the learner. The sum of these findings provides support to established scholarly work and future research both within the field of instructional design and to the general field of education. Addressed below are the implications, limitations, and recommendations for future research to conclude this chapter.

Implications for Practice

Educators and professional instructional designers may take interest in this research as it supports additional understanding on how a novice instructional designer builds a primary competency for use in the industry. For example, Stepich & Ertmer (2009) evolve the concept of the expert instructional designer's thinking processes. Comprehending and comparing the problem-solving decision process of novices to experts may result in determining effective strategies for imparting more expert-like skills to novice designers. Stepich & Ertmer also

suggest three core strategies for incorporation into pedagogical practice to hone problem-finding skills for the novice: accumulating experiences, indexing the accumulated experiences, and providing scaffolds such as instructional design models. The findings from this dissertation extend the idea of honing not only problem-finding capabilities, but also decision-making processes for resolving the problem. Thus, educators should look at ways in which novice instructional designers develop and shape how they solve the problems encountered in the educational setting.

Another consideration is self-efficacy acts as a catalyst or deterrent for novice instructional designers with respect to their problem-solving capabilities. Educators, in conjunction with teaching and guiding students on applying instructional design principles, may want to investigate teaching strategies bolstering self-efficacy. For example, validation or affirmation of applying concepts correctly.

Lastly, these findings explain a learning environment that extends beyond the classroom, whether online or traditional. As discovered in this research, personal learning environments take on an organic nature as students attempt to solve problems associated with the instructional design problem outside of the classroom. This lends to pedagogical inquiry supporting problem solving and decision-making that transcends all learning environments. In addition to the noted implications, there are manners in which this research was limited and therefore limited the ability to provide additional inferences. However, the presentation of these limitations will assist in shaping future research given the stated implications.

Limitations of Research

Inherently, grounded theory research suggests limitations from the design and implementation perspectives. However, it can also be limited with respect to inference and

validity. Discussions of these factors will help to identify and present opportunities for future research.

The design of the study, with respect to the interview process, had some shortcomings. For example, asking participants to describe their experiences in interacting with the educational setting and solving problems. Requests for a description of the participants' problem-solving processes or their approach to solving problems related to instructional design issues did not occur. This limited the yield of the data in discovering meaning and relationships between the learning environments, problem-solving abilities, and interaction types. Additionally, direct inquiry into participants ranking their perception of their own competency for problem solving did not happen. In analyzing the PSI scores, there was no ability to compare the quantitative findings with the qualitative results to determine differences and similarities within the participants' perception of themselves.

From the implementation side, heterogeneous groups and timing were two main limitations. Though all participants came from the same Advanced Instructional Design class, in the same master's degree program, the homogeneity of the group was weak. The study examined participants from both an online learning (during the Summer) and F2F (during the Fall) format. However, in the summer many of the participants had not taken any courses F2F in the graduate program. Additionally, one participant from the Fall had never taken a course online. In addition, some students are out-of-state or live at-a-distance so they must take all of their classes online. These aspects are limitations to the study since descriptions and experiences shared by the participants may have limited ability to provide comparative information.

Looking at timing, implementation of the study occurred during a 12-week summer semester and a 15-week fall semester. Though no participants indicated issues with having less

time or an advantage by having more time, having the same amount of time would have increased the overall homogeneity of the sample. There is no indication that having less or more time to perform the tasks of the course influenced problem-solving decisions, the learning environment, or any behaviors displayed.

A final design limitation was not examining learning effectiveness. However, the intent of the research was not to examine whether the competencies actually changed from an empirical perspective. The objective was to understand competency development in an educational setting.

A further restriction on this study is the limited aspects of grounded theory research in the sense of inference to a more generalizable population. However, when using grounded theory, weighing the amount of inference to the population from which the sample was drawn should be weighed by how strongly each case within the sample has a particular repetitive element (Creswell, 2013). The presented implications to this study denote potential value to both educators and practitioners due to the recurring themes discussed by participants. The inference may be limited, but the consistency of the responses would suggest further investigation on the subject for purposes of generalization.

Finally, limitations of validity with respect to the investigator stemmed from the potential for the researcher to weave her personal perspective into the study or insert desired outcomes into the findings. Positionality of the researcher and use of methodological and environmental triangulation and saturation methods as part of the grounded theory process validated the research. With the totality of this research presented along with its findings and implications, the researcher can now establish several possible veins for future research prior to concluding this chapter.

Recommendations for Future Research

Both the limitations of this study and the implementation and execution of this research present a number of opportunities for further investigation. Given the previous explanation about the academic and professional spheres as elaborated in Conclusion of Findings and Figure 4, the following recommendations support future research:

- **Longitudinal Research.** Over time and acquisition of more data points, researchers could investigate the trends and patterns of many students within the same course to determine repetitive aspects for inference to a bigger audience. For example, studying all students enrolled in the same Master's program. Additionally, performing longitudinal studies on students throughout their time in acquiring an instructional design degree allows for examination of how problem-solving competencies develop over time as opposed to how they develop in one course.
- **Learning Effectiveness.** To study levels of effectiveness, a move toward a mixed methods approach would assist in supporting current theory through empirical evidence, while allowing a qualitative strand to play a supporting role to a quantitative one. For example, determining the statistical significance of the Problem Solving Inventory (PSI) scores and then using qualitative artifacts to corroborate quantitative findings.
- **Skill Development.** The research of Stepich & Ertmer (2009) and Hardre & Kollman (2013) strongly encourages using metacognition to develop skills. They denote learners can more quickly identify problems when given opportunity to reflect on their own actions. Researching metacognitive practice in conjunction

with the model developed by this researcher, Problem Solving in Multiple Learning Environments, may assist in comprehending development of the decision-making process.

- **Alternate Environments.** Investigation only occurred in two educational settings for this research. Examining problem solving in all academic environments, including blended, flipped, traditional, and online classes, could help to derive understanding of problem solving as it interplays with each environment's factors. Also, a focus on personal learning environments (PLE) and how a student develops these could also lead to further comprehension of interactions and problem solving in educational settings.
- **Additional Populations.** Many other professions, besides instructional design, deal with ill-structured problems on a daily basis. For example, doctors, engineers, and chemists. It is uncertain if students within these professions develop competencies the same way as instructional design students. It is also unknown if the learning environments, mediating variables, or interactions within an educational setting derive the same problem-solving process in other fields of study.

Derived from the performed research and the presented interpretation of the findings these recommendations suggest both academic and professional implications and applications.

Conclusion

Instructional design educators face the multi-faceted task of shaping problem-solving proficiencies of novice instructional design students. Educational settings and established interaction types, and the student's ability to solve problems all influence problem solving of

instructional design challenges. Instructional design students leverage and shape their skills by examining the relationship of variables within each problem. This study provides foundational perspectives to comprehending the interchange between these dynamics. A noteworthy aspect of this presented study is the discovery of self-defined learning environments and a fifth interaction type for all learning environments: personal research.

The findings serve as an initial opportunity to evaluate how to utilize online and traditional educational settings to facilitate development of problem-solving abilities. In addition, the self-defined learning environment and fifth interaction type of personal research lend to further investigation. Before moving into more empirical and/or other inductive methods, this researcher recommends advancement of the grounded theory research to derive full meaning from the interplay of the educational setting, student mediating variables, and interaction types.

References

- Abdous, M., & Yen, C. (2010). A predictive study of learner satisfaction and outcomes in face-to-face, satellite broadcast, and live video-streaming learning environments. *Internet and Higher Education*, 13(4), 248-257. doi:10.1016/j.iheduc.2010.04.005
- Abrami, P. C., Bernard, R. M., Bures, E. M., Borokhovski, E., & Tamim, R. M. (2011). Interaction in distance education and online learning: Using evidence and theory to improve practice. *Journal of Computing in Higher Education*, 23(2-3), 82-103. doi:10.1007/s12528-011-9043-x
- Albrechtslund, A. (2007). Ethics and technology design. *Ethics and Information Technology*, 9(1), 63-72. doi:10.1007/s10676-006-9129-8
- Allen, I. E., & Seaman, J. (2013). *Grade Change: Tracking online education in the United States*. Retrieved from: <http://www.onlinelearningsurvey.com>
- Aman, R. R. (2009). *Improving student satisfaction and retention with online instruction through systematic faculty peer review of courses* (Doctoral dissertation). Retrieved from <http://ir.library.oregonstate.edu/>
- American Society for Training & Development. (2011, July). *ASTD's learning and development industry salary & compensation report, 2011* [Whitepaper]. Retrieved from ASTD: <http://www.astd.org>
- American Society for Training and Development. (2010). *Instructional systems design: Today and in the future*. Retrieved from <http://store.astd.org>
- Anderson, T., & Elloumi, F. (Eds.). (2004). *Theory and practice of online learning*. Athabasca, Canada: Athabasca University.

- Atwell, G. (2007). Personal learning environments - the future of eLearning? *eLearning Papers*, 2(1), 1-8. Retrieved from <http://www.elearningpapers.eu>
- Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice-Hall.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.
- Bandura, A. (1989, a). Human agency in social cognitive theory. *American Psychologist*, 44(9), 1175-1184.
- Bandura, A. (1989, b). Social cognitive theory. In R. Vasta (Series Ed.), *Annals of child development: Vol. 6. Six theories of child development*, (pp. 1-60). Greenwich, CT: JAI Press.
- Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. *Educational Psychologist*, 28(2), 117-148.
- Bandura, A. (1999). Social cognitive theory: An agentic perspective. *Asian Journal of Social Psychology*, 2(1), 21-41. doi:10.1111/1467-839X.00024
- Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology*, 52, 1-26. doi:10.1146/annurev.psych.52.1.1
- Bandura, A. (2001). Social cognitive theory of mass communication. *Media Psychology*, 3(3), 265-299. doi:10.1207/S1532785XMEP0303_03
- Bannan-Ritland, B. (1999). *Teaching instructional design: an action learning approach*. Retrieved from <http://it.coe.uga.edu/itforum/paper37/paper37.html>
- Bannan-Ritland, B. (2001). Teaching instructional design: An action learning approach. *Performance Improvement Quarterly*, 14(2), 37-52.

- Bannan-Ritland, B. (2003). The role of design in research: The integrative learning design framework. *Educational Researcher*, 32(1), 21-24. Retrieved from www.ethiopia-ed.net/images/1582511463.pdf
- Barrows, H. S., & Tamblyn, R. M. (1980). *Problem-based learning: An approach to medical education*. New York, NY: Springer.
- Beldarrain, Y. (2006). Distance education trends: Integrating new technologies to foster student interaction and collaboration. *Distance Education*, 27(2), 139-153.
- Bennett, S. (2010). Investigating strategies for using related cases to support design problem solving. *Education Technology Research and Development*, 58(4), 459-480.
doi:10.1007/s11423-009-9144-7
- Bernard, H. R. (2002). *Research methods in anthropology: Qualitative and quantitative approaches* (3rd ed.). Walnut Creek, CA: AltaMira Press.
- Bernard, R. M., Abrami, P. C., Borokhovski, E., Wade, C. A., Tamim, R. M., Surkes, M. A., & Bethel, E. C. (2009). A meta-analysis of three types of interaction treatments in distance education. *Review of Educational Research*, 79(3), 1243-1289.
doi:10.3102/003465430933384
- Bethel, E. C., & Bernard, R. M. (2010). Developments and trends in synthesizing diverse forms of evidence: Beyond comparisons between distance education and classroom instruction. *Distance Education*, 21(3), 231-256. doi:10.1080/01587919.2010.513950
- Bichelmeyer, B., Boling, E., & Gibbons, A. S. (2006). Instructional design and technology models: Their impact on research and teaching in instructional design and technology. In M. Orey, V.J. McClendon, R.M. Branch (Ed.), *Educational media and technology yearbook* (Vol. 31, pp. 33-73). Westport, CT: Libraries Unlimited.

- Boling, E., & Smith, K. (2010). *Intensive studio experience in a non-studio masters program: Student activities and thinking across levels of design*. Paper presented at the Design Research Society Conference, Montreal, Canada.
- Boling, E., & Smith, K. M. (2009). *Design tensions: Adapting a signature pedagogy into instructional design education*. Paper presented at the American Educational Research Association, San Diego, CA.
- Bourne, J., & Moore, J. C. (Eds.). (2005). *Elements of quality online education: Engaging communities, Volume 6 in the Sloan-C series*. Retrieved from <http://www.sloan-c.org>
- Brown, A., & Green, T. D. (2011). *The essentials of instructional design: Connecting fundamental principles with process and practice* (2nd ed.). Boston, MA: Pearson.
- Campbell, K., Schwier, R. A., & Kenny, F. R. (2005). Agency of the instructional designer: Moral coherence and transformative social practice. *Australasian Journal of Educational Technology*, 21(2), 242-262. Retrieved from <http://www.ascilite.org.au/ajet/ajet21/campbell.html>
- Campbell, K., Schwier, R. A., & Kenny, R. F. (2009). The critical, relational practice of instructional design in higher education: An emerging model of change agency. *Educational Technology Research and Development*, 57(5), 645-663.
doi:10.1007/s11423-007-9061-6
- Campbell, M., Gibson, W., Hall, A., Richards, D., & Callery, P. (2008). Online vs. face-to-face discussion in a web-based research methods course for postgraduate nursing students: A quasi-experimental study. *International Journal of Nursing Studies*, 45, 750-759.
doi:10.1016/j.ijnurstu.2006.12.011

- Carlidge, S., Gerity, B., & Eastmond, N. (1999). Utah State University Department of Instructional Technology Needs Assessment. Retrieved from <http://ocw.usu.edu/education/research-for-the-classroom-teacher/unit-8/needs.pdf>
- Cassarino, C. A. (2006). *The impact of problem-based learning on critical thinking and problem solving skills* (Doctoral dissertation). Available from Proquest.
- Cavanaugh, C., Gillan, K., Kromrey, J., Hess, M., & Blomeyer, R. (2004). *The effects of distance education on K-12 student outcomes: A meta-analysis*. Naperville, IL: Learning Point Associates.
- Charmaz, K. (1983). The grounded theory method: An explication and interpretation. In R. M. Emerson (Ed.), *Contemporary field research* (pp. 109-126). Boston, MA: Little, Brown.
- Charmaz, K. (2012, October). The power and potential of grounded theory. *Medical Sociology online*, 6(3). Retrieved from <http://www.medicalsociologyonline.org/>
- Charmaz, K. (2014). *Constructing grounded theory* (2nd ed.). Thousand Oaks, CA: SAGE.
- Chen, C. (2009). Promoting college students' knowledge acquisition and ill-structured problem solving: Web-based integration and procedure prompts. *Computers & Education*, 55, 292-303. doi:10.1016/j.compedu.2010.01.015
- Clark, R. E. (1983). Reconsidering research on learning from media. *Review of Educational Research*, 53(4), 445-459. doi:10.3102/00346543053004445
- Clark, R. E. (1994). Media will never influence learning. *Educational technology research & development*, 42(2), 21-29.
- Clark, R. E. (Ed.). (2001). *Learning from media: Arguments, analysis, and evidence*. Greenwich, CT: Information Age Publishing.

- Clark, R. E., & Salomon, G. (1986). Media in teaching. In M. Wittrock (Ed.), *Handbook of research on teaching* (3rd ed., pp. 464-478). New York: Macmillan.
- Compeau, D. R., & Higgins, C. A. (1995). Application of social cognitive theory for training for computer skills. *Information Systems Research*, 6(2), 118-143. doi:10.1287/isre.6.2.118
- Corbin, J. M., & Strauss, A. (2008). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (3rd ed.). Thousand Oaks, CA: Sage.
- Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches* (3rd ed.). Thousand Oaks, CA: SAGE.
- Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among five approaches* (3rd ed.). Thousand Oaks, CA: SAGE.
- Dabbagh, N., & Blijd, C. W. (2010). Students' Perceptions of their learning experiences in an authentic instructional design context. *The Interdisciplinary Journal of Problem-based Learning*, 4(1), 6-29. Retrieved from <http://docs.lib.purdue.edu/ijpbl/vol4/iss1/3>
- Dede, C. (1996). The evolution of distance education: Emerging technologies and distributed learning. *American Journal of Distance Education*, 10(2), 4-36.
- Demetriadis, S. N., Papadopoulos, P. M., Stamelos, I. G., & Fischer, F. (2007, September 12). The effect of scaffolding students' context-generating cognitive activity in technology-enhanced case-based learning. *Computers & Education*, 51, 939-954. doi:10.1016/j.compedu.2007.09.012
- Deyhle, D. L., Hess, Jr, G. A., & LeCompte, M. D. (1992). Approaching ethical issues for qualitative researchers in education. In M. D. LeCompte, & W. L. Millroy (Eds.), *The handbook of qualitative research in education* (pp. 597-641). San Diego, CA: Academic Press.

- DiCicco, J., & Lowell, D. (2009). *Facilitating discourse in asynchronous environments*.
Unpublished manuscript. Retrieved from www.dominiquelowell.info/wp-content/.../dicicco-lowell_finalproject.pdf
- Dick, W., Carey, L., & Carey, J. O. (2009). *The systematic design of instruction* (7th ed.). Upper Saddle River, NJ: Pearson.
- Duffy, T. M., & Jonassen, D. H. (Eds.). (1992). *Constructivism and the technology of instruction: A conversation*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- EDUCAUSE. (2009). *7 things you should know about Personal Learning Environments (PLE)* (ELI7049). Retrieved from EDUCASE:
<http://www.educause.edu/Resources/7ThingsYouShouldKnowAboutPerso/171521>
- Ertmer, P. A., & Cennamo, K. S. (1995). Teaching instructional design: An apprenticeship model. *Performance Improvement Quarterly*, 8(4), 43-58.
- Ertmer, P. A., Stepich, D. A., Flanagan, S., Kocaman-Karoglu, A., Reiner, C., Reyes, L., Santone, A. L., & Ushigusa, S. (2009). Impact of guidance on the problem-solving efforts of instructional design novices. *Performance Improvement Quarterly*, 21(4), 117-132.
doi:10.1002/piq.20041
- Ertmer, P. A., Stepich, D. A., York, C. S., Stickman, A., Wu, X., Zurek, S., & Goktas, Y. (2008). How instructional design experts use knowledge and experience to solve ill-structured problems. *Performance Improvement Quarterly*, 21(1), 17-42.
- Felder, R. M., & Silverman, L. K. (1988). Learning and teaching styles in engineering education. *Engineering Education*, 78(7), 674-681.

- Fletcher, K. M. (2005). *Evaluating an intervention to build online learning self-efficacy* (Doctoral dissertation, Walden University). Retrieved from www.pacrimcross.com/papers/FinalEIBOLS.pdf
- Ge, X., Chen, C., & Davis, K. A. (2005). Scaffolding novice instructional designers' problem-solving processes using question prompts in a web-based learning environment. *Journal of Educational Computing Research*, 33(2), 219-248.
- Glaser, B. G. (1998). *Doing grounded theory: Issues and discussions*. Mill Valley, CA: Sociology Press.
- Glaser, B. G., & Hon (2008). *Doing quantitative grounded theory*. Mill Valley, CA: Sociology Press.
- Glesne, C. (2011). *Becoming qualitative researchers: An introduction* (4th ed.). Boston, MA: Allyn & Bacon.
- Groenewald, T. (2004). A phenomenological research design illustrated. *International Journal of Qualitative Methods*, 3(1). Retrieved from http://www.ualberta.ca/~iiqm/backissues/3_1/pdf/groenewald.pdf
- Guion, L. A., Diehl, D. C., & McDonald, D. (2011). *Triangulation: Establishing the validity of qualitative studies* (FCS6014). Retrieved from <http://edis.ifas.ufl.edu/>
- Hardre, P., & Kollman, S. (2013). Dynamics of instructional and perceptual factors in instructional design competence development. *Journal of Learning Design*, 6(1). Retrieved from <https://www.jld.edu.au/article/view/46>
- Hardre, P. L., Ge, X., & Thomas, M. K. (2006). An investigation of development toward instructional design expertise. *Performance Improvement Quarterly*, 19(4), 63-90.

- Heckman, R., & Annabi, H. (2006). How the teacher's role changes in online case study discussion. *Journal of Information Systems Education*, 17(2), 141-150. Retrieved from <http://jise.org/Issues/17/V17N2P141-Abs.pdf>
- Helle, L., Tynjala, P., Olkinuora, E., & Lonka, K. (2007). 'Ain't nothin' like the real thing'. Motivation and study processes on a work-based project course in information systems design. *British Journal of Educational Psychology*, 77(2), 397-411.
doi:10.1348/000709906X105986
- Helle, L., Tynjala, P., & Olkinuora, E. (2006). Project-based learning in post-secondary education: Theory, practice and rubber sling shots. *Higher Education*, 51(2), 287-314.
Retrieved from <http://www.jstor.org/stable/29734978>
- Heppner, P. P. (1988). *The problem-solving inventory manual*. Palo Alto, CA: Consulting Psychologists Press.
- Heppner, P. P., & Baker, C. E. (1997). Applications of the problem solving inventory. *Measurement and Evaluation in Counseling and Development*, 29, 229-241.
- Heppner, P. P., & Lee, D. (2009). Problem-solving appraisal and psychological adjustment. In C. R. Snyder, & S. J. Lopez (Eds.), *Oxford handbook of positive psychology* (pp. 345-356). New York, NY: Oxford University Press.
- Heppner, P. P., & Petersen, C. H. (1981, August). *A personal problem-solving inventory*. Paper presented at the, Los Angeles, CA.
- Heppner, P. P., Witty, T. E., & Dixon, W. A. (2004). Problem-solving appraisal and human adjustment: A review of 20 years of research using the problem solving inventory. *The Counseling Psychologist*, 32(3), 344-428. doi:10.1177/0011000003262793

- Hernandez-Serrano, J. (2001). *Effects, meaning and learning processes regarding experts' stories and novice problem solving in an ill-structured problem-solving environment* (Doctoral dissertation). Retrieved from <http://www.etsd.psu.edu>
- Hew, K., & Cheung, W. (2010). Use of three-dimensional (3-D) immersive virtual worlds in K-12 and higher education settings: A review of the research. *British Journal of Educational Technology*, 41(1), 33-55. doi:10.1111/j.1467-8535.2008.00900.x
- Hodell, C. (2011). *ISD from the ground up: A no-nonsense approach to instructional design* (3rd ed.). Chelsa, MI: ASTD Press.
- Hung, W., Jonassen, D. H., & Liu, R. (2008). Problem-based learning. In J. M. Spector, J. G. Van Merriënboer, M. D. Merrill, & M. Driscoll (Eds.), *Handbook of research on educational communications and technology* (pp. 485-506). Mahwah, NJ: Erlbaum.
- Isaksen, S. G., Dorval, K. B., & Treffinger, D. J. (2011). *Creative approaches to problem solving: A framework for innovation and change* (3rd ed.). Thousand Oaks, CA: SAGE.
- Jensen, L. B., & Jankowski, N. W. (1991). *A handbook of qualitative methodologies for mass communication research*. New York, NY: Routledge.
- Johnson, S. D., Aragon, S. R., Shaik, N., & Palma-Rivas, N. (2000). Comparative analysis of learner satisfaction and learning outcomes in online and face-to-face learning environments. *Journal of Interactive Learning Research*, 11(1), 29-49.
- Jonassen, D., Davidson, M., Collins, M., Campbell, J., & Haag, B. B. (1995). Constructivism and computer-mediated communication in distance education. *American Journal of Distance Education*, 9(2), 7-26. Retrieved from <http://www.c3l.uni-oldenburg.de/cde/media/readings/jonassen95.pdf>

- Jonassen, D. H. (2008). Instructional design as design problem solving: An iterative process. *Educational Technology*, 48(3), 21-26. doi:10.1.1.162.1058
- Jonassen, D. H., & Hung, W. (2008). All problems are not equal: Implications for problem-based learning. *The Interdisciplinary Journal of Problem-based Learning*, 2(2), 6-28. Retrieved from <http://docs.lib.purdue.edu/ijpbl/vol2/iss2/4/>
- Jonassen, D., Previs, T., Christy, D., & Stavroulaki, E. (1999). Learning to solve problems on the web: Aggregate planning in a business management course. *Distance Education*, 20(1), 49-63.
- Julian, M. F., Kinzie, M. B., & Larsen, V. A. (2000). Compelling case experiences: Performance, practice, and application for emerging instructional designers. *Performance Improvement Quarterly*, 13(3), 164-201.
- Kanuka, H. (2011). Interaction and the online distance classroom: Do instructional methods effect the quality of interaction? *Journal of Computing in Higher Education*, 23(2), 143-156. doi:10.1007/s12528-011-9049-4
- Kapp, K. M., Phillips, T. L., & Wanner, J. H. (2002). A problem-based learning model for teaching the instructional design business acquisition process. *Performance Improvement Quarterly*, 15(1), 25-46.
- Kennedy, C. K., & Shaughnessy, M. F. (2008). Q&A with ed tech leaders: Interview with Allan Collins. *Educational Technology*, 48(3), 49-53. doi:10.1.162.1058
- Kenny, R. F., Bullen, M., & Loftus, J. (2006). Problem formulation and resolution in online problem-based learning. *International Review of Research in Open and Distance Learning*, 7(3), 1-20. Retrieved from <http://www.eric.ed.gov/PDFS/EJ806049.pdf>

- Kim, M. C., & Hannafin, M. J. (2011). Scaffolding problem solving in technology-enhanced learning environments (TELEs): Bridging research and theory with practice. *Computers & Education*, 56, 403-417. doi:10.1016/j.compedu.2010.08.024
- King, P. M., & Kitchener, K. S. (2004). Reflective judgment: Theory and research on the development of epistemic assumptions through adulthood. *Educational psychologist*, 39(1), 5-18.
- Kvale, S. (1996). *InterViews: An introduction to qualitative research interviewing*. Thousand Oaks, CA: SAGE.
- Larson, M. B. (2004). *Survey and case study analyses of the professional preparation of Instructional Design and Technology (IDT) graduates for different career environments* (Doctoral dissertation, Virginia Polytechnic Institute and State University). Retrieved from http://scholar.lib.vt.edu/theses/available/etd-10252004-171426/unrestricted/DissertationFinal10_04pdf.pdf
- Lattuca, L. R., & Stark, J. S. (2009). *Shaping the college curriculum: Academic plans in context* (2nd ed.). San Francisco, CA: Jossey-Bass.
- Lechner, T. R. (2010). *Preparing instructional designers for the realities of the business and industry workplace* (Unpublished doctoral dissertation). University of Georgia, Athens, GA.
- Lee, S., & Tsai, C. (2011). Students' perceptions of collaboration, self-regulated learning, and information seeking in the context of Internet-based learning and traditional learning. *Computers in Human Behavior*, 27, 905-914. <http://dx.doi.org/10.1016/j.chb.2010.11.016>
- Lindlof, T. R., & Taylor, B. C. (2011). *Qualitative communication research methods* (3rd ed.). Thousand Oaks, CA: SAGE.

- Luck, P., & Norton, B. (2005). *Problem based management learning - better online?*. Retrieved from <http://www.eurodl.org>
- Mack, N., Woodsong, C., MacQueen, K. M., Guest, G., & Namey, E. (2005). *Qualitative research methods: A data collector's field guide*. Retrieved from http://www.fhi.org/en/rh/pubs/booksreports/qrm_datacoll.htm
- Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2009). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies*. Retrieved from U.S. Department of Education: <http://www2.ed.gov/rschstat/eval/tech/evidence-based-practices/finalreport.pdf>
- Morian, J. E., & Lu, M. (1993). A Survey of Media and Instructional Technology Competencies Needed by business, industry, health professions, agencies, military trainers, and independent contractors in northern California. *Annual Proceedings of Selected Research and Development Presentations at the 1993 Convention of the Association for Educational Communications and Technology*, 719-730. Retrieved from <http://eric.ed.gov/PDFS/ED362188.pdf>
- Owen, W. F. (1984). Interpretive themes in relational communication. *Quarterly Journal of Speech*, 70(3), 274-287. doi:10.1080/00335638409383697
- Paechter, M., & Maier, B. (2010). Online or face-to-face? Students' experiences and preferences in e-learning. *Internet and Higher Education*, 13(4), 292-297. doi:10.1016/j.iheduc.2010.09.004
- Pajares, F. (1996). Self-efficacy beliefs in academic settings. *Review of Educational Research*, 66(4), 543-578. doi:10.3102/00346543066004543

- Patel, L. (2010). *2010 state of the industry report: Creating a world that works better*. Retrieved from American Society for Training and Development website: <http://store.astd.org>
- Patton, M. Q. (2002). *Qualitative research and evaluation methods* (3rd ed.). Thousand Oaks, CA: Sage.
- Pearson, J. (2006). Investigating ICT using problem-based learning in face-to-face and online learning environments. *Computers & Education*, 47(1), 56-73.
doi:10.1016/j.compedu.2004.09.001
- Popkewitz, T. S. (1998, Winter). Dewey, Vygotsky, and the social administration of the individual: Constructivist pedagogy as systems of ideas in historical spaces. *American Educational Research Journal*, 35(4), 535-570.
- Price, S. M. (2009). *How perceived cognitive style, metacognitive monitoring, and epistemic cognition indicate problem solving confidence* (Doctoral dissertation). Retrieved from <http://repository.lib.ncsu.edu/ir/bitstream/1840.16/5722/1/etd.pdf>
- Purzer, S. (2009). *Learning engineering in teams: Perspectives from two different learning theories*. Paper presented at the Research in Engineering Education Symposium, Palm Cove, QLD.
- Quinn, J. (1994). Connecting education and practice in an instructional design graduate program. *Educational Technology Research and Development*, 42(3), 71-82.
doi:10.1007/BF02298096
- Raelin, J. A. (2007). Toward an epistemology of practice. *Academy of management Learning & Education*, 6(4), 495-519.
- Reiser, R. A. (2001). A history of instructional design and technology: Part I: A history of instructional media. *Educational Technology, Research and Development*, 49(1), 53-64.

- Richey, R. C., Fields, D. C., & Foxon, M. (2001). *Instructional design competencies: The standards* (3 ed.). Syracuse, NY: ERIC Publications.
- Richey, R. C., Klein, J. D., & Nelson, W. A. (2004). Developmental research: Studies on instructional design and development. In *Handbook of research for educational communications and technology* (2, pp. 1099-1130). Retrieved from <http://www.aect.org/edtech/41.pdf>
- Roberts, R. M. (2011). *Best instrumental practices for distance education: A meta-analysis* (Doctoral dissertation, University of Nevada). Retrieved from http://www.robinroberts.net/Roberts_2011.pdf
- Ross, K. R. (1998). Blending authentic work projects and instructional assignments: An adaptation process. *Educational technology research and development*, 46(3), 67-79.
- Rothwell, W. J., & Kazanas, H. C. (2008). *Mastering the instructional design process: A systematic approach* (4 ed.). San Francisco, CA: Pfeiffer.
- Rounds, L. R., & Rappaport, B. A. (2008). The successful use of problem-based learning in an online nurse practitioner course. *Nursing Education Perspectives*, 29(1), 12-16
- Rowland, G., Parra, M. L., & Basnet, K. (1995). Educating instructional designers: Different methods for different outcomes. In B. Seels (Ed.), *Instructional design fundamentals: A reconsideration* (pp. 223-236). Englewood Cliffs, NJ: Educational Technology Publications.
- Savery, J. R., & Duffy, T. M. (1995). Problem based learning: An instructional model and its constructivist framework. *Educational Technology*, 35(5), 31-38.
- Seidman, I. (2013). *Interviewing as qualitative research: A guide for researchers in education and social sciences*. New York, NY: Teachers College Press.

- Shank, P. (2012, a). Cognitive effects of an authentic computer-supported, problem-based learning environment. *Instructional Science*, 30, 465-495.
- Shank, P. (2012, b). *Degree for eLearning professionals: What's needed?* Santa Rosa, CA: The eLearning Guild.
- Simon, S. D. (1999). *From neo-behaviorism to social constructivism?: The paradigmatic non-evolution of Albert Bandura* (Bachelor's thesis, Emory University). Retrieved from www.uky.edu/~eushe2/Pajares/simon.PDF
- Sims, R. C., & Koszalka, T. A. (2008). Competencies for the new-age instructional designer. In J. M. Spector, M. D. Merrill, J. Van Merriënboer, & M. P. Driscoll (Eds.), *Handbook of research on educational communications and technology* (3rd ed. (pp. 569-575). New York, NY: Lawrence Erlbaum Associates.
- Sitzmann, T., Kraiger, K., Stewart, D., & Wisher, R. (2006). The comparative effectiveness of web-based and classroom instruction: A meta-analysis. *Personnel Psychology*, 59(3), 623-664. doi:10.1111/j.1744-6570.2006.00049.x
- Stepich, D. A., & Ertmer, P. A. (2009). "Teaching" Instructional Design Expertise: Strategies to Support Students' Problem-Finding Skills. *Technology, Instruction, Cognition and Learning*, 7, 140-170.
- Stepich, D. A., Ertmer, P. A., & Lane, M. M. (2001). Problem-solving in a case-based course: Strategies for facilitating coached expertise. *Educational Technology research and development*, 49(3), 53-67. doi:10.1007/BF02504915
- Strauss, A., & Corbin, J. (1994). Grounded theory methodology: An overview. In N. K. Denzin, & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 273-285). Thousand Oaks, CA: Sage.

- Swan, K. (2003). Learning effectiveness: What the research tells us. In J. Bourne, & J. C. Moore (Eds.), *Elements of quality online education: Practice and direction* (pp. 13-45). Needham, MA: Sloan Center for Online Education.
- Swan, K. (2004). Learning online: Current research on issues of interface, teaching presence and learner characteristics. In J. Bourne, & J. C. Moore (Eds.), *Elements of quality online education, into the mainstream*. Needham, MA: Sloan Center for Online Education.
- The Quality Matters Higher Education Rubric: 2011-2013 [Rubric]. (2013). Unpublished instrument. Retrieved from www.qualitymatters.org
- Treffinger, D. J., Selby, E. C., & Isaksen, S. G. (2008). Understanding individual problem-solving style: A key to learning and applying creative problem-solving. *Learning and Individual Differences*, 18(4), 390-401. doi:10.1016/j.lindif.2007.11.007
- Tripp, S. D. (1994). How should instructional designers be educated? *Performance Improvement Quarterly*, 7(3), 116-126.
- Valatis, R. K., Sword, W. A., Jones, B., & Hodges, A. (2005). Problem-based learning online: Perceptions of health science students. *Advances in Health Sciences Education*, 10(3), 231-252. doi:10.1007/s10459-005-6705-3
- Van Gog, T., Ericsson, K. A., Rikers, R. M., & Paas, F. (2005). Instructional design for advanced learners: Establishing connections between the theoretical frameworks of cognitive load and deliberate practice. *Educational Technology Research and Development*, 53(3), 73-82.
- Van Kamm, A. (1996). *Existential foundations of psychology*. Pittsburgh: Duquesne University Press.

- Van Manen, M. (1990). *Researching lived experience: Human science for an action sensitive pedagogy*. Ontario, Canada: The State University of New York.
- Van Rooij, S. W. (2008). Scaffolding project-based learning with the project management body of knowledge (PMBOK). *Computers & Education*, 52(1), 210-219.
doi:10.1016/j.compedu.2008.07.012
- VonGlaserfeld, E. (1989). Cognition, construction of knowledge, and teaching. *Synthese*, 80(1), 121-140.
- Walker, D., & Myrick, F. (2006). Grounded theory: An exploration of process and procedure. *Qualitative Health Research*, 16(4), 547-559. doi:10.1177/1049732305285972
- Weegar, M. A., & Pacis, D. (2012, January). *A comparison of two theories of learning - Behaviorism and constructivism as applied to face-to-face and online learning*. Paper presented at the E-leader, Manila, Philippines.
- Wilson, B. G. (1995). *Situated instructional design: Blurring the distinctions between theory and practice, design and implementation, curriculum and instruction*. Paper presented at the Annual National Convention of the Association for Educational Communications and Technology (AECT), Anaheim, CA.
- Winn, W. D. (1995, February). *Advantages of theory-based curriculum in instructional technology*. Paper presented at the Annual Convention of the Association for Educational Communication and Technology, Anaheim, CA.
- Woods, D. R. (2007). *Preparing for PBL* (3rd ed.). Retrieved from
<http://www.chemeng.mcmaster.ca/innov1.htm>
- Woods, D. R., Hrymak, A. N., Marshall, R. R., Wood, P. E., Crowe, C. M., Hoffman, T. W., Wright, J. D., ... Bouchard, C. K. (1997). Developing problem solving skills: The

McMaster Problem Solving Program. *Journal of Engineering Education*, 86(2), 75-92.

Retrieved from <http://www.jee.org/1997/april/80.pdf>

Yusop, F. D., & Correia, A. (2012). The civic-minded instructional designers framework: An alternative approach to contemporary instructional designers' education in higher education. *British Journal of Educational Technology*, 43(2), 180-190.

Zimmerman, B. J. (1989). A social cognitive view of self-regulated academic learning. *Journal of Educational Psychology*, 8(3), 329-339.

Appendix A

The Problem Solving Inventory

P. Paul Heppner, Ph.D.

Directions: People respond to personal problems in different ways. The statements on this inventory deal with how people react to personal difficulties and problems in their day-to-day life. The term “problems” refers to personal problems that everyone experiences at times, such as depression, inability to get along with friends, choosing a vocation, or deciding whether to get a divorce. Please respond to the items as honestly as possible so as to most accurately portray how you handle such personal problems. Your responses should reflect what you actually do to solve problems, not how you think you should solve them. When you read an item, ask yourself: Do I ever behave this way? Please answer every item.

Read each statement and indicate the extent to which you agree or disagree with that statement, using the scale provided. Mark your responses by circling the number to the right of each statement.

1. Strongly Agree
2. Moderately Agree
3. Slightly Agree
4. Slightly Disagree
5. Moderately Disagree
6. Strongly Disagree

1. When a solution to a problem has failed, I do not examine why it didn't work.
2. When I am confronted with a complex problem, I don't take the time to develop a strategy for collecting information that will help define the nature of the problem.
3. When my first efforts to solve a problem fail, I become uneasy about my ability to handle the situation.
4. After I solve a problem, I do not analyze what went right and what went wrong.
5. I am usually able to think of creative and effective alternatives to my problems.
6. After following a course of action to solve a problem, I compare the actual outcome with the one I had anticipated.
7. When I have a problem, I think of as many possible ways to handle it as I can until I can't come up with any more ideas.
8. When confronted with a problem, I consistently examine my feelings to find out what is going on in a problem situation.
9. When confused about a problem, I don't clarify vague ideas or feeling by thinking of them in concrete terms.
10. I have the ability to solve most problems even though initially no solution is immediately apparent.
11. Many of the problems I face are too complex for me to solve
12. When solving a problem, I make decisions that I am happy with later.
13. When confronted with a problem, I tend to do the first thing that I can think of to solve it.
14. Sometimes I do not stop and take time to deal with my problems, but just kind of muddle ahead.
15. When considering solutions to a problem, I do not take the time to assess the potential success of each alternative.
16. When confronted with a problem, I stop and think about it before deciding on a next step.
17. I generally act on the first ideal that comes to mind in solving a problem.

18. When making a decision, I compare alternatives and weigh the consequences of one against the other.
19. When I make plans to solve a problem, I am almost certain that I can make them work.
20. I try to predict the result of a particular course of action.
21. When I try to think of possible solutions to a problem, I do not come up with very many alternatives.
22. When trying to solve a problem, one strategy I often use is to think of past problems that have been similar.
23. Given enough time and effort, I believe I can solve most problems that confront me.
24. When faced with a novel situation, I have confidence that I can handle problems that may arise.
25. Even though I work on a problem, sometimes I feel like I'm groping or wandering and not getting down to the real issue.
26. I make snap judgments and later regret them.
27. I trust my ability to solve new and difficult problems.
28. I use a systematic method to compare alternatives and make decisions.
29. When thinking of ways to handle a problem, I seldom combine ideas from various alternatives to arrive at a workable solution.
30. When faced with a problem, I seldom assess the external forces that may be contributing to the problem.
31. When confronted with a problem, I usually first survey the situation to determine the relevant information.
32. There are times when I become so emotionally charged that I can no longer see the alternatives for solving a particular problem.
33. After making a decision, the actual outcome is usually similar to what I had anticipated.
34. When confronted with a problem, I am unsure of whether I can handle the situation.
35. When I become aware of a problem, one of the first things I do is try to find out exactly what the problem is.

Appendix B

Proof of Permissions

Permission to use the Heppner PSI Instrument and to use INSTTECH.551: Advanced Instructional Design were obtained via e-mail. E-mails were edited to remove contact information.

Permission to use PSI Instrument in modified format

From: Heppner, Punccky
Sent: Monday, June 27, 2011 23:54
To: Robyn A. Defelice
Subject: RE: Thank you!

Hi Robyn,
 yes, your dissertation as you describe it below still sounds fine to me. All the best with your research. I look forward to hearing about your results. Punccky

From: Robyn Defelice
Sent: Thursday, January 02, 2014 9:56 AM
To: Heppner, Punccky
Subject: RE: Thank you!

Happy New Year Dr. Heppner!

I do hope this e-mail finds you doing quite well!

I am writing to you again about the status of my dissertation and where I am at - which is not exactly where I want to be, but the circumstances are temporary and that's always a plus!

I am pretty much where I was last time at this year (almost). I am currently re-writing my first three chapters to coincide with the new direction of my study. Instead of being quan-qual I am now just qual.

I wanted to touch base with you and make sure that I can indeed continue to use the PSI tool. In this design I am approaching from a inductive lens and a phenomenological approach. The PSI fits in still through the process of my interviews. I am seeking volunteers from each class learning environment (F2F and online respectively) to interview about their interactions with faculty, peers, content, and the environment itself. I am also inquiring to problem-solving in the context of those interactions. To help develop the questions for my interviews I wanted to use the PSI as a guide.

The participants will take the PSI prior to the first interview and also the final interview. I will use the results to generate some final interview questions to the participants. E.g., Why do you think you grew in your confidence to problem-solve? OR Have you realized that you now have more tendency to avoid problems? Do you attribute this to the team dynamics or to your learning environment?

If everything still sounds fine to you would you please confirm for me? If you have any additional questions or concerns I will be happy to address them for you.

Thank you for your time, it is appreciated!

Kindly,
Robyn

From: Heppner, Puncky
Sent: Monday, June 27, 2011 23:54
To: Robyn A. Defelice
Subject: RE: Per Request: Modification, Number of Participants, and Study Purpose

Hi Robyn,
 yes you can use the PSI in the way that you plan to modify it. It sounds like a very interesting study you are conducting, and I would be very interested in learning about the results after you complete the study.

I am attaching the PSI Form B in case you need it, scoring instructions, as well as a few articles that might be of interest to you.

All the best in your research,

Puncky

From: Robyn A. Defelice
Sent: Friday, June 17, 2011 7:56 AM
To: Heppner, Puncky
Subject: Per Request: Modification, Number of Participants, and Study Purpose

Dr. Heppner

Thank you for the reply and consideration of my study. Please find below responses to your request:

Modification to Instrument

Please find attached a scan of the front of the instrument that Dr. Kapp used. The only modification made is in the directions. We are asking graduate instructional design (ID) students to think of their problem-solving abilities in conjunction with creating a solution to an ID need, not their personal problem solving. As I am trying to replicate and expand Dr. Kapp's use of the instrument, I will be applying it to the same class he did, but comparing the scores of students from two semesters and two different learning formats (face-to-face and online).

Number of Participants

At the current moment there are 25 students registered for the course in the Fall. Dr. Kapp and I anticipate about the same amount or less for the Spring semester. Given that we are doing a pre-/post-test we estimate 50 total participants over both semesters and the need to make 100 copies of the instrument.

Purpose of Study

This is my draft problem/purpose statement: *For this study constructivism is applied to investigate instructional design graduate students awareness of their problem-solving skills in both a traditional classroom setting and online within a learning management system (Blackboard). This study examines the student's perception of their confidence prior to and immediately after solving an instructional design (ID) problem. A comparison of the traditional classroom students' versus the online students' perceptions will be analyzed to determine if one learning environment over another effects perceived confidence.*

Methodology

We will be using a mixed methods approach. The scores of the pre-/post-test will hopefully show a change (we anticipate one) in all three dimensions of problem solving. The qualitative learning logs that

students will journal in between the two tests will hopefully show acknowledgement of these dimensions and their growth within each (epiphanies and experiences).

Additional Resource

To get a stronger sense of what I am attempting to replicate and expand I have attached a copy of the article that Dr. Kapp wrote in 2002 and was published in Performance Quarterly. The figures, tables, and references are in separate documents so I have not attached them as I did not want to inundate you with information. However, if you want them I can share.

Please advise if you require any additional information and I will be more than happy to get it for you.

Thank you for your time.

Kindly,
Robyn

From: Heppner, Puncky

Sent: Thursday, June 16, 2011 12:09 AM

To: Robyn A. Defelice

Subject: RE: Follow up to voicemail and previous e-mail inquiry. RE: Problem-Solving Inventory sheet and manual

Hi Robyn,

It is good to hear of your interest in the PSI. Yes, send me an email indicating how you wish to modify the PSI, how many participants, and purpose of your study. I will try to respond as quickly as possible. Best, Puncky

From: Robyn A. Defelice

Sent: Wednesday, June 15, 2011 3:08 PM

To: Heppner, Puncky

Subject: Follow up to voicemail and previous e-mail inquiry. RE: Problem-Solving Inventory sheet and manual

Good Afternoon Dr. Heppner,

My name is Robyn Defelice and I am a doctoral student at Indiana University of Pennsylvania obtaining a degree in Communications Media and Instructional Technology. I am following up to a previous e-mail and voicemail with respect to your problem-solving inventory instrument. As I had noted previously the instrument was modified (instructions only, nothing else) in 2002 for a research project performed by Dr. Karl Kapp and that I am attempting to replicate his study and expand it for my dissertation.

I am seeking permission from you to use this instrument and to modify it in the same manner as Dr. Kapp. I was hoping to obtain this confirmation so that I may submit for IRB approval to commence research for the Fall semester. As I am unsure of your current availability to attend to this request I would like to offer assistance in facilitating this process, if that is a possibility. In addition, I am unclear to how formal of a permission you would desire (i.e. formal contract, e-mail, etc.), but am willing to work within what you wish to provide. No matter the decision you make (permission or not) a response would be greatly appreciated.

Thank you for your time and consideration of my requests.

Kindly,
Robyn

Permission for INSTTECH.551: Advanced Instructional Design

From: Dr. Timothy Phillips

To: Robyn A. Defelice

Subject: Re: For Friday Morning: Request for Dissertation - Confirmation of Class Use

Date: Fri, 14 Feb 2014 03:08:30 -0500

Dear Robyn and Dr Wilson,

I confirm that Robyn Defelice has my permission make use of my Summer and Fall 2014 Advanced Instructional Design Course. I will allot her the time she requires to provide the students information and to collect the data her study requires. If you require any additional information from me in support of Robyn's study, please do not hesitate to contact me. Here is my cell phone number (570) 764-6263 and I encourage you to call me if there is a need.

Sincerely,

Dr. Timothy L. Phillips
Chairperson, Department of Instructional Technology
Director, Institute for Interactive Technologies
Bloomsburg University
Bloomsburg, PA 17815

Appendix C

Information Sheet and Informed Consent - Fall

INFORMATION SHEET and INFORMED CONSENT (Please Read Prior to taking PSI)

WHO

My name is Robyn Defelice, a doctoral candidate at Indiana University of Pennsylvania. I am an alumna of the Masters of Science in Instructional Technology (MSIT) program, a current instructor in the MSIT program, as well as, the Internship Coordinator.

WHAT

As I complete the final requirement for my Ph.D. in Communications Media and Instructional Technology, the dissertation, I am examining problem-solving styles of novice instructional designers, which is how you are currently defined in our field. My topic encompasses studying how competencies of instructional designers are impacted by learning environments, mediating variables, such as ones problem-solving style, and curriculum design.

PARTICIPATION

Participation is voluntary. You are permitted to withdraw at any time from the study without penalty. To withdraw from the study you are asked to inform the researcher via the contact information provided. Additionally, if after two attempts by the researcher to contact you with no response or upon missing any part of the study (survey and/or interview) you will be removed from the study.

Your Privacy

Those who choose to participate will need to be known by the researcher. However what you share in the PSI and **during interviews is confidential and will only be used as part of the study**. Neither your peers nor the course instructor will be able to view this information. Though all interviews will be recorded, this is done for purposes of ensuring proper analysis. The recordings of interviews will be available only to the researcher.

THE PARTICULARS OF THE STUDY

The study consists of two components, completion of two surveys (PSI pre-/post-test) and three interviews. You will complete the survey the first week of class and the week prior to your third interview. The interviews are planned for the second week of the semester in addition to a mid-semester interview and a concluding interview at the end of the semester.

These interviews will be anywhere from 20 minutes to an hour in length depending on your responses.

The Problem-Solving Inventory (PSI)

The PSI is not a requirement of the course in which you are enrolled and you may decline to participate in the survey. Declining to participate in the PSI also excludes your participation in the study. Below is a copy of the informed consent that is part of the PSI:

Your participation in this study will shed light on how instructional design programs can better structure curricula to meet the needs of the learner and the learning environment. Completing this inventory is your consent to participating in this study.

Scheduling Interviews

Once you have completed the PSI, you will be directed to a new survey that will ask you to share information about your availability and the methods most conducive for conducting interviews with you. You will be contacted to confirm the dates, times, and locations of your three interviews.

CONTACT

Any questions? Please contact me at: r.a.defelice@iup.edu.

- Project Director: Robyn A. Defelice | Doctoral Candidate, IUP | Communications Media & Instructional Technology | Indiana, PA 15705.

Please keep a copy of this information sheet for your own records.

Appendix D

Interview Scheduling Intake Survey

Name and e-mail

Please share your name. First Name and Last Initial is sufficient.

Please provide your BU e-mail address for purposes of communicating with you.

Who is on your team?

Please list your teammates names here. Again, First Name and Last Initial is sufficient. This is to help determine if we have more than one participant on a team. Do not include yourself.

Team Member 1	
Team Member 2	
Team Member 3	
Team Member 4	

When would you like to meet?

Please provide two days out the week that you would be available for a one-hour interview (at a minimum). Please also denote the timespans on those days.

Interviews will be held via the phone unless you request a different meeting format. Please provide the phone number you intend to use for interviews.

Do you have any questions, concerns, or additional comments? Please put them here. For example, if you would prefer to meet in a different manner than via the phone, place that request here along with your preference for the interview.

Thank You

This concludes the first part of the study. Your time is appreciated!

You will be contacted shortly with a confirmation of your interview dates and times. Please make sure that your junk or spam filter accepts e-mails from the provided address (below).

If you have any questions or comments please feel free to e-mail the lead investigator, Robyn A. Defelice at: r.a.defelice@iup.edu

Appendix E

E-mail Communications – Fall

E-mail 1: Problem-solving Inventory and Informed Consent Invite (PRE)

Good Evening Class,

Thank you again for your time in listening to and participating with my presentation. As indicated during our discussion this e-mail serves to invite you to participate in the research I am performing. Please find attached an information sheet of the research and guidelines outlining consent to participate.

To actively consent and commence participation in the study please follow this link: Problem-Solving Inventory (PSI-Pre). This link is also available inside your Advanced Instructional Design course within BOLT. This link will be active for seven days starting Wednesday, August 27th and ending Wednesday, September 3rd.

Upon completion of the PSI you will be linked to an additional survey that will ask you to provide your availability for interviews during weeks 2, 8, and 15 and the methods that you prefer to use for interviewing. You will be contacted to confirm the dates, times, and locations of your three interviews.

If you have additional inquiries prior to participating, please contact me at r.a.defelice@iup.edu.

Thank you for your time and consideration,

Robyn A. Defelice, MSIT

Doctoral Candidate, CMIT – IUP

r.a.defelice@iup.edu

E-mail 2: Mid-Week Reminder to Participate (PRE)

Good Morning Class,

It is exciting to see your collective willingness to participate in this study! Thank you to those who have volunteered.

This communication serves to provide another opportunity to request your consideration in participating in the research I am performing for my dissertation. Your assistance will be instrumental in shaping education for future colleagues and peers. Additionally, your involvement provides you with insight to one of the most valuable traits of an instructional designer, the ability to problem solve. A focus on developing this skill will improve your overall instructional design competencies.

Please find attached an information sheet of the research and guidelines outlining consent to participate.

To actively consent and commence participation in the study please follow this link: Problem-Solving Inventory (PSI-Pre). This link is also available inside your Advanced Instructional Design course within BOLT. This link will be active for four more days (including today), expiring on Wednesday, September 3rd.

Upon completion of the PSI, you will be linked to an additional survey that will ask you to provide your availability for interviews during weeks 2, 8, and 15 and the methods that you prefer to use for interviewing. You will be contacted to confirm the dates, times, and locations of your three interviews.

If you have additional inquiries prior to participating, please contact me at r.a.defelice@iup.edu.

Thank you for your time and consideration,

Robyn A. Defelice, MSIT

Doctoral Candidate, CMIT – IUP

r.a.defelice@iup.edu

E-mail 3: Problem-Solving Inventory Follow Up (POST)

Congratulations on completing the Advanced Instructional Design class! Give yourself a pat on the back for all your hard work!

As I discussed with you at the beginning of the semester, you will take the Problem-Solving Inventory (PSI) prior to your final interview.

To finalize participation in this portion of the study please follow this link: Problem-Solving Inventory (Post). This link is also available inside your Advanced Instructional Design course within BOLT. This link will be active for seven days starting Wednesday, November 19th and ending Wednesday, November 26th.

If you have additional inquiries please contact me at r.a.defelice@iup.edu.

Thank you for your time and consideration,

Robyn A. Defelice, MSIT

Doctoral Candidate, CMIT – IUP

r.a.defelice@iup.edu

E-mail 4: Mid-Week Reminder to Participate (post)

Good Morning Class,

This communication serves to provide a reminder that this week the Problem-Solving Inventory (PSI) is still active for four more days (including today), expiring on Wednesday, November 26th.

As I discussed with you at the beginning of the semester, you will take the Problem-Solving Inventory (PSI) prior to your final interview.

To finalize participation in this portion of the study please follow this link: Problem-Solving Inventory (Post).

If you have additional inquiries please contact me at r.a.defelice@iup.edu.

Thank you for your time and consideration,

Robyn A. Defelice, MSIT

Doctoral Candidate, CMIT – IUP

r.a.defelice@iup.edu

E-Mail 5: Confirmation of Interviews

Good Morning [PARTICIPANT NAME]:

Thank you for agreeing to participate in my study. I appreciate your willingness to share details of your experiences in the Advanced Instructional Design class.

To follow up from the input you provided on availability please note the following dates, times, and locations as our confirmed interview schedule. You will receive a reminder e-mail at least 2 days prior to Interviews 2 and 3. This communication also serves to remind you about your first interview.

Interview 1:

- Date:
- Time:
- Location:
- Special Notes/Requests: Please be prepared to address basic demographic information about yourself in addition to your educational background. For example, your anticipated graduation date or how many classes you have taken online and face-to-face. Additional questions will be asked that gather your opinion and perspective on how you like to learn and how you problem-solve.

Interview 2:

- Date:
- Time:
- Location:
- Special Notes/Requests: During this interview, we will focus mainly on your thoughts and perceptions about your efforts in learning and problem-solving in the Advanced Instructional Design course.

Interview 3:

- Date:
- Time:
- Location:
- Special Notes/Requests: In this final interview, we will discuss your PSI results in conjunction with gaining your final thoughts on your efforts in learning and problem-solving during your time in the Advanced Instructional Design course.

Please retain this communication for your records and for setting up your personal calendar. If you need a copy of this e-mail at any point in the future please contact me at: r.a.defelice@iup.edu or by calling 610.462.5134.

Thank you and I look forward to our interviews.

Kindly,
Robyn A. Defelice, Project Director
Doctoral Candidate, IUP – CMIT
r.a.defelice@iup.edu

E-Mail 6: Interview Reminder

Good Morning [PARTICIPANT NAME]:

Thank you for agreeing to participate in my study. I hope the semester has been moving along well for you!

This is a reminder that your next interview is coming up. We initially agreed to the following:

- Date:
- Time:
- Location:
- Special/Notes Request:

If anything has changed or if you need a new date or time, please contact me immediately so that we may arrange another time within this week to hold our interview.

Please retain this communication for your records and for setting up your personal calendar.

Thank you and I look forward to our interviews.

Kindly,

Robyn A. Defelice, Project Director
Doctoral Candidate, IUP – CMIT
r.a.defelice@iup.edu
610.462.5134

Appendix F

PSI Pre-/Post-Instrument

Overview of Survey and Consent to Participate

Your participation in this study will shed light on how instructional design programs can better structure curricula to the needs of the learner and the learning environment. Completing this survey is your consent to participate in this study. All input is provided in an confidential format. Providing your name is requested so that we can match your pre- and post-test scores along with your interviews.

Directions

Instructional designers respond to problems in different ways. The statements on this inventory deal with how instructional designers react to instructional design problems. The term "problems" refers to instructional design problems, such as determining actual client needs, selecting proper instructional media for delivery and using correct instructional strategies. Please respond to the items as honestly as possible so as to most accurately portray how you handle such problems. Your responses should reflect what you actually do to solve instructional design problems, not how you think you *should* solve them. When you read an item ask yourself: Do I ever behave this way? Please answer every item.

This survey should take about 10 minutes. Once you have completed the inventory you will be taken to the next survey which asks you to provide your schedule availability and preferences for interviewing.

Questions? E-mail Robyn Defelice: r.a.defelice@iup.edu

I consent to participating
in this study. I
comprehend that my
information is
confidential and that I
can withdraw from
participating at any time.

Please enter your name.
First Name, Last Initial is
sufficient.

I have chosen not to
participate in the study.

Please enter your name.
First Name, Last Initial is
sufficient.

Thank you for your consideration. Please share with us why you chose to not participate in the box below. If you have decided you do want to participate close the survey and re-open the survey via the provided link.

Over the next five screens you will be presented 35 statements. Read each statement and indicate the extent to which you agree with that statement, using the scale provided. Mark your responses by clicking the number to the right of each statement. (Items 1-7)

[illegible]

Items 15 - 21

[illegible]

Items 29 - 35

	Strongly Agree (1)	Moderately Agree (2)	Slightly Agree (3)	Slightly Disagree (4)	Moderately Disagree (5)	Strongly Agree (6)
(29) When thinking of ways to handle a problem, I seldom assess the external forces that may be contributing to the problem.	☐	☐	☐	☐	☐	☐
(30) When faced with a problem, I seldom assess the external forces that may be contributing to the problem.	☐	☐	☐	☐	☐	☐
(31) When confronted with a problem, I usually first survey the situation to determine the relevant information.	☐	☐	☐	☐	☐	☐
(32) There are times when I become so emotionally charged that I can no longer see the alternatives for solving a particular problem.	☐	☐	☐	☐	☐	☐
(33) After making a decision, the actual outcome is usually similar to what I had anticipated.	☐	☐	☐	☐	☐	☐
(34) When confronted with a problem, I am unsure of whether I can handle the situation.	☐	☐	☐	☐	☐	☐
(35) When I become aware of a problem, one of the first things I do is try to find out exactly what the problem is.	☐	☐	☐	☐	☐	☐

Thank you for your participation. If you have any questions or comments please feel free to e-mail the lead investigator, Robyn A. Defelice at: r.a.defelice@iup.edu.

☐ Complete Survey.

Appendix G

Interview Protocol (Interview Series 1-3)

Interview I: Gathering the Baseline

Before the interview can commence subjects must confirm that they took the PSI (Problem-Solving Inventory) and that they acquiesce to having their interview recorded. If either question is answered in the negative, the subject will be dismissed from the study.

For today, I will be asking some questions related to basic demographics, your educational background, and your perceptions on your learning preferences and your ability to problem-solve.

Educational Background

- Which track of the MSIT program are you in? (Corporate – CORP or Instructional Technology Specialist – ITS)? Are you part-time/full-time?
- How many semesters have you been in the program?
- Including this semester, how many more semesters must you complete before you officially graduate? Officially meaning that you have completed all program requirements (including thesis or internship).
- Thinking only about the MSIT program, how many classes have you taken online? Face-to-face?

Face-to-Face/Online

- Thinking in generalities, what have been your experiences in interacting with each of the following while taking an F2F class? (Instructor, Peers, Course, Content, Learning Environment)
- Thinking in generalities, what have been your experiences in interacting with each of the following while taking an online class? (Instructor, Peers, Course, Content, Learning Environment)

Problem Solving

- Can you share about your experiences in problem solving with respect to your coursework (MSIT program) in general?
- What have been your experiences in solving instructional design problems as related to this class?
- Thinking about problem solving, what have been your experiences in solving problems through interactions with the following? (Instructor, Peers, Course, Content, Learning Environment)

The interview is concluded by thanking the participant and reminding them of the next interview date and time. In addition the participants will each be informed of what the next interview will cover. For example, *“In the next interview we will continue our conversation about your perceptions on interacting within your current learning environment for Advanced Instructional Design and your capacity for problem-solving.”*

Interview II: Gathering Class-Specific Experiences and Perceptions

For today I will be concentrating on a series of questions about your experiences and perceptions towards interactions with the ADVID course and with your problem-solving.

- Since our last interview, do you think you have thought about problem solving and your class interactions more or less? Describe.
- Share with me your current experiences, if any, towards a problem related to the class.
- What have been your experiences in solving instructional design problems as related to THIS class?
- What have been your experiences in solving instructional design problems through interacting with each of the following: the instructor, your peers, the course content, and the educational setting for THIS class?

The interview is concluded by thanking the participant and reminding them of the next interview date and time and that they will need to take the PSI prior to the final interview.

Interview III: Reflecting on the Experience(s)

For today, I will be concentrating on a series of questions about your experiences and perceptions towards interactions with the ADVID course and with your problem solving.

- Since our last interview, do you think you have thought about problem solving and your class interactions more or less? Describe.
- What have been your experiences in interacting in this class?
- Share with me your current experiences, if any, towards a problem related to the class.
- What have been your experiences in solving instructional design problems as related to THIS class?
- What have been your experiences in solving instructional design problems through interacting with each of the following: the instructor, your peers, the course content, and the educational setting for THIS class?

Cumulative Inquiries

- Do you think you faced more problems at the beginning, middle, or end of the course? Why?
- Do you think you dealt with different types of problems at different times in the semester, how were they different?
- Describe how you think each of the following: the instructor, the peer, class content, and the educational setting impacted your ability to problem-solve if at all.

PSI Results

Inquiries were adjusted based on results of pre- and post-test. Instructions to self: *Provide overview of what each dimension means then provide Pre and then Post overall and then breakdowns.*

- What do you think of your results?
- What experiences did you have that helped you recognize your ability to solve problems?
- Describe any experiences that you think assisted in further developing your ability to approach more readily the problems you faced.
- Describe any experiences that you think assisted in further developing your personal control over the problems you faced.

The interview is concluded by thanking the participant their cooperation and assistance to my research.