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Investigating Instructional Designers' Decisions Regarding The Use Of Multimedia Learning Principles in E-learning Course Design

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INVESTIGATING INSTRUCTIONAL DESIGNERS' DECISIONS REGARDING THE USE OF MULTIMEDIA LEARNING PRINCIPLES IN E-LEARNING COURSE DESIGN

by

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ABSTRACT

This study employed a qualitative research design using the Decomposed Theory of Planned Behavior (DTPB) to investigate instructional designers' use of multimedia learning principles (MLPs) in e-learning course design. While MLPs have been extensively studied in educational research and are largely associated with positive results, evidence suggests that instructional designers are not uniformly implementing these strategies when designing e-learning environments. The purpose of this study was twofold: (a) to understand better the alignment between instructional designers' knowledge and demonstrated implementation of MLPs; and (b) to understand the factors that influence instructional designers' intent and actual implementation of MLPs in their e-learning course design. Based on two interviews conducted with seven instructional designers and an analysis of representative work samples, this study produced seven findings. Participants were recruited using homogenous purposive sampling method from two small corporate organizations whose primary business is the development of e-learning environments. Overall, these findings suggest that, despite being exposed to MLPs and holding positive behavioral beliefs regarding the usefulness of them, instructional designers may hold negative beliefs and face constraining conditions that pose significant barriers to the utilization of MLPs in e-learning course design. Other findings regarding MLP use in design are discussed and future directions for practice, policy, and research are offered.

To my mother

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TABLE OF CONTENTS

LIST OF FIGURES xiii

LIST OF TABLES xiv

CHAPTER ONE: INTRODUCTION 1

Background of the Problem 1

What is Instructional Design? 3

Instructional Design Models and Approaches 4

What is Multimedia Learning? 6

Cognitive Theory of Multimedia Learning 7

Statement of the Problem 14

Purpose of the Study 16

Alignment Between Knowledge and Implementation 17

Knowledge of Multimedia Learning Principles 17

Implementation of Multimedia Learning Principles 18

Salient Beliefs Regarding Multimedia Learning Principles 19

Confidentiality and Trust 20

Study Population 21

Research Questions 22

Conceptual Framework 22

Direct Determinants 25
Indirect Determinants 26
Decomposed Theory of Planned Behavior 28
Behavioral Beliefs 29
Normative Beliefs 30
Control Beliefs 30
Knowledge and Skills 31
Application of Conceptual Framework 32
Significance of Problem 33
Limitations 34
Summary 35
CHAPTER TWO: RESEARCH METHODOLOGY 37
Introduction 37
Rationale for Qualitative Research Design 37
Qualitative Study Characteristics 38
Study Setting and Participant Demographics 40
Institutional Review Board Approval 41
Data-Collection Methods 42
Alignment Between Knowledge and Application 42

MLP Knowledge Instrumentation and Procedure 43
MLP Application Instrumentation and Procedure 44
Salient Beliefs Regarding Multimedia Learning Principles 44
MLP Salient Beliefs Instrumentation and Procedure 44
General Interview Data Collection Considerations 46
Interview Protocol Development 48
Methods for Qualitative Data Analysis 49
Organizing the Data, Reading, and Memoing 50
Identifying Codes and Themes 52
Interpreting Data and Themes 53
Inter-rater Reliability 55
Data Triangulation 56
Ethical and Trust Considerations 57
Summary 58
CHAPTER THREE: RESEARCH FINDINGS 59
Introduction 59
Study Setting and Participant Demographics 60
Years of Experience and Tenure 61
Formal Education 63

RQ1: To What Degree Do Instructional Designers Know MLPs? 65

RQ2: To What Degree are Instructional Designers Currently Implementing MLPS in Their E-learning Development? 68

Coherence 70

Signaling 71

Spatial Contiguity 71

Temporal Contiguity 72

Expectation 74

Segmenting 74

Pre-Training 75

Personalization 75

Concretizing 76

Anchoring 77

RQ3: To What Degree Does an Instructional Designer's Knowledge Align with Their Implementation of MLPs 78

RQ4: What salient beliefs (attitudes, subjective norm, and perceived behavioral control) affect instructional designers' behavioral intention and actual implementation of MLPs? 79

Instructional Designers' Behavioral Beliefs About MLPs 80

Perceived usefulness (Bu1 – Bu3) 82

Perceived Ease of Use (Be1 – 3) 85

Compatibility (Bc1-Bc5) 87

Instructional Designers' Normative Beliefs About MLPs 91

Supervisor Influence (Ns1 – Ns3) 92

Peer Influence (Np1 – Np2) 94

Instructional Designers' Control Beliefs About MLPs 96

Facilitating Conditions (Cf1-Cf3) 97

Self-efficacy (Cs) 100

Summary 102

CHAPTER FOUR: DISCUSSION 103

Introduction 103

RQ1: To What Degree Do Instructional Designers Know MLPs? 105

RQ2: To What Degree Are Instructional Designers Currently Implementing MLPS in their E-learning Development? 107

RQ3: To What Degree Does an Instructional Designer's Knowledge Align with Their Implementation of MLPs 108

RQ4: What salient beliefs (attitudes, subjective norm, and perceived behavioral control) affect instructional designers' behavioral intention and actual implementation of MLPs? 109

Behavioral beliefs 109

Perceived Usefulness 111

Perceived Ease of Use 112

Compatibility 114

Normative Beliefs 118

Supervisor Influence 119

Peer Influence 121

Control beliefs 122

Facilitating Conditions 123

Self-Efficacy 124

Summary and Implications of Findings 126

Implications for Instructional Design Organizations 127

Implications for Instructional Design Practitioners 129

Limitations of Study 130

Future Study 132

Summary 135

APPENDIX A: IRB APPROVAL LETTER 137

APPENDIX B: MLP KNOWLEDGE STRUCTURED INTERVIEW PROTOCOL 139

APPENDIX C: MLP SALIENT BELIEFS INTERVIEW PROTOCOL 144

APPENDIX D: COURSE ANALYSIS CHECKLIST 148

APPENDIX E: HRP-508 - SUMMARY EXPLANATION FOR EXEMPT RESEARCH 151

LIST OF REFERENCES 153

LIST OF FIGURES

Figure 1: Cognitive Theory of Multimedia Learning (Mayer & Moreno, 2003) 10

Figure 2: Theory of Planned Behavior (Ajzen, 1991) 27

Figure 3: Decomposed Theory of Planned Behavior (Taylor & Todd, 1995)..... 28

Figure 4 Violation of Spatial Contiguity Principle by Group B 72

Figure 5: Violation of Temporal Contiguity Principle by Group A 73

Figure 6: Application of Personalization Principle by Group A..... 76

Figure 7: Application of Anchoring Principle by Group B 78

LIST OF TABLES

Table 1: CTML Assumptions (Mayer & Moreno, 2003) 8

Table 2: Average Years of Experience 62

Table 3: Average Years of Experience and Tenure by Group 63

Table 4: Informal Training in Instructional Design 65

Table 5: MLP Knowledge 66

Table 6: Frequency of correctly defined MLPs 68

Table 7: Principle Implementation Observed in Sample Module 70

Table 8: Instructional Designers' Beliefs About MLPs 81

Table 9: Summary of Perceived Usefulness MUs 82

Table 10: Summary of Perceived Ease of Use MUs 86

Table 11: Summary of Compatibility MUs 88

Table 12: Summary of Supervisor Influence MUs 93

Table 13: Summary of Peer Influence MUs 95

Table 14: Summary of Facilitating Conditions MUs 98

Table 15: Summary of Self-efficacy MUs 100

CHAPTER ONE: INTRODUCTION

Background of the Problem

Electronic learning (e-learning) has become commonplace in education and training environments around the world (Lundberg & Sheridan, 2015; Selim, 2007; Sorgenfrei & Smolnik, 2016; Tsai, Chuang, Liang, & Tsai, 2011). It is a transformative technology that has enabled us to learn and communicate in ways not possible with traditional methods. Corporate organizations and higher learning institutions have embraced e-learning environments on a large scale because of the modality's potential. For instance, the National Center for Educational Statistics (2015) reports that, in Fall 2013, degree-granting postsecondary institutions enrolled over 5 million students in online courses. Similarly, eLearning Industry (2016) estimates that 77% of companies in the Unites States offer their employees some form of online corporate training.

Academic and professional literature has mainly attributed the broad appeal of e-learning to its many benefits. For example, learners engaged in e-learning courses have the ability to set their pace, work remotely, and access learning materials at any time (Cheng et al., 2014; Mullin, 2013; Nguyen, 2015; Sun, Tsai, Chen, & Yeh, 2008; Wang, 2010). Collectively, these advantages provide learners an increased level of flexibility and control not possible through traditional face-to-face environments. Research by Kasraie & Kasraie (2010) suggests that in 2002, the most significant advantages of e-learning were the ability to control one's schedule, the aptitude to use multimedia to move beyond text-heavy instruction, and the promise of increased learner interactivity. Today, advances in technology enable instructional designers to develop online environments that allow individuals to learn and collaborate in social settings, learn

through playing games, and even interact with life-like avatars. Notwithstanding the ever-growing advances in e-learning technology; learner control remains one of the major determinants of learner satisfaction with e-learning courses (Sorgenfrei & Smolnik, 2016).

Likewise, e-learning offers organizations numerous benefits, including enhanced employee collaboration, greater flexibility in the deployment of learning environments, and more significant cost savings relative to traditional face-to-face courses (Cheng et al., 2014; Mullin, 2013; Wang, 2010). Cost savings is a particularly powerful benefit of e-learning, which has garnered a significant amount of attention in e-learning literature (Kasraie & Kasraie, 2010). Studies on the economics of e-learning have demonstrated that e-learning environments save organizations money by eliminating the need for travel expenditures as well as variable costs such as utilities and building maintenance (Kasraie & Kasraie, 2010).

Despite the numerous perceived advantages of e-learning environments, however, it is vital that we understand how effective e-learning environments are in fostering meaningful learning relative to traditional classroom instruction, as well as its viability as an emerging instructional and training method. Gaining a deeper understanding of these issues is essential given increasingly more learners are involved in online environments and a rising investment in the modality. In this vein, a growing body of research associated with e-learning has explored a variety of themes, including learner motivation (Caudill, 2015; Swann, 2013), technological self-efficacy beliefs (Cigdem, 2015; Lin, 2016; Scherer & Siddiq, 2015), and the effects of educational technology advancements on the learner experience (Nelson, Fien, Doabler, & Clarke, 2016; Robinson, 2016; Skiba, 2016; Sorgenfrei & Smolnik, 2016). While these studies have made essential contributions to our understanding of e-learning environments, literature

related to the practice of instructional design and the development of multimedia instruction that fosters meaningful learning is particularly significant to this study.

What is Instructional Design?

The origins of instructional design practice can be traced back to World War II. Psychologist and educators, including Robert Gagne and Leslie Briggs, were recruited during the war to develop training materials for military services (Reiser, 2001; Reiser & Dempsey, 2012). Their work helped to solve critical training problems and influenced how training materials were created using principles derived from research on instruction, learning, and human behavior (Reiser, 2001). Psychologists continued to work on solving instructional problems after the war, establishing research organizations that continued to advance our understanding of instructional environments (Reiser, 2001). Since then, a variety of design procedures have been developed and have been referred to by several names including *the systems approach*, *instructional systems design (ISD), instructional development,* and *instructional design* (Reiser, 2001). In the context of this study, the researcher refers to design procedures as instructional design.

Hilgart, Ritterband, Thorndike, and Kinzie (2012) aptly describe instructional design in three contexts: instructional design as a *science*, instructional design as a *field of practice*, and instructional design as a *systematic process*. As a *science*, the concern of instructional design is with improving the learning process to help people learn more effectively (Hilgart et al., 2012). As a result, there is a growing body of research in learner motivation, learning strategies, and process models that can improve the design of instructional programs (Hilgart et al., 2012; Swann, 2013). As a *field of practice*, instructional design involves professionals, known as

instructional designers, who employ principles and evidence-based strategies derived from the growing contributions of the science of instructional design to create and maintain e-learning conditions (Hilgart et al., 2012). Consequently, instructional designers are an essential component of the success of e-learning environments. Finally, as a *systematic process*, instructional design specifies and encourages the use of various models to guide the advancement of e-learning settings (Hilgart et al., 2012). For example, Dick, Carey, and Carey (2009) more succinctly describe instructional design as a systematic approach used to conduct activities undertaken during the development of training.

Instructional Design Models and Approaches

Several key methods and models that have gained popularity over the last 20 years inform the systematic process of instructional design. One of the most prominent instructional design models in corporate learning settings is the ADDIE model, which remains a preferred method of instructional design practice around the world (Dick et al., 2009; Reiser & Dempsey, 2012). The ADDIE model was originally developed in 1975 for the U.S. Army by the Center for Educational Technology at Florida State University (Branson et al., 1975). This original version has been modified through the years. Today, five major procedural phases define ADDIE: analysis, design, development, implementation, and evaluation. Instructional design researchers have designed subsequent instructional models, including the Dick and Carey Model, the 4C/ID-model, and the Kemp Instructional Design Model; however, many still contain the core elements of the ADDIE model (Dick et al., 2009; Reiser, 2001; Reiser & Dempsey, 2012).

The first two phases of the ADDIE model—analysis and design—are mostly leaner-focused and concerned with defining what students learn and how. For example, typical tasks during the analysis and design phases include identifying learner constraints, establishing learning strategies, and writing objectives (Dick et al., 2009). The development and implementation phases of the model begin with authoring instructional materials and testing. During these phases, instructional designers concern themselves with systems used to develop and implement e-learning courses, such as authoring tools and learning management systems (Dick et al., 2009). Lastly, during the evaluation phase, instructional designers determine the appropriateness and adequacy of the e-learning course (Dick et al., 2009). They accomplish this by conducting focus groups, collecting survey data, and pre/post testing. Collectively, these phases of development provide a systematic process for e-learning design. The use of instructional design models, such as the ADDIE model, is important to this study because activities undertaken by instructional designers during each development phase have a direct impact on the success of e-learning environments. Particularly relevant are the activities and decisions made by instructional designers during design activities. Since remaining instructional design decisions are scaffolded in these first phases of development, instructional designers' design decisions have a significant impact on the final evolution of an e-learning course.

Overall, the science of instructional design supports development activities and processes specified by design models, such as the ADDIE model. That is, evidence-based principles that are aligned with our understanding of how humans learn inform the development efforts instructional designers engage in (Mayer, 2008; Reiser & Dempsey, 2012). Nevertheless, while this discussion does not provide an exhaustive summary of the various approaches to

instructional design, understanding the underlying frameworks that guide instructional design practice provides a glimpse into the various evidence-based and procedurally-focused methods available to aid e-learning course creation. It also illustrates how the instructional design industry has supported and advocated the use of evidence-based design practices.

What is Multimedia Learning?

In its simplest form, multimedia learning refers to learning from pictures and words. Learners can either read words in print or hear words in an oral narration. Pictures can range from simple static images to dynamic animations or videos. For example, Richard Mayer (2008) explains that "multimedia learning includes watching and listening to a narrated animation, reading a science textbook, playing an educational video game, or attending a Power-Point presentation" (p. 760). Multimedia learning is an essential part of e-learning courses given that these environments often use images and words to present content. In fact, Reiser (2001) suggests that the use of multimedia in e-learning is a core practice of instructional design. Research supports the uses of multimedia learning and suggests people learn more efficiently from pictures and words rather than from words alone (Mayer, 2011). Moreover, our understanding of multimedia learning best practices is ingrained in cognitivist research, which has had a significant impact on the industry's understanding of how humans learn during multimedia instruction (Mayer & Moreno, 2003; Mayer, 2008; Reiser & Dempsey, 2012). In particular, cognitive load theory, dual-coding theory, and the working memory model have provided a framework for understanding the human cognitive architecture (Mayer, 2008, 2011; Yue, Kim, Ogawa, Stark, & Kim, 2013). From this knowledge of the brain and memory,

instructional design practice can align multimedia instruction with learner's cognitive abilities (Khalil & Elkhider, 2016; Mayer, 2008). Consequently, the application of cognitive learning theories in instructional design practice has significantly improved instructional designers' ability to create multimedia instructional atmospheres that help people learn more effectively (Mayer, 2011).

Cognitive Theory of Multimedia Learning

Cognitive Theory of Multimedia Learning (CTML) builds on cognitive research on the brain and memory to provide a framework for guiding the proper use of multimedia, a key component of e-learning environments (Mayer, 2008, 2011). Three main assumptions reinforce CTML, which support and build on cognitive learning theories: dual channels – there are two separate channels for processing information; limited capacity – each channel has a limited facility, and active processing – learning is an active process that requires filtering, selecting, organizing; and integrating information (Mayer, 2008, 2011; Yue et al., 2013). These assumptions are summarized in Table 1.

Table 1: CTML Assumptions (Mayer & Moreno, 2003)

Assumption	**Definition**
Dual channel (Baddeley, 1986; Paivio, 1986)	Humans possess separate information processing channels for verbal and visual material.
Limited capacity (Sweller, 1988)	There is only a limited amount of processing capacity available in the verbal and visual channels.
Active processing (Mayer, 2008; Wittrock, 1989)	Learning requires substantial cognitive processing in the verbal and visual channels.

The dual channel assumption suggests that working memory has at least two difference processing channels: auditory/verbal and visual/pictorial (Mayer, 2011; Mayer & Moreno, 2003). It was derived from Alan Paivio's (1986, 1991) dual coding theory of memory and Alan Baddeley's (1986) theory of working memory. Each channel is assumed to be functionally independent but interact with each other. John Sweller's (1988) cognitive load theory (CTL) provides the basis for the limited capacity assumption, which suggests that both processing channels (working memory) are limited in their ability to process and hold information at one time. Learners process all information required for learning within capacity limits (Mayer, 2010a, 2011). Various types differentiate cognitive load: intrinsic, extraneous, and germane cognitive load (Sweller, van Merrienboer, & Paas, 1998). Intrinsic load reflects the inherent level of task complexity (Sweller, et al., 1998). Extraneous load is generated by cognitive efforts exerted by an individual due to the way information is presented (Sweller, et al., 1998). Germane load reflects the cognitive effort required in processing information to build and store mental representations (Sweller, et al., 1998). Finally, active processing, suggests that individuals build essential knowledge by paying attention to necessary material, organizing it into mental

structures, and integrating it with prior knowledge (Mayer, 2011). Merlin Wittrock's (1974, 1989) generative-learning theory and Richard Mayer's (2002) selecting–organizing–integrating theory of active learning are the basis of the assumption of active processing. Wittrock's research forms an important part of the CTML because it establishes meaningful learning as a generative process and focuses on instructional methods that improve generative processing (Mayer, 2010b). Mayer (2010b) solidified this idea when he stated that Wittrock's contributions are "required reading for anyone wishing to apply the science of learning to education" (p. 50).

Figure 1 illustrates how these assumptions are integrated into the CTML. The theory is represented through a series of boxes which Mayer (2010a, 2011) organizes into two rows and five columns, along with arrows between boxes. The first row represents the auditory channel and the second row represents the visual channel (Mayer, 2011; Mayer & Moreno, 2003). The columns in the figure symbolize the architecture of the human information-processing system and the arrows represent actual cognitive processing (Mayer, 2011; Mayer & Moreno, 2003).

This visual representation of the human information-processing system illustrates how the CTML posits meaningful learning occurs during multimedia instruction. For example, an individual engaging in a multimedia e-learning lesson is assumed to process printed words and pictures using his eyes and spoken words using his ears (Mayer & Moreno, 2003). This type of information processing occurs within sensory memory and is represented as arrows from the boxes labeled *words* and *pictures* to the boxes labeled *ears* and *eyes*. Sensory memory is assumed to have a virtually unlimited capacity for information processing. As the learner continues to process the incoming information, he will pay attention to some of the audio coming in from the ears, as well as some of the visual information coming in through the eyes (Mayer &

Moreno, 2003). Mayer and Moreno (2003) refer to this process as selecting words and images, and it is represented by similarly labeled arrows from boxes labeled *ears* and *eyes* to those labeled *sounds* and *images*, respectively. Spoken words are temporarily stored in the working memory as sounds and incoming printed words as images. However, printed words are converted to sound for processing by the verbal channel (Mayer & Moreno, 2003). This is indicated as arrows between the boxes labeled *sound* and *images* in the working memory column. Next, the learner organizes this information to form coherent verbal and pictorial representations to create *verbal models* and *pictorial models* (Mayer & Moreno, 2003). Selecting and organizing words and images occurs within working memory, which is assumed to have a limited capacity (Mayer & Moreno, 2003). Finally, verbal and pictorial models are integrated into a mental construct that is partially guided by prior knowledge activated from long-term memory (Mayer & Moreno, 2003). Mental constructs are assumed by the CTML to represent meaningful learning developed through active generative processing (Mayer & Moreno, 2003).

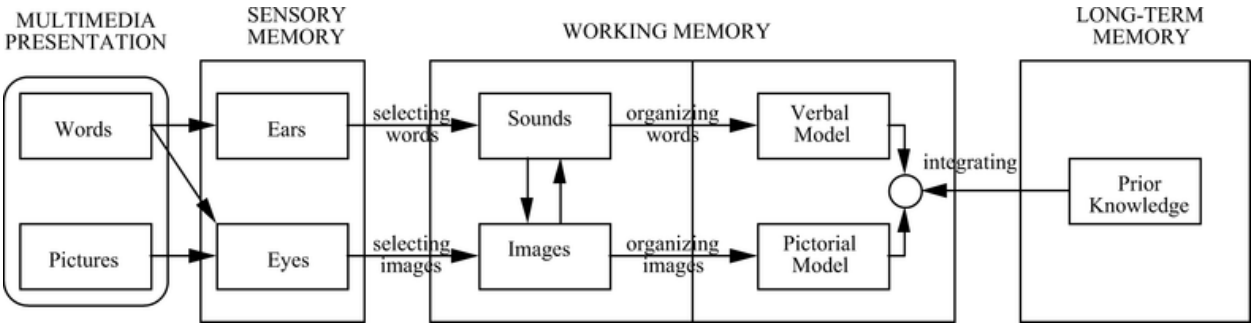

Figure 1: Cognitive Theory of Multimedia Learning (Mayer & Moreno, 2003)

Using the CTML to gain a deeper understanding of the human information-processing system allows instructional designers to create learning environments that are mindful of the

limited capacity of working memory. This practice is important because, while sensory and long-term memory may have unlimited capacities, the limitations of the working memory can "act as a sort of bottleneck in the system" (Mayer, 2010a, p. 544). Thus, to achieve meaningful learning, learning materials must include features that fosterers generative processing while lowering cognitive loads to prevent overtaxing the limited capacity of the working memory. In this vein, Mayer (2011) outlines several evidence-based multimedia learning principles (MLPs) that foster meaningful learning during multimedia instruction. Three main groups categorize the principles: evidenced-based instructional principles for reducing extraneous processing; principles for managing essential processing; and principles for fostering generative processing (Mayer, 2011).

Evidence-based MLPs for reducing extraneous processing include:

- Coherence – People learn better from a multimedia presentation when extraneous material is excluded.
- Signaling – People learn better when relevant information is highlighted or signaled.
- Spatial Contiguity – People learn better when words and images are presented near each other, rather than far apart.
- Temporal Contiguity – People learn better when corresponding spoken words and images are presented simultaneously, rather that successively.
- Expectation – People learn better when they are shown in advance the types of test items (Mayer, 2011, p. 66).

Evidence-based MLPs for managing essential processing include:

- Segmenting – People learn better when complex information is presented in manageable chunks.

- Pre-training – People learn better from a complex lesson when they receive pre-training in the names and characteristics of the key concepts (Mayer, 2011, p. 68).

Evidence-based MLPs for fostering generative processing include:

- Personalization – People learn better when words in multimedia instruction are presented in a conversational style rather than a formal style.
- Concretizing – People learn better when unfamiliar material is related to familiar knowledge.
- Anchoring – People learn better when material is presented in the context of a familiar situation (Mayer, 2011, p. 70).

The researcher has centered this study around the implementation of MLPs in e-learning course design because extensive research has suggested that using MLPs helps instructional designers author learning environments that foster meaningful learning (Fenesi, Kramer, & Kim, 2016; Ginns, Martin, & Marsh, 2013; Mammarella, Fairfield, & Di Domenico, 2013; Mautone & Mayer, 2001; Moreno & Mayer, 2000a, 2000b; Rey & Steib, 2013). For example, Moreno and Mayer (2000a) famously studied the coherence principle through two experiments. In the first experiment, leaners received instruction with an animation and concurrent narration explaining the formation of lighting (Moreno & Mayer, 2000a). The second experiment exposed students to an animation and concurrent narration on how hydraulic braking systems work (Moreno & Mayer, 2000a). During each experiment, the researchers added music, sounds, both, or neither to the animations (Moreno & Mayer, 2000a). The researchers found that learners who received instruction using only animation with concurrent narration performed better in retention tests than those who were exposed to the same lesson with the addition of music, sound, or both

(Moreno & Mayer, 2000a). More recently, Fenesi et al. (2016) conducted an experiment with 71 undergraduate students enrolled in the same introductory psychology course. Study participants were randomly assigned to either a congruent or incongruent condition. The study researchers defined conditions in the following way: "congruent condition paired relevant images that supported the narration and the incongruent condition paired images that did not directly support the narration" (Fenesi et al., 2016, p. 695). Both groups were given the same 20-minute comprehension quiz after completing their respective eight-minute lessons. Similar to Moreno and Mayer's (2000a) findings, the researchers found that participants who received instruction adhering to the coherence principle outperformed those who received instruction that violated the principle (Fenesi et al., 2016). The researchers also noted that learners with limited working memory capacity were especially negatively affected by instruction that violated the coherence principle (Fenesi et al., 2016).

Other examples of empirical MLP studies include Moreno and Mayer's (2000b) examination of the personalization principle where participants were presented information that was either written in a formal or personalized manner. The results showed that personalized information produced better transfer and retention (Moreno & Mayer, 2000b). Rey and Steib (2013) also studied the personalization principle by presenting learners animations with either formal or personalized concurrent narration. Their results were consistent with Moreno and Mayer's (2000b) findings, suggesting that learners who received animation with concurrent personalized narration performed better on transfer test. Finally, Ginns et al. (2013) conducted a meta-analysis of 16 journal articles relating to the personalization principle. They found that "students who learned from instructional materials written in a conversational style learned more

from instruction than those who studied more formally expressed materials" (p. 466). More recently, Mammarella et al. (2013) conducted two experiments which explored the effects of temporal and spatial contiguity. Again, their findings supported Mayer's assumption that learning is improved when learning materials are physically and temporally integrated (Mammarella et al., 2013).

Statement of the Problem

A primary goal of instructional design research is to improve learner success via improvements in design practices, and instructional designers are central to attaining this aim. Specifically, it is essential that designers understand how their development decisions impact overall learner success (Roytek, 2010; Yanchar & Hawkley, 2015). A growing body of cognitive research in e-learning instructional design has examined the practices of instructional designers and the cognitive abilities of learners as a means to understand what it takes to develop effective e-learning courses (Dick et al., 2009; Mayer, 2011; Reiser & Dempsey, 2012). Also, research in this vein has described various models and frameworks that inform the industry on evidence-based practices thought to improve overall program quality (Dick et al., 2009).

Of these frameworks, research in multimedia learning by Richard Mayer (2011) and his colleagues have recommended the use of several evidence-based MLPs to improve learner outcomes. However, while educational researchers have extensively studied instructional design principles, evidence suggests that instructional designers do not uniformly implement these strategies (Khalil & Elkhider, 2016; Merrill & Wilson, 2007; Thompson-Sellers & Calandra, 2012). This poses a serious problem, as research has suggested that implementing MLPs may

help to lower learners' cognitive load levels and essential processing load requirements, as well as increase their generative processing during passive multimedia learning experiences (Mayer, 2010a, 2011; Mayer & Moreno, 2003). Consequently, omitting these principles in the design of e-learning courses can lead to many negative consequences, including poor content retention and transfer, decreased levels of learner motivation, and lower course completion rates (Mayer, 2010a; Thompson-Sellers & Calandra, 2012).

Within recent literature, investigators have paid some attention to instructional designers' experience and training (Khalil & Elkhider, 2016; Roytek, 2010; Yanchar & Hawkley, 2015). The instructional design industry is somewhat unique in that professionals working in the role of an instructional designer often have a broad range of professional backgrounds and training. That is, while some instructional designers receive formal training in instructional design, many come from other disciplines (Thompson-Sellers & Calandra, 2012). For example, organizations often assign subject matter experts (SME), individuals who have an advanced knowledge of a particular field, to instructional design responsibilities despite lacking formal training in instructional design (Khalil & Elkhider, 2016). Unfortunately, since many professionals engaging in instructional design practice lack formal training, a significant gap in their knowledge may negatively impact their ability to implement instructional design principles (Khalil & Elkhider, 2016; Yanchar & Hawkley, 2015).

Recent research has explored the extent to which instructional designers engage in the development process (Larson, & Lockee, 2009; York & Ertmer, 2016). Instructional designers in large organizations and those who specialize in e-learning development work in teams where each designer engages in a particular development activity. This is an ideal condition where the

contributions of others reduce the individual demands on instructional designers. In contrast, designers in smaller organizations often work with limited budgets and fewer development resources (Dick et al., 2009; Larson, & Lockee, 2009). In fact, instructional designers in these work environments engage in many or all activities associated with curriculum development, including generating assessment instruments, storyboarding and prototyping course design, and building course interfaces using e-learning authoring tools (Dick et al., 2009). On the whole, this places an increased demand on individual designers, which poses a significant difficulty. Research suggests that when instructional designers' demands increase, particularly the need to complete a development task quickly, they compensate by rushing or selectively implementing strategies that impact the overall quality of e-learning environs (Roytek, 2010).

Despite the progress already made in respect to understanding the systematic process of instructional design, the training and experience level of instructional designers, and the complexity of the industry, there has been no focused exploration of instructional designers' intent to use MLPs in their development (Khalil & Elkhider, 2016; Yanchar & Hawkley, 2015). That is, there has been no in-depth examination of the factors associated with instructional designers' intent and actual implementation of MLPs. Thus, this study seeks to identify which MLPs are not being performed by instructional designers, and what factors may influence their intent to use those principles, to suggest actionable and evidence-based recommendations.

Purpose of the Study

The purpose of this qualitative study was twofold: (a) to understand better the alignment between instructional designers' knowledge and demonstrated implementation of MLPs; and (b)

to understand the factors that influence instructional designers' intent and actual implementation of MLPs in their e-learning program design. In alignment with the study purposes, this study first sought to determine instructional designer's knowledge of MLPs. Secondly, this study analyzed instructional designers' actual implementation of MLPs. Finally, this study explored instructional designer's salient beliefs regarding MLPs in the context of the Decomposed Theory of Panned Behavior (DTPB).

Alignment Between Knowledge and Implementation

In an attempt to explore the alignment between instructional designers' knowledge and implementation of MLPs, the researcher conducted a structured interview with each instructional designer. He also analyzed the implementation of MLPs by instructional designers in a representative e-learning module, which was recently created in a collaborative effort by all study participants.

Knowledge of Multimedia Learning Principles

To determine instructional designers' knowledge of MLPs, the researcher conducted a structured interview with seven instructional designers. Using a structured interview design ensured that, by using a consistent questioning and scoring process for all participants, the researcher could reliably aggregate and compare responses (Zoellner et al., 2012). The interview consisted of 10 main questions, one for each MLP, which asked study participants to define each MLP. The researcher asked follow-up probing questions to elicit responses that provided a deeper understanding of instructional designers' knowledge of MLPs, along with any

knowledge-related opinions or beliefs that may exist. Moreover, the researcher repeated this process 10 times, one for each MLP. The interviews lasted 35 minutes, on average.

The results of this qualitative interview process identified gaps in instructional designers' MLP knowledge, as well as their past experiences with MLPs. This data was relevant to this study because many instructional designers lack a basic understanding of instructional design principles, which research suggests hinders instructional designers' abilities to develop effective courses (Khalil & Elkhider, 2016; Yanchar & Hawkley, 2015). Understanding the extent to which instructional designers have a knowledge deficit of MLPs helped to inform this study on critical knowledge gaps to address in future behavioral intervention programs.

Implementation of Multimedia Learning Principles

To determine instructional designers' implementation of MLPs, the researcher conducted an analysis of a representative e-learning module, which all study participants recently developed in a collaborative effort. A quantitative checklist guided the module's analysis. The checklist listed each MLP along with a short description. During his analysis, the researcher reviewed each module screen and tallied the total number of correct applications and violations observed for each MLP.

The results of the course analysis provided relevant data regarding principles most often implemented or violated by instructional designers. The information is relevant to this study because it allowed the researcher to compare instructional designers' knowledge and real-world application of MLPs. When compared, this data enabled the researcher to explore factors that influenced instructional designers' implementation of MLPs, a goal of this study.

Salient Beliefs Regarding Multimedia Learning Principles

To explore instructional designers' salient beliefs and opinions regarding each multimedia learning principle, the researcher conducted a second interview, which was semi-structured in design. Using a semi-structured interview design was appropriate because the interview questions were related to beliefs, which varied widely between participants (Brayda & Boyce, 2014). This design permitted the researcher to guide the discussion to ensure he covered essential points in sufficient detail while enabling for the opportunities to identify new or varying points of views (Brayda & Boyce, 2014; Creswell, 2013). Therefore, a semi-structured script comprised of open-ended questions guided the data collection. The interview protocol and script was grounded in TPB constructs (attitudes, subjective norms, perceived behavioral control) and was formatted using an expanded version of the TPB known as the Decomposed Theory of Planned Behavior (DTPB) to establish specific sections that were used to prompt opinions and beliefs about each MLP. The researcher asked probing questions throughout the interviews to clarify the meanings of the responses. The researcher coded and analyzed the data collected from the interviews. Using an inductive approach to qualitative data analysis, the researcher identified themes and sub-themes and organized them by the number of mentions throughout the interviews. The researcher further organized themes and sub-themes by DTPB constructs.

Overall, interview results provided data useful in identifying possible factors for instructional designers' decisions to deviate from implementing MLPs in their e-learning curriculum design. Specifically, by probing participants and discussing their behavioral, normative, and control beliefs regarding each MLP, the researcher identified recurring themes. Recurring themes and subthemes may inform future intervention programs in ways to efficiently

address problems. Similarly, while a growing body of literature has suggested that instructional designers do not uniformly implement instructional design principles, little research has explored their motivation and intent to implement evidence-based design principles.

It is important to note that the researcher structured this part of the study differently from typical TPB studies. Even though quantitative studies generally use the TPB to predict an individual's volitional behavior, this study is not interested in the prediction of behavior. On the contrary, this study is interested in exploring the factors that influence instructional designers' implementation of MLPs in e-learning course design. Thus, framework of this qualitative study does not include intention. The researcher will provide a more detailed explanation of the TPB and the use of the DTPB as a guide for data collection later in this work.

Confidentiality and Trust

All interviews were audio-recorded, with consent, at a location chosen by the interview participant and transcribed by the researcher. During transcription of the interviews, the researcher removed all identifying information to protect the confidentiality of each subject. In the same vain, once the transcription process was complete, the researcher destroyed all audio recordings. Before the start of each interview, the researcher reminded participants that participation in this study was voluntary and that the study would not highlight or identify personal flaws, lack of ability, or knowledge. The researcher ensured that the participants understood the purpose of this study was to improve organizational practice and contribute to related industry research.

Study Population

Instructional designers' intent to use MLPs in e-learning course design occurs within the context of two small corporate organizations whose primary business is the development of e-learning environments. This context likely affects instructional designers' intent to use MLPs. For this reason, the researcher selected participants from two similar instructional design organizations (Organization A and Organization B) also referred to as "instructional design houses" or "development houses" in the Orlando, Central Florida area. The collection of information about each organization verified that instructional designers' work conditions were sufficiently similar to enable results from each site to be aggregated for analysis. Specifically, both companies are small businesses that employ 50 or fewer individuals, create e-learning courses that the organization deploys within the organization as well as custom courseware that is created for external clients. Most programs developed by each establishment are revenue-generating courses marketed to external clienteles. Additionally, both businesses use a modified version of the ADDIE model for developing e-learning modules. They are also similar in staff size, annual revenue, primary market, and number of e-learning courses created per year.

Using purposive sampling, the researcher selected seven instructional designers (four females and three males) to participate in this study. For the purpose of this study, the definition of an instructional designer is a professional who designs e-learning curriculum for a variety of audiences and applications. All participants were given a pseudonym (e.g. ID2) to protect their identity. In total, Organization A employed four of the participants (Group A) and Organization B employed three of the participants (Group B). The researcher employed the purposive sampling method as statistical generalization was not an objective of this study. Furthermore, he

employed a multi-site method to permit him to gain a deeper understanding of the problem and for triangulation of data.

Research Questions

To guide the collection and analysis of data, the researcher posed the following research questions:

1. To what degree are instructional designers familiar with MLPs?
2. To what degree are instructional designers currently implementing MLPs in the development of online courses?
3. To what extent does an instructional designers' knowledge align with their implementation of MLPs?
4. What salient beliefs (attitudes, subjective norm, and perceived behavioral control) affect instructional designers' behavioral intention and actual implementation of MLPs?

In the context of this study, the definition of the term *instructional designer* is limited to professionals engaging in instructional design practice.

Conceptual Framework

The Theory of Planned Behavior (TPB) formed the theoretical framework and research design for this study. The TPB is an extension of Martin Fishbein and Icek Ajzen's Theory of Reasoned Action (TRA), which has been widely used to predict behavioral intention (Madden, Ellen, & Ajzen, 1992). For example, Brubaker and Wickersham (1990) used the theory to predict testicular cancer self-screening practices in male college students, and Pryor (1990) used the

TRA to predict teachers' participation in continuing education. More recently, Tagler, Stanko, and Forbey (2017) used the TRA to explore predictors of daily sleep habits.

As its name suggests, the theory posits that individuals consider the outcomes of their behaviors before acting. That is, individuals are said to hold beliefs that influence their intent to perform a behavior (Madden et al., 1992). By separating intention from behavior, the TRA is able to explore beliefs that may limit an individual's intention to perform a specific behavior. Based on the TRA, understanding intention is important because it is assumed to be the greatest predictor of actual behavior. Moreover, the TRA further posits that an individual's beliefs fall into two conceptually different sets of beliefs, behavioral and normative, which are said to be direct determinants of intention (Madden et al., 1992). However, while the TRA has been used in a variety of settings, the theory is limited in that it assumes that behaviors are under complete volitional control, ignoring the influences of an individual's perceived control beliefs. In response to this limitation, Ajzen's TPB extends the TRA to include beliefs regarding resources, opportunity, and support needed to perform a behavior (Ajzen, 1985). Thus, while both the TRA and TPB assume that individuals use information and reasoning to guide their behavior, only the TPB accounts for the influences of perceived control on behavioral intention (Lee, Cerreto, & Lee, 2010).

The TRA and the TPB are relevant to this study because they provided a basis for understanding human behavioral decisions in specific contexts (Schifter & Ajzen, 1985). However, the researcher chose the TPB as the conceptual framework for this research because instructional designers do not have complete volitional control over the implementation of MLPs. Additionally, the researcher chose the TPB because researchers have used TPB

extensively–with great success–to explore human behavioral decisions in a variety of disciplines including healthcare, sales and marketing, and education. In fact, in 2010, Ajzen (2011) measured the popularity of his theory by conducting a Google Scholar search for the keywords "theory of planned behavior" and "theory of planned behaviour," which indicated that the number of citations grew from 22 in 1985 to 4,550 in 2010. Today, TPB citations listed by Google Scholar have reached over 15,000.

The application of the TPB has been most extensive in medical research. For example, Povey, Conner, Sparks, James, and Shepherd (2000) used the TPB to study individuals' decisions to eat healthy and their attitudes towards healthy foods, and Okun and Sloane (2002) used the theory to study college student volunteerism. In addition, Gredig, Nideroest and Parpan-Blaser (2006) used the theory to study condom use in heterosexual men, while Prapavessis et al. (2005) used the TPB to study exercise motivation in patients with congenital heart failure. More recently, Chevance, Caudroit, Romain, and Boiché (2017) used the theory to study individuals' engagement in physical activity, and Catalano et al. (2017) used the TPB to study human papillomavirus (HPV) vaccination behaviors in college men.

The theory has also been applied to various educational settings. For example, Demir (2010) used the TPB to study teachers' Internet use behavior for professional development. In the context of e-learning, Chu and Chen (2016) used an extended version of the TPB to study group influences on e-learning adoption, and Tagoe and Abakah (2014) used the theory to study students' decisions about mobile learning and their beliefs towards learning from e-learning environments presented on mobile devices.

Most importantly, the popularity and extensive use of the TPB have provided specific information useful in the design of effective intervention programs, which was a goal of this study. For example, in a study about teachers' intentions to use technology, Lee et al. (2010) found that, while teachers held positive views concerning the outcomes of computer use to create and deliver lessons, they believed that it required excessive time. This is an example of the moderating effect beliefs have on intent. Since the researcher employed the TPB to collect data unique to the teachers' attitudes (direct determinants) and behavioral beliefs (indirect determinants) about using computers to create and deliver lessons, their results provided practical guidance for the development of an intervention program. Specifically, Lee et al. (2010) recommended an intervention program emphasizing methods to improve efficiency to modify teacher technology use behaviors.

Direct Determinants

According to the TPB, three direct determinants relate to an individual's plan to engage in a behavior: *attitudes* – the degree to which an individual believes the outcome of engaging in a behavior will be positive; *subjective norms* – the extent to which an individual believes that key individuals want them to engage in a behavior; and, *perceived behavioral control* – belief that they can perform the behavior, including factors that may facilitate or impede their performance (Lee et al., 2010; Schifter & Ajzen, 1985). Collectively, these considerations serve as direct determinants of intent, which the TPB suggests are an antecedent of behavior (Ajzen, 1985). Specifically, as a general rule, favorable attitudes and normative beliefs, and greater perceived control will increase intention (Ajzen, 1985; Sugar & Luterbach, 2016). Moreover, the role direct

determinants play on an individual's intention can vary by behavior and population (Ajzen, 1985). In the Lee et al. (2010) example previously discussed, the direct determinant was the teachers' positive views that students would benefit from the teacher's use of computers to design and deliver classroom instruction. The teachers' salient beliefs ultimately moderated this attitude, however, which Ajzen (1985) refers to as indirect determinants. Similarly, in a study about teacher's beliefs and use of technology-based assessments (TBA), Chien, Wu, and Hsu (2014) found that, while teachers believed using TBAs would be beneficial, they also held beliefs that they required extra efforts. They noted this as a moderating effect on teacher's intent to use TBAs.

Indirect Determinants

The TPB further posit that indirect determinants influence each direct determinant, which ultimately affects behavioral intent (Ajzen, 1985). Indirect determinants represent an individual's salient beliefs related to each direct determinant (Lee et al., 2010; Schifter & Ajzen, 1985). For example, an individual's beliefs that healthy food options are bland in taste (indirect determinant) may affect his positive attitude regarding the benefits of eating healthy (direct determinant). In this scenario, an individual's decision to make unhealthy food choices, despite having positive opinions about the benefits of eating healthy, likely influences, among other variables, his opinion that bland tastes characterize healthy foods. In the Lee et al. (2010) example, the teacher's belief that, despite associated positive results, using computers to design and deliver instruction would take an excessive amount of time is an illustration of how indirect determinants can moderate positive outcomes views. That is, while the teachers believed that

using computers to design and deliver instruction would be beneficial to learners, their beliefs that it would take too much time ultimately meant they circumvented participating in the behavior.

Direct determinants are direct measures of an individual's attitude, subjective norms, and perceived behavioral control, while indirect determinants are the salient beliefs and evaluation of those beliefs that influence an individual's direct determinants and subsequent behavioral intention (Lee et al., 2010; Schifter & Ajzen, 1985). This is, furthermore, a relevant distinction because researchers use the study of direct determinants to predict an individual's behavior (Ajzen, 1985). To understand factors that may influence behavioral intent—an aim of this research—the researcher must have a thorough understanding of behavioral, normative, and control beliefs (Ajzen, 1985). As previously discussed, this study is concerned with explaining the factors that influence instructional designers' decisions to implement MLPs. It did not seek to predict their behavior. Moreover, understanding instructional designers' beliefs may inform future behavioral interventions aimed at changing salient beliefs that negatively impact MLP utilization.

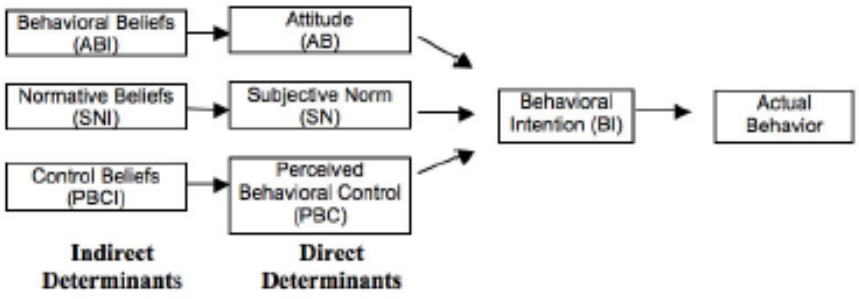

Figure 2: Theory of Planned Behavior (Ajzen, 1991)

Decomposed Theory of Planned Behavior

The Decomposed Theory of Planned Behavior (DTPB) extends the TPB by breaking down indirect determinants (behavioral beliefs, normative beliefs, and control beliefs) by specific belief-based actions (Sadaf, Newby, & Ertmer, 2012; Taylor & Todd, 1995). Specifically, the researcher divided attitudes down to beliefs of perceived usefulness, ease of use, and compatibility; subjective norms to beliefs of peer influence and superior's influence; and perceived behavioral control to self-efficacy beliefs and facilitative conditions (Sadaf et al., 2012; Taylor & Todd, 1995). Since the DTPB focuses on specific variables that influence indirect determinants, using it as a framework for exploring instructional designers' salient beliefs will bring focus to the study. It will permit fuller explanations and deeper understanding of the variables related to instructional designers' decisions to implement MLPs in their lesson designs (Sadaf et al., 2012).

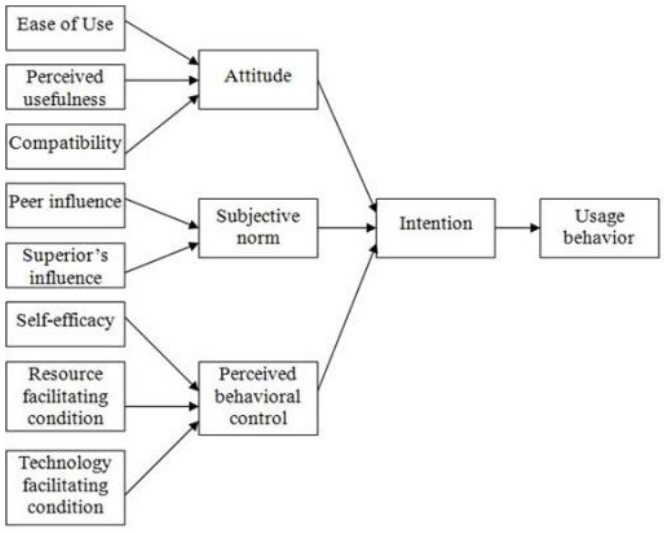

Figure 3: Decomposed Theory of Planned Behavior (Taylor & Todd, 1995)

Behavioral Beliefs

As an extension of the TPB, the DTPB assumes that attitudes towards a behavior are a function of an individual's behavioral beliefs (Ajzen, 1985, 1991; Taylor & Todd, 1995). That is, individuals may form and hold many beliefs about a behavior that may influence their attitudes towards carrying out that behavior (Ajzen, 1985, 1991; Taylor & Todd, 1995). Moreover, while individuals can form many beliefs about a behavior, only a small number of those beliefs are accessible in memory (salient beliefs) (Ajzen, 1985, 1991; Taylor & Todd, 1995). Since behavioral beliefs are assumed to serve as direct determinants of attitudes and subsequent behavioral intent, examining instructional designers' behavioral salient beliefs can provide a better understanding of why they hold specific attitudes and how those attitudes may be changed (Ajzen, 1985, 1991).

In the context of this study, behavioral beliefs refer to instructional designers' beliefs and opinions about using MLPs in their e-learning course development (Ajzen, 1985). Employing the DTPB, this study divides behavioral beliefs into three distinct variables: perceived usefulness, ease of use, and compatibility (Taylor & Todd, 1995). The definition of perceived usefulness is the extent to which instructional designers believe that using MLPs in their e-learning course design will improve their job performance and contribute to refining learner outcomes (Taylor & Todd, 1995). The definition of perceived ease of use is the point to which instructional designers believe implementing MLPs would be effortless (Taylor & Todd, 1995). Lastly, the definition of compatibility is the degree to which instructional designers believe that implementing MLPs would be compatible with their current work (Taylor & Todd, 1995).

Normative Beliefs

Normative beliefs refer to perceived behavioral expectations of important individuals. That is, an individual's expectation that someone important to them wants them to engage or not engage in a particular behavior (Ajzen, 1985, 1991). The DTPB assumes that subjective norms are a function of an individual's normative beliefs and their motivation to comply with the expectations of important others (Taylor & Todd, 1995). As with behavioral beliefs, gaining a better understanding of instructional designer's normative beliefs can help to inform future behavioral intervention by providing insight into where intervention efforts should be focused.

In the context of this study, normative beliefs describe instructional designers perceived social pressure to implement or not implement MLPs in their e-learning curriculum design (Ajzen, 1985). This study divides normative beliefs into two groups: superior's influence (superiors) and peer influence (colleagues; Taylor & Todd, 1995). Research bases these beliefs on the supposition that supervisors and colleagues may hold beliefs that may support or not support instructional designers' use of MLPs (Taylor & Todd, 1995).

Control Beliefs

Perceived behavioral control beliefs refer to instructional designers' views that implementing MLPs is easy or difficult (Ajzen, 1985, 1991). These beliefs are often shaped by previous experiences and perceived barriers. Moreover, the DTPB posits that, given adequate levels of control, instructional designers are more like to use MLPs (Ajzen, 1991; Taylor & Todd, 1995). It is important to note that while it is possible to measure some aspects of control, it may be impossible to measure all factors that influence instructional designers' control beliefs.

Still, as Ajzen (1991) points out, if instructional designers provide realistic accounts of their control beliefs, measures of those beliefs can serve as a proxy for actual control. This is important to this study because control belief measures can contribute to the understanding of instructional designers' MLP use behaviors.

This study divides control beliefs into self-efficacy beliefs and facilitative conditions (Taylor & Todd, 1995). Self-efficacy beliefs are instructional designer's self-assessments of their ability to implement MLPs (Taylor & Todd, 1995). The definition of facilitative conditions are the conditions that may exist that support or do not support instructional designers' use of multimedia principles (Taylor & Todd, 1995).

Knowledge and Skills

Research by Ajzen, Joyce, Sheikh, and Cote (2011) suggests that while the information individuals possess is essential to the decisions they make, in the context of TPB-grounded research, the accuracy of the information can be irrelevant. In previous studies, researchers have frequently observed a lack of correlation between an individual's knowledge accuracy and behavioral intent. For example, while accurate knowledge about AIDS, its causes, and transmission routes is high in at-risk populations, adoption of safer sex practices is low. Similarly, Zoellner et al. (2012) found that while study participants possessed accurate information regarding the negative health implications of drinking sugar-sweetened beverages, adoption of healthier options was lower than expected.

Ajzen et al. (2011) suggest that instead of focusing on ensuring that people possess accurate information, TPB-grounded research should identify the information individuals possess

and explore how this information may affect intention of actions (Ajzen et al., 2011). Thus, to fully explore factors related to instructional designers' behavioral intent, this study defined knowledge as the information instructional designers possessed and how this information either reinforced or did not reinforce the implementation of MLPs. Of course, beliefs and measures of knowledge support are irrelevant if the requisite skills and knowledge are deficient. For example, an instructional designer may possess positive behavioral, normative, and control beliefs leading to intention and subsequent behavioral action, but may lack the knowledge and expertise necessary to implement MLPs correctly. Consequently, this study also sought to identify gaps in knowledge and skills demonstrated by instructional designers.

Application of Conceptual Framework

Understanding which factors relate to intention and subsequent use of MLPs informed this study on methods to improve the implementation of such strategies among instructional designers. In addition, understanding instructional designers' behavioral domain-specific knowledge and how this information guided their intentions to implement MLPs helped to identify behavioral interventions to strengthen their existing supportive beliefs or foster new beliefs that support implementation. Accordingly, this study explored instructional designers' current knowledge of MLPs, along with attitudes, subjective norms, and perceived behavioral control associated with behavioral intention.

Various phases of behavioral intervention development, including implementation, and evaluation use TPB and DTPB (Zoellner et al., 2012). However, the researcher was not able to find any studies that have used DTPB factors and behavioral domain-specific knowledge to

identify DTPB-grounded targets and knowledge gaps in an intervention related to factors that may influence instructional designers' use of MLPs. As Zoellner et al. (2012) pointed out, the majority of TPB and DTPB studies conducted have historically been quantitative in design. While quantitative DTPB research has proven to be useful in measuring the impact of each DTPB factor as a means of predicting human behavior, qualitative studies may be more appropriate in understanding beliefs related to behaviors in specific contexts. This qualitative study used the DTPB factors to explore the beliefs instructional designers hold that may influence their intent. Beliefs were inductively coded from interview data, resulting in emerging themes. While these themes may not be appropriate for behavioral intention prediction, the frequency of each theme was calculated by number of mentions and may represent the extent of their influence on instructional designers' intent to use MLPs. It is worth mentioning that quantitative research would not be possible given the size of the study population–seven instructional designers. Thus, this study endeavored to qualitatively collect a rich data set from several data collecting methods, including interviews, field notes, and analysis of work samples, to accurately and deeply explore the complexity of the problem through various perspectives (Creswell, 2013).

Significance of Problem

This study is significant to the field of instructional design because it will compare instructional designers' knowledge and their actual implementation of MLPs to identify gaps in knowledge and application. Correspondingly, this study explored possible factors that may affect instructional designers' decisions to use those principles. Specifically, by examining knowledge

and skill gaps and identifying designers' attitudes, subjective norms, and perceived behavioral control beliefs regarding MLPs, this research could inform potential behavioral intervention programs aimed at increasing instructional designers' implementation of MLPs.

Significant gaps in instructional designers' knowledge of MLPs may draw attention to the overall understanding of those principles within practicing instructional designers. Ultimately, this study is significant to the field of instructional design because, despite a large body of research in instructional design, cognitive load theory, and multimedia learning, there are no studies that directly relate to instructional designers' implementation of MLPs in e-learning lesson design.

Limitations

This qualitative study is limited in the ability to generalize the findings to another population. Since the researcher will conduct the study in a narrow field within two small corporate organizations, the results may more closely reflect the beliefs and behaviors of the study group, rather than the general population. Specifically, the study may not generalize to all instructional designers because this study focuses on instructional designers working in two small corporations each employing less than 50 individuals in the United States.

It is possible that study participants will not impart their honest opinions and thoughts, particularly if they are attributed to job-related performance failures or knowledge gaps. Therefore, to address problems associated with trust, the researcher reminded each study participant that their responses will be private and that the researcher will protect their confidentiality. Additionally, the researcher provided a consent form to each study participant

outlining the measures taken to ensure their confidentiality. However, despite these actions, a possibility exists that a study participant will be anxious about the negative implications of their responses and provide inaccurate or biased information. Moreover, due to the interpretive nature of this research design, the findings may be subject to alternative interpretations. To address problems related to understandings, the researcher provided a detailed explanation of the data collected accompanied by tables that visually presents all evidence used in establishing interpretations of the research data. The researcher also employed an inter-rater procedure to assess the validity of coding methodology and he collected data from multiple sources to ensure data triangulation.

Summary

In conclusion, this chapter provided a detailed narrative of the background and purpose of this study. Specifically, this study was centered around the implementation of MLPs in e-learning program design due to extensive research suggesting that using MLPs may help instructional designers create e-learning environments that improve learner outcomes. Accordingly, the purpose of this research was to understand better the alignment between instructional designers' knowledge and demonstrated implementation of MLPs and to comprehend the factors that influence instructional designers' intent and actual implementation of those principles. To explore the factors that influence instructional designers' intent to apply MLPs, the DTPB formed theoretical framework for this study and guided the data collection. This research is significant since examining knowledge and skill gaps, and identifying designers' attitudes, subjective norms, and perceived behavioral control beliefs regarding MLPs, may

inform potential behavioral intervention programs aimed at growing instructional designers' implementation of MLPs.

CHAPTER TWO: RESEARCH METHODOLOGY

Introduction

Chapter two provides a detailed description of the research methods and procedures used to conduct this study. Major sections of this chapter include a rationale for qualitative research design, a description of the setting and participants, an overview of investigational design, a description of the IRB approval process, data collection methods, methods for data analysis and synthesis, and ethical and trust considerations. The purpose of this study was twofold: (a) to understand better the alignment between instructional designers' knowledge and demonstrated implementation of MLPs; and (b) to understand the factors that influence instructional designers' intent and actual implementation of MLPs in their e-learning program design.

Rationale for Qualitative Research Design

This study employed a qualitative approach to data inquiry. The researcher chose a qualitative approach over a quantitative one because this study did not seek to establish cause and effect relationships or to make predictions related to MLPs. Instead, this inquiry sought to gain a thorough and multifaceted understanding of the factors that may influence an instructional designer's decision to implement MLPs in e-learning course design. This is important because the researcher must have a profound and thorough understanding of the various facets of the problem to completely understand the implications of the findings (Creswell, 2013). As Creswell (2013) points out, a detailed understanding of the issue "can only be established by talking directly with people, going to their home or place of work, and allowing them to tell their

stories…" (p 48). Speaking directly with individuals and visiting their workplaces to collect data would not be possible using quantitative research methods.

Additionally, this research approach was particularly suitable for this study because qualitative research can empower participants to openly share their opinions and beliefs through the establishment of a collaborative relationship between participants and the researcher (Creswell, 2013). This is pertinent because, to appreciate the environmental and personal contexts associated with the issues explored in this study, participants must feel that they are a part of the research and that their involvement is important and meaningful. Therefore, participant perspectives and opinions are significant ideas in qualitative interviewing (Brayda & Boyce, 2014). Moreover, qualitative interviewing enabled the researcher to gain a deep understanding of concepts that are not easily discernable, such as intention and feelings (Brayda & Boyce, 2014). This required that the researcher listen closely to be able to ask relevant follow-up questions and to solicit a deeper understanding of participant beliefs (Dempsey, Dowling, Larkin, & Murphy, 2016).

Qualitative Study Characteristics

This study adhered benchmark characteristics of qualitative research. Foremost, the researcher conducted this study in the natural setting (Leech & Onwuegbuzie, 2007). Specifically, the data collection during this exploration took place in the instructional designers' workplace, the site where participants experienced the issues described in this research (Leech & Onwuegbuzie, 2007). Conducting the study in the natural environment enabled the researcher to gain a deep understanding of the factors, such as supervisor support, that may contribute to

instructional designers' use of MLPs (Leech & Onwuegbuzie, 2007; Rabinovich & Kacen, 2013). Since a goal of this enquiry was to gain a deep understanding of the problem, conducting the study in the natural setting was critical to the success of the research. In the same vain, data analysis of existing products was limited to those products created by instructional designers during the last six months. Analyzing work samples beyond six months could introduce variables that could have altered the findings of the study (Leech & Onwuegbuzie, 2007). Additionally, during all phases of the study, the researcher acted as the principal instrument. That is, the researcher personally collected and analyzed all data gathered during this study, including conducting the interviews and analyzing existing work samples. As Morse, Barrett, Mayan, Olson, and Spiers (2002) suggest, the researcher plays a relevant role in the success of any investigation and needs to be a key part of the research. Importantly, the researcher's flexibility and active participation in all facets of the investigation is critical to the reliability and validity of a work.

This study employed multiple methods of data collection. Specifically, the researcher gathered data using structured and semi-structured interviews along with an analysis of representative work samples. Using multiple data collection methods to provide different facets of the problem enabled the researcher to carefully consider the study findings through cross verification of data sources. This process is best described as data triangulation. Additionally, the researcher used an inductive approach to thoroughly analyze interview data. (Rabinovich & Kacen, 2013; Thomas, 2006; Zoellner et al., 2012). Inductive analysis refers to collecting and analyzing data to derive themes through interpretations made by the researcher (Thomas, 2006; Zoellner et al., 2012). The purpose of the inductive analysis is to allow themes to emerge in the

data (Rabinovich & Kacen, 2013; Thomas, 2006). Using this approach, the researcher identified themes and subthemes within interview responses. Subsequent sections of this chapter provide a thorough description of the inductive process used.

Lastly, this study adhered to the following qualitative characteristics: reflexivity and holistic account (Creswell, 2013; Leech & Onwuegbuzie, 2007). Reflexivity means that the researcher placed himself in the study and explained how his experiences informed his interpretations of the information. In regard to a holistic account, the purpose of this study was to develop a complex picture of the problem. This included reporting multiple perspectives, identifying the many factors associated with the problem, and identifying emerging themes. The researcher's focus was to identify the complex interactions of factors.

Study Setting and Participant Demographics

Using homogenous purposive sampling, the researcher selected seven professionals who worked as instructional designers (four females and three males) from two similar, but unrelated e-learning development companies, to participate in this study. Three additional participants were invited to participate in the study, but were to unable join because of their limited availability during the study. All participants were white. Each received pseudonyms (e.g. ID2) to protect their identity. Organization A (Group A) employed four participants and Organization B (Group B) employed three. The companies were intentionally chosen because of their similarities and are considered, by the researcher, to be "sister organizations." Before Organization A was selected to participate in this study, two more small e-learning development companies in Central Florida were invited to participate, but choose not to because of privacy

concerns related to client proprietary information and nondisclosure agreements. Organizations were selected because they create and deploy e-learning courses within the business as well as custom courseware that is developed for external clients. The organizations create most courses and generates revenue by selling e-learning courses to external clients. Additionally, both companies use a modified version of the ADDIE model for developing e-learning courses. They are also similar in staff size, yearly revenue, primary market, and the number of e-learning courses developed per year.

It is essential to mention that the researcher is an employee of Organization B and works alongside the study participants in Group B. Furthermore, the researcher does not hold any supervisory responsibilities, and does not have any study participants directly reporting to him. Chapter 2 describes efforts taken by the researcher to safeguard the confidentiality of each participant with steps taken to engender trust between the researcher and study participants.

Institutional Review Board Approval

Before conducting study-related activities, the researcher created and submitted a study application by means of the University of Central Florida IRIS online portal that included: a research protocol (HRP-503) that detailed the contextual framework, research questions, study design, sampling criteria/practice, data management, benefits and risks, and other procedural information; a consent form (HRP-302a) delineating the purpose of the study, what participants would be asked to do, time requirements, confidentiality information, and Institutional Review Board (IRB) contact information; and an email/communication plan. The IRB approved this

study as human participant research that is exempt from regulation. The IRB number is SBE-16-12687 (Appendix A).

Data-Collection Methods

The researcher aligned the data collection with the purposes of the study and he conducted it as follows: a structured interview with each instructional designer to gather data apropos of their current knowledge of MLPs (research questions one and three); an analysis of the implementation of MLPs in relevant work samples (research questions two and three); and a semi-structured interview with each instructional designer concerning their salient beliefs about MLPs (research question four). Afterward, the researcher amassed each data set using a unique instrument employing two different data-collection methods. This section describes those instruments, as well as the procedure the researcher used to conduct the study. A description of the process used to develop interview protocols is also provided.

Alignment Between Knowledge and Application

To understand better the alignment between instructional designers' knowledge and demonstrated implementation of MLPs, this study first sought to explore instructional designers' current knowledge of MLPs. Accordingly, the research collected data using a structured interview protocol that included focused open-ended questions. The goal of the collection of data was to determine which principles instructional designers knew, along with their experiences using each MLP.

MLP Knowledge Instrumentation and Procedure

The instrument created to investigate instructional designers' current knowledge of MLPs was a structured interview protocol. The instrument is displayed in Appendix B. The first section of the protocol included a script that the researcher recited to all participants. The script contained information about the study, audio recording procedures, and additional information about informed consent. In the second section of the interview, labeled warm-up, the researcher used open-ended questions to begin the interview. The researcher asked the participants the following:

1. How long have you worked at your current employer?
2. Describe your professional experience prior to working for your current employer.
3. Describe your formal training in instructional design.

The third section of the interview protocol, titled MLPs, the researcher asked specific questions about the participant's knowledge of MLPs. The researcher asked study participants the following:

1. Define, if you can, the _____ principle in your own words.
2. How confident are you in your current understanding of _____ principle?
3. In what ways have you used this principle in your design of e-learning?
4. Why or why not have you used this principle in your design of e-learning?

To explore instructional designers' actual implementation of MLPs, the researcher conducted an analysis of work samples.

MLP Application Instrumentation and Procedure

The instrument created for the analysis of relevant work samples was a checklist. The instrument is displayed in Appendix D. The checklist was created to calculate the number of correct implementations and violations of MLPs in representative work samples. This checklist included a description of each MLP to aid the researcher in the analysis process. The researcher used a simple table as a location to score the implementation of each principle. For example, if the researcher observed the proper implementation of the coherence principle, the researcher placed a mark in the corresponding box. The researcher reviewed each screen in the module. In addition, he catalogued representative samples of accurate implementations and violations of MLPs during the data collection process that he used to supplement study descriptive analysis. After the researcher completed his analysis of work samples, an assisting doctoral candidate used the same checklist to analyze the Group B work sample. The researcher and assisting doctoral candidate met in person to compare their independent analyses. No discrepancies were found between analyses.

Salient Beliefs Regarding Multimedia Learning Principles

To explore instructional designers' salient beliefs regarding MLPs, the researcher collected data using a semi-structured interview protocol. The goal of the collection of data was to determine what behavioral, normative, and control beliefs study participants held about MLPs.

MLP Salient Beliefs Instrumentation and Procedure

The instrument created for this phase was a semi-structured interview protocol. The instrument is displayed in Appendix B. The first section of the protocol included a script that the

researcher read to all participants, along with relevant information about the study. In the second section of the interview protocol the researcher asked probing questions about the participant's salient beliefs regarding MLPs. The researcher asked the participants the following:

Behavioral Beliefs (a)

1. (perceived usefulness) Do you think using MLPs in your e-learning course design will improve your job performance? How?
2. (perceived usefulness) If a colleague asked you to describe the value of using MLPs in e-learning course design, what would you say?
3. (perceived ease of use) Would using MLPs in your e-learning course design be easy or difficult? Why?
4. (perceived ease of use) Would it be easy for you to become skillful in using MLPs in your e-learning course design?
5. (compatibility) Would using MLPs in your e-learning course design fit well (support or not support) with your organization's development timelines?
6. (compatibility) Would using MLPs in your e-learning course design work well with the way you like to design e-learning courses?

Normative Beliefs (b)

1. (supervisor influence) What influences does your supervisor have on your use of multimedia principles in your e-learning course design?
2. (supervisor influence) Do you think your supervisor would support your use of MLPs?

3. (peer influence) What influences do your colleagues have on your use of MLPs in your e-learning course design?
4. (peer influence) Would your colleagues think you should use MLPs? In what situations do you think they would suggest you not use the principles?

Control Beliefs (c)

1. (facilitating conditions – resources) If you wanted to use the principles in your design e-learning course design, what resources might you need that you don't currently have available?
2. (facilitating conditions – resources) Are there any other issues related to resources that come to mind when you think about the difficulty using the principles in your course design?
3. (facilitating conditions – technology) Is the e-learning authoring tool you use compatible with using MLPs?
4. (facilitating conditions – technology) Would the authoring tool you use to develop e-learning courses help or hinder your use of MLPs? How? Why?
5. (self-efficacy) If you wanted to, do you feel confident in your current ability to use these principles?
6. (self-efficacy) Do you feel confident in your understanding of when to use MLPs?

General Interview Data Collection Considerations

The researcher first invited the study participants to participate in the study via email. The researcher followed-up the email invitation with a one-on-one visit with each prospective

participant to discuss the purpose of the study. During this initial meeting, the researcher established a preliminary schedule for both interviews; and the researcher sent a reminder of each interview via email three days before the interview. The researcher sent a final reminder via email one day before each interview.

The researcher provided study participants with the flexibility to alter the time and date of their interview, as needed. Moreover, the researcher permitted study participants to select the location of their interview. All seven participants designated their workplace as the interview location largely because of convenience. Thereafter, the interview was audio-recorded, with consent, in its entirety. While conducting the interview, the researcher also took limited notes to ensure that he engaged in meaningful dialogue with each participant and effectively guided the discussion, ensuring that he included all requisite points. Finally, all participants were given the opportunity to review the transcripts of their interview, a process known as member checking. Participants were asked to comment on the researcher's interpretations of their interview responses. All participants largely confirmed the interview transcripts represented their views, with only small changes requested by two participants. Changes were implemented and confirmed with each participant during a phone call. Member checking was an important component of data collection because it allowed participants to check the accuracy of their accounts which enhances the validity of findings derived from interview data by ensuring the research did not misinterpret participant interview responses (Creswell, 2013). Since participant interviews were an important source of data for this study, any misinterpretations of interview responses could lead to inaccurate or incomplete study findings (Creswell, 2013). Thus, member checking was an important component of this study.

Interview Protocol Development

Each interview began with several "warm-up" questions. The purpose of these questions was to initiate a casual dialogue and to establish a comfortable and collaborative environment between the researcher and the interviewee (Rubin & Rubin, 2012). Warm-up questions were broad in scope and can best be described as "tour" questions (Rubin & Rubin, 2012). During these discussions, participants act as guides, providing important contextual information about their workplace environment and their experiences (Bloomberg & Volpe, 2012; Rubin & Rubin, 2012).

To develop focused main questions for the MLP salient beliefs interview, the researcher began by rewording each DTPB construct. Having simple descriptions of the DTPB constructs enabled the researcher to create a series of main questions that, by design, were easy to understand and answer. The researcher worked to ensure he did not phrase questions formally or include academic jargon that may be out of the reach of most study participants (Rubin & Rubin, 2012). For example, "Describe your normative beliefs regarding MLPs" would likely confuse most participants. However, "How does your supervisor support your use of MLPs in your e-learning course design" is much easier to understand and encourages dialogue. Once developed, the researcher analyzed each question to ensure the exclusion of any vocabulary, terms, or concepts that the interviewees may not recognize (Rubin & Rubin, 2012).

Once the researcher completed this initial process, a second draft of each question was created, this time with a focus on phraseology. As Rubin and Rubin (2012) point out, "phrasing matters in ways that encourage interviewees to answer based on their own experiences and perceptions" (p.159). It is relevant that the researcher phrased the questions in an open and

inviting format, avoiding judgments and bias (Creswell, 2013; Rubin & Rubin, 2012). If interviewees feel uncomfortable during the interview, they are less likely to be completely open and honest (Creswell, 2013). Thus, it was important that the entire interview maintained a positive and professional atmosphere. Finally, before conducting the interviews, the researcher rehearsed the interview with two instructional designers not participating in the study (Rubin & Rubin, 2012). During this initial testing, the researcher solicited information about phraseology used and the understandability of each question. From this feedback, the researcher revised each question as necessary and developed an interview protocol, which was used during each interview, to guide the discussion.

Methods for Qualitative Data Analysis

Most qualitative studies characterized by large amounts of data that need to be analyzed can be challenging for even the most experienced researcher (Bloomberg & Volpe, 2012; Creswell, 2013; Rubin & Rubin, 2012). A study must have a clear and organized approach to alleviate problems during the data analysis process. Employing an organized approached to data analysis enabled the researcher to bring order and structure to the large amount of data collected during this qualitative research. Moreover, it enabled the researcher to transform raw data, discrete pieces of information, into meaningful units of information that were used to develop study-related inferences (Bloomberg & Volpe, 2012). Therefore, to organize the data analysis of this study, the researcher employed a traditional data analysis spiral method, including organizing the data, reading, and memoing; identifying codes and themes; and interpreting data and themes (Creswell, 2013).

It is significant to note that while this procedure presents what may seem to be successive steps or phases, the data analysis process employed in this study was not linear. Continuous formative assessment of the data analysis process required that the researcher repeat the analysis procedures to address issues or to reflect the researcher's refined understanding of the problem (Creswell, 2013). This process required a considerable amount of time. Thus, the researcher endeavored to be patient, committed, and reflective in his practice.

Organizing the Data, Reading, and Memoing

Once the researcher completed the data collection, he began the data analysis process by organizing the large amounts of raw data collected during each interview. In accordance with recommendations made by Bloomberg and Volpe (2012) regarding qualitative data analysis, the researcher personally transcribed each interview by hand immediately after each interview, and assigned identification codes to each transcript. The researcher made initial connections and helped to identify useful ways to organize the raw data by transcribing the interviews shortly after they have been conducted (Bloomberg & Volpe, 2012; Brayda & Boyce, 2014; Dempsey et al., 2016). Personally transcribing each interview was a great way for the researcher to immerse himself in the data and become more familiar with it prior to moving forward in the analysis process (Bloomberg & Volpe, 2012; Thomas, 2006). Moreover, immersing himself in the data allowed the researcher to generate emergent insights along the way, and the increased familiarity with the details of the data also helped the researcher present and analyze the data (Bloomberg & Volpe, 2012; Thomas, 2006).

Regarding transcription of the interviews, the researcher transcribed each interview verbatim, including aspects of nonverbal communication, such as pauses, body movement, or laughter. The researcher noted all nonverbal communication with parenthesis, as they occurred in the interview. Nonverbal communication indicators can play a major role in understanding the meaning of statements and comments made by study participants (Bloomberg & Volpe, 2012). The researcher also sought to ensure that all information was complete and legible and that he labeled all study data and documentation including dates. Immediately following each transcription, the researcher prepared a document summary, which included simple summary notes of the participants and the interview process. Summarizing interview data enabled the researcher to create a profile for each document and individual research participant (Bloomberg & Volpe, 2012). While the researcher required a significant amount of time and arrangement to adhere to these procedures, it helped to simplify subsequent analysis processes.

Once the researcher transcribed the interviews, the qualitative data collected during the work sample analysis was summarized to illustrate patterns that may augment or supplement qualitative findings. The researcher presented the qualitative data using simple descriptive statics and tables to depict patterns. This allowed the researcher to seamlessly integrate the qualitative data collected during this study with interview data in an overall holistic approach (Bloomberg & Volpe, 2012).

After each interview, the researcher transcribed and summarized the work sample curriculum analysis, and he continued the analysis by reading all available data to understand the complete picture. This included reading transcripts in their entirety several times so that the

researcher could gain an understanding of the interview as a whole, before breaking it down into parts (Creswell, 2013).

As the researcher reviewed the study data, he made notes and comments about any ideas, or concepts that came to mind. These comments were informal and represented the researchers' initial thoughts and comments. Memos included ideas or thoughts about the organization of the data, general comments, notes about possible data gaps that may persist, and questions the researcher wanted to explore (Bloomberg & Volpe, 2012). Overall, these memos represented the researcher's reflective conversation with himself about the research data and analysis process (Bloomberg & Volpe, 2012; Creswell, 2013). Memoing is important because it enables the researcher to move from description to conceptualization and helps build a collection of analytic ideas that he can sort, order and reorder (Bloomberg & Volpe, 2012; Creswell, 2013).

Identifying Codes and Themes

The data analysis process continued with the identification of codes and themes from raw data. To accomplish this, the researcher first used a deductive analysis approach to code each interview back to DTPB concepts (Zoellner et al., 2012). Specifically, the researcher thoroughly reviewed each interview transcript and used priori coding to group data sets back to each DTPB constructs utilized in the interview, including behavioral, normative, and control beliefs (Creswell, 2013; Zoellner et al., 2012). This provided a vital organizational structure that allowed the researcher to present the findings by the specific DTPB variables used in the study.

Next, the researcher independently read each interview transcript several times and generated initial key themes and subthemes. Then, an assisting doctoral candidate independently

identified meaning units (MU) throughout each transcript in the same way as the researcher. The researcher met with the assisting doctoral candidate to compare results, resolve discrepancies, and further develop themes and sub-themes (Hallgren, 2012; Rabinovich & Kacen, 2013). This process best represents an inductive analysis approach to identifying themes and subthemes throughout the raw data (Creswell, 2013; Rabinovich & Kacen, 2013; Zoellner et al., 2012). Inductive analysis refers to "approaches that primarily use detailed readings of raw data to derive concepts, themes, or a model through interpretations made from the raw data by an evaluator or researcher" (Thomas, 2006, p. 238). The primary purpose of the inductive approach was to identify emergent themes that may be significant and appear frequently or dominantly in raw data (Thomas, 2006). An inductive analysis was particularly useful in identifying unplanned or unanticipated patterns and themes (Thomas, 2006). Importantly, inductive analysis enabled the researcher to progressively narrow large sets of data into smaller groups of meaningful information that contribute to themes or patterns (Bloomberg & Volpe, 2012; Creswell, 2013; Thomas, 2006).

Interpreting Data and Themes

During coding process, the researcher prepared data summary tables and actively updated relevant memos and notes created during the initial data analysis process. The researcher used summary tables to assemble and organize what participants said or shared relating to each DTPB construct and how many comments fell under the same construct (Bloomberg & Volpe, 2012). These tables are essential because they provided an easy-to-understand summary of participant data and provided a way for the researcher to support, with evidence, what he claims to have

found (Bloomberg & Volpe, 2012). The tables are also an important part of interpreting study data because they allowed the researcher to look closely at the responses from individuals and the overall group (Bloomberg & Volpe, 2012). Without summary tables, interpretation of the data would be at the discretion of the reader, not the evidence supporting the findings (Bloomberg & Volpe, 2012).

From the initial key themes and subthemes identified, the researcher identified meaning units (Zoellner et al., 2012). Meaning units are defined as phrases or statements that relate to the same central meaning (Bloomberg & Volpe, 2012; Zoellner et al., 2012). Ultimately, the researcher assigned meaning units by the number of mentions in aggregated data and included a label, brief description, and data associated with each meaning unit (Thomas, 2006). Although qualitative research is not typically concerned with quantifying data, tallies, and frequencies in qualitative data can be useful in supplementing narrative data (Bloomberg & Volpe, 2012).

After the researcher identified codes and themes, he reviewed and considered the data in its totality, including themes and meaning units, to establish the larger meaning of the data (Creswell, 2013; Sofaer, 1999; Thomas, 2006). When interpreting the research data and themes, the researcher attempted to explore every possible position to establish and confirm patterns and relationships among the data points (Sofaer, 1999; Thomas, 2006). This process helped to reveal beliefs held by instructional designers that may negatively influence their implementation of MLPs, which can be used to inform future behavioral intervention programs.

Inter-rater Reliability

Using a similar approach as employed by Zoellner et al. (2012) in their qualitative TPB study, the researcher sought the assistance of a fellow doctoral candidate, experienced in instructional design, to independently code initial key themes and subthemes from interview data in two distinct phases. As previously discussed, during the first phase, the researcher used a deductive analysis approach to code each interview back to DTPB concepts. The researcher accomplished this through the use of data tables. Using data tables, the researcher coded each individual interview response to its corresponding DTPB construct: behavioral, normative, and control beliefs. The interview protocol, structured and guided by DTPB construct, was a relatively simple process.

Once the researcher coded the interview data using DTPB constructs, in the second phase, the researcher first independently read through three interview transcripts several times to identify meaning units (MU). MUs are defined in this study similarly to the definition provided by Zoellner et al. (2012), which states that MUs "are defined as the constellation of words or statements that relate to the same central meaning" (p. 1780). Next, a fellow doctoral candidate independently coded the same three interview transcript in a similar way as the researcher. The researcher met with his colleague to compare results of coding activities and to resolve discrepancies through further review of interview data and available field notes. After the researcher resolved coding disagreements and reached a satisfactory level of agreement of 90% in each of the three interview transcripts coded, he continued independently coding the remaining interview transcripts, tabulated the codes, and used them to find patterns. The researcher and his colleague collaboratively coded 43% of the interview transcripts. Finally, the

researcher assigned meaning units by the number of mentions. This approach was adopted because it aligned well with recommendations from research on inter-rater reliability procedures and because of its effectiveness when used by Zoellner et al. (2012) in their qualitative study (Armstrong, Gosling, Weinman, & Marteau, 1997; Creswell, 2013; Thomas, 2006).

Data Triangulation

Data triangulation is an important strategy in fostering study reliability and validity. As Armstrong et al. (1997) suggest, "diverse confirmatory instances in qualitative research lend weight to findings" (p. 597). For the purpose of this study, the researcher used multiple sources of data, including two separate interviews, field notes, work samples, and observation to triangulate the research analysis and findings (Creswell, 2013; Thomas, 2006). Participant responses from each interview were analyzed and compared to identify corroborating or contrasting views as well as to provide various perspectives of beliefs. Field notes were used to augment participant responses by providing additional context not possible through interview transcripts, such as participants behavior while responding to an interview question. Work samples were used to compare instructional designers self-reported knowledge and implementation of MLPs. Similarly, the researcher conducted thematic coding using an inter-rater process (Armstrong, et al., 1997). The researcher wove specific observations and field notes providing context and a deeper understating of participant comments in the description and interpretation of participant responses. The researcher used work samples to compare and corroborate participant comments about MLP knowledge and use.

Ethical and Trust Considerations

Building and maintaining trust between study participants and the researcher, along with conducting the study in an ethical manner is paramount to the success of any qualitative study. This is a notion echoed in research literature. For example, Bloomberg and Volpe (2012) assert that a researcher is responsible for both informing and protecting respondents. Thus, to protect study subjects, the researcher ensured that he informed all study participants about the purpose of the study, the process and advantages/risks of being part of the study, and other information contained in the study research protocol (Rubin & Rubin, 2012). The researcher reminded each study participant that participation in the study was voluntary and that there would not be a penalty or reward for choosing to take part or abstain from the study.

Prior to their participation in the study, the researcher ensured that each study participant received a copy of the interview consent form. The researcher answered any question posed by participants about the research process and consent information being careful to avoid seeming annoyed to ensure each participant felt comfortable asking questions along the way.

All information and data gathered during this study was password-protected and digitally encrypted to protect the privacy of study participants (Bloomberg & Volpe, 2012; Creswell, 2013; Rubin & Rubin, 2012). Only the researcher had access to study data, including audio recordings. Once the researcher conducted an interview, he transcribed the interview, removing all personal identifying information. Once the researcher completed the transcription process, the audio recordings were permanently destroyed.

While the researcher worked diligently to conduct this study in an ethical manner, some participants might have felt that being part of the study put them at risk. Since the study is related

to instructional designers' job, it was vital that the researcher ensured each study participant that they would be protected from risk. The researcher worked rigorously to ensure study participants understood that their participation in this study was not a reflection on their talents; but meant to provide information that may help improve instructional design practice. Fortunately, the researcher had a close relationship with many of the participants, which helped to mitigate some of the concerns they had.

Summary

In summary, this chapter provided a detailed description of this study's research methodology. Specifically, the researcher employed qualitative research methodology to explore the alignment between instructional designer knowledge and implementation of multimedia principles, along with factors that influence their implementation of MLPs. The participant sample consisted of seven individuals, from two similar but different organizations, who worked as instructional designers. The researcher employed two data-collection methods, including individual structured and semi-structured interviews and a work sample analysis. The researcher reviewed the data gathered during the study and coded it to identify common themes and subthemes. Finally, the researcher employed an inter-rater procedure to assess the validity of coding methodology and he collected data from multiple sources to ensure data triangulation.

CHAPTER THREE: RESEARCH FINDINGS

Introduction

Chapter three presents the findings from the MLP knowledge interview, salient beliefs interview, and work sample analysis. The researcher organized major sections of this chapter first by research questions, and then further organized by data collection method and include study setting and participant demographics, instructional designers' knowledge and application of MLPs, and instructional designers' salient beliefs regarding MLPs. The findings developed from the interviews were documented based on themes identified from a thorough review of interview transcripts. The researcher applied priori and emergent thematic coding to determine meaning units (MU) and completed an interrater process to reconcile and validate the development of MUs. Additionally, the researcher explored participants' application of MLPs through an analysis of work samples.

To help to both describe emergent themes and demonstrate how they came about, the findings are supported by examples, mainly direct quotes for varying perspectives. The emphasis throughout is on allowing participant comments to illustrate emergent topics. Additionally, the findings are considered in the context of the purpose of the study, which was twofold: (a) to understand better the alignment between instructional designers' knowledge and demonstrated implementation of MLPs; and (b) to understand the factors that influence instructional designers' intent and actual implementation of MLPs in their e-learning program design.

Finally, the following research questions guided the data collection for this study:

1. To what degree do instructional designers know MLPs?

2. To what degree are instructional designers currently implementing MLPs in the development of online courses?
3. To what degree does an instructional designers' knowledge align with their implementation of MLPs?
4. What salient beliefs (attitudes, subjective norm, and perceived behavioral control) affect instructional designers' behavioral intention and actual implementation of MLPs?

The researcher believes that an enhanced understanding of the factors that influence instructional designers' decisions to implement MLPs would allow managers and supervisors in learning and development departments, as well as the broader instructional design industry, to proceed from a more informed perspective in terms of supporting and facilitating the proper implementation of MLPs. Specifically, this study seeks to identify the factors that may affect instructional designers' intent to implement MLPs in their e-learning course design. The researcher's objective was to gather data and use it to suggest actionable and evidence-based recommendations.

Study Setting and Participant Demographics

Using homogenous purposive sampling, the researcher selected seven professionals who worked as instructional designers (four females and three males) from two similar, but unrelated businesses, to participate in this study. All participants were white. Each received pseudonyms (e.g. ID2) to protect their identity. In total, organization A (Group A) employed four participants and organization B (Group B) employed three.

The organizations were intentionally chosen because of their similarities and are considered, by the researcher, to be "sister organizations." Both organizations create e-learning courses deployed within the organization as well as custom courseware that is prepared for external clients. Most programs created by each organization are revenue-generating courses sold to external clients. Additionally, both organizations use a modified version of the ADDIE model for developing e-learning curriculum. They are also similar in staff size, yearly revenue, primary market, and number of e-learning courses developer per year.

It is critical to note that the researcher is an employee of Organization B and works alongside the study participants in Group B. However, the researcher does not hold any supervisory responsibilities, and does not have any study participants directly reporting to him. Chapter 2 presents detailed information on efforts taken by the researcher to ensure the confidentiality of each participant, along with steps taken to engender trust between the researcher and study participants.

Years of Experience and Tenure

The following demographic data was collected from the first three questions in the MLP knowledge interview. Descriptive analysis was then used to explore the data collected for each question. The researcher used data collected from the first two interview questions to determine participants' years of experience in e-learning development (Can you describe your professional experience prior to working at your current employer?) as well as their years of service with their current employer (How long have you worked for your current employer?).

Overall, most participating instructional designers were experienced in instructional design practice. As Table 2 illustrates, 71% of instructional designers (5 out of 7) held 11 or more years of experience working as instructional designers in e-learning lesson design, averaging 14 years of experience. Only 29% of participating instructional designers (2 out of 7) held less than 10 years of experience. Of those two instructional designers, one participant held five years of experience, while the other held a little over one year. Moreover, the most experienced participant held 18 years of experience, and the most inexperienced participant held just over four months of experience, at the time of the interview. Finally, the average years of experience between all participants was 11.

Table 2: Average Years of Experience

Experience (years)	Participants	%	Average Experience (years)
0 - 10	2	29%	3
11+	5	71%	14
Total	7	100%	11

A comparison analysis between groups showed that Group A participants were the most experienced instructional designers in the study with an average of 15 years of experience, compared to six years for those in Group B. However, participants from both groups averaged just three years of service with their respective employers. Group A had the most tenured instructional designer at six years of service, as well as the most novice at four months. Table 3 displays the average years of experience and tenure between groups.

Table 3: Average Years of Experience and Tenure by Group

Group	Number of Participants	Average Experience (years)	Tenure with Employer (years)
A	4	15	3
B	3	6	3

Formal Education

The researcher used the third interview item (Describe your formal training in instructional design.) to determine participants' formal training in instructional design methodology. An analysis of this data showed that the majority (86%) of participating instructional designers (6 out of 7) had not engaged in formal training. In fact, none of the study participants held a post-secondary degree in instructional design or education. Only one participant, ID7 in Group B, had previously engaged in any type of formal education in instructional design. ID7 stated: "I have taken some classes towards a graduate certificate in instructional design, but I didn't complete it; I think I took 9 out of the 15 credits needed for the certificate." When asked why the individual did not complete the remaining courses required for completing the certificate program, ID7 stated that starting the program was a strategy used to eventually get a job in instructional design; and since that goal had already been achieved, there was no reason to continue. One participant described their formal training in the following way:

> My formal training in instructional design is not much of anything. Because of the way they were doing it at [redacted], my formal training, what got me hired there, was as a web designer, actually. So, I had HTML development training and I was taking the materials and then just converting them over. (ID5)

When asked to describe how they learn instructional design skills and maintain currency in the industry, the majority (86%) of instructional designers (6 out of 7) described learning instructional design competencies from more experienced instructional designers while on the job. Presented below are examples of participant responses:

> I learned from two people that kind of mentored me. I learned from them. I learned from observing and editing the courseware that we were creating. I do read some, you know, websites here and there. But there's nothing I really do formally to keep up on design. It's something that I feel I absorb through either just the work that we do and conversations with coworkers and colleagues. (ID1)

> The training I received about instructional design is actually on-the-job training. The first company I worked for, where I really got into the instructional design field, we had some very knowledgeable, you know, experienced senior instructional designers that really taught us about methodology. That really helped solidify my approach to instructional design. (ID4)

Beyond learning from more experienced instructional designers, the majority (86%) of instructional designers (6 out of 7) described either attending professional conferences, engaging in professional networks, reading literature from industry organizations, or a combination of those, as their preferred source of informal training in e-learning methodology. Only one instructional designer mentioned taking part in professional development relating to MLPs. Table 4 shows a breakdown of informal training methods used by instructional designers.

Table 4: Informal Training in Instructional Design

Types of Informal Training	Number of IDs Coded
On-the-job	7
Professional networks	4
Industry organizations	5
Professional conferences	4
Professional development	1

Prior to working as instructional designers, participants' professional backgrounds ranged from finance to academic publishing to project management. All participants described transitioning into instructional design roles because of interest in the type of work or because of a job opportunity. For example, one participant stated that, while working as an editor, he would apply for open instructional design positions because of his interest in the type of work. The individual described:

> Probably a year and a half into working as an editor is where I thought I could instructional design. So, I applied and interviewed. I didn't get the first job, but the second job I did get. (ID1)

RQ1: To What Degree Do Instructional Designers Know MLPs?

To understand better the alignment between instructional designers' knowledge and demonstrated application of MLPs, this study first sought to explore instructional designers' current understanding of MLPs. Data gathered during this process was collected using the same structured interview protocol used to gather participant demographics data. The aim of the collection of data was to determine the principles instructional designers knew, along with their experiences using each MLP.

To explore instructional designers' knowledge of MLPs, the researcher asked the participants to define each principle in their own words. As Table 5 illustrates, instructional designers in Group A significantly outperformed those in Group B. This data suggests that participants in Group A had previously been exposed to MLPs, while those in Group B had not. Specifically, instructional designers in Group A were able to accurately define an average of 4.5 principles, compared to just one for Group B. Moreover, two instructional designers from Group A were able to correctly define six principles, the highest amount between all participants. Only one participant failed to properly define any principle. The average number of correctly defined principles for Group B was just one, while the average for Group A was four. Lastly, the average number of principles correctly defined by all participants was three.

Table 5: MLP Knowledge

	Group A				Group B		
Principle	**ID1**	**ID2**	**ID3**	**ID4**	**ID5**	**ID6**	**ID7**
Coherence	0	1	1	0	0	0	0
Signaling	0	1	0	0	0	0	0
Spatial Contiguity	0	0	1	1	0	0	0
Temporal Contiguity	0	0	1	1	0	0	0
Expectation	0	0	0	1	0	0	0
Segmenting	1	1	1	1	0	0	1
Pre-training	0	1	0	0	0	0	0
Personalization	0	1	1	1	0	1	1
Concretizing	0	0	0	0	0	0	0
Anchoring	0	1	0	1	0	0	0
Total out of 10	1	6	5	6	0	1	2
Group Average			4.5			1	

Instructional designers' differing prior experience with MLPs was further supported by comments made by a participant in Group A:

> I first read about all this stuff a while ago, and then they came back up when I started working here. It's funny because different people define these differently and I know there's a right definition out there for these. But I don't always remember them. (ID2)

An instructional designer from Group B described a lack of exposure to MLPs in the following way:

> I know Mayer's got 10 or 12 principles he uses and to be honest I don't know what any of them are. We don't use these here and I've never really talked about these in any specific way. So, based on that, I can tell you that I won't be able to define any of these. (ID5)

Of the 10 principles, segmenting and personalization were the most well-known and were each defined by 71% of instructional designers (5 out of 7). Coherence, spatial contiguity, temporal contiguity, and anchoring were all correctly defined by 29% of participants (2 out of 7). Signaling, expectation, and pre-training were correctly defined by 14% of instructional designers (1 out of 7) Lastly, concretizing was the most foreign principle to instructional designers in that none of the participants were able to define it. Table 6 provides a summary of correctly defined MLPs.

Table 6: Frequency of correctly defined MLPs

Principle	Number of IDs	%
Coherence	2	29%
Signaling	1	14%
Spatial Contiguity	2	29%
Temporal Contiguity	2	29%
Expectation	1	14%
Segmenting	5	71%
Pre-training	1	14%
Personalization	5	71%
Concretizing	0	0%
Anchoring	2	29%

RQ2: To What Degree are Instructional Designers Currently Implementing MLPS in Their E-learning Development?

Instructional designers' actual application of MLPs in e-learning lesson design was examined through an analysis of work samples. The researcher worked with department leaders in each organization to collect representative work samples. Because of privacy restrictions stipulated by external clients, some of the intellectual property contained in the figures included in this chapter has been redacted. The organization owning the content conducted the redaction in a way that would not interfere with the analysis of MLP implementation. To confirm this, the researcher was granted temporary access to compare redacted and original versions. This was done to ensure the samples worked well within the study purpose.

Each e-learning sample consisted of one module per organization, which were similar in length (20 slides/screens), design, and multimedia features. To qualify as a work sample, each study participant must have participated in the development of the organization's representative module. For example, ID5, ID6, and ID7 all worked on the course module analyzed for Group B. Thus, the work samples selected represent a snapshot of how study participants implemented

MLPs. Work samples were rejected if other instructional designers outside of study participants contributed to the design or development of a module.

In the analysis of each sample module, the researcher first navigated through the entire program to ensure that each screen appeared as intended. This first navigation of the course did not include any analysis of the content. Once the researcher completed that process, he randomly chose one of two work samples. The researcher then navigated through the module 10 distinct times, one for each principle. During each attempt, the researcher took notes relevant to the corresponding principle being analyzed. This process was then repeated for the Group A module.

Similar to MLP knowledge measures, a comparative analysis of data showed a significant disparity between groups in the observed application of MLPs. Specifically, instructional designers in Group A correctly applied 60% of principles examined (6 out of 10), compared to only 20% for Group B (2 out of 10). Table 7 provides a summary of principle implementation by group. In the framework of this study, the *applied* designation was assigned if the principle was correctly applied throughout the entire sample module. The *violated* designation was assigned if one or more violations of that principle were observed.

Table 7: Principle Implementation Observed in Sample Module

Principle	Group A	Group B
Coherence	Applied	Violated
Signaling	Applied	Violated
Spatial Contiguity	Applied	Violated
Temporal Contiguity	Violated	Violated
Expectation	Violated	Violated
Segmenting	Applied	Violated
Pre-Training	Violated	Violated
Personalization	Applied	Applied
Concretizing	Violated	Violated
Anchoring	Applied	Applied

Coherence

In the context of the coherence principle, the researcher's analysis of work samples was aimed at identifying extraneous material that instructional designers may have added during the design of the curriculum. This included any background audio, sound effects, or imagery that was not related to the lesson topic or that distracted attention from the intended purpose. The analysis of the Group A module did not find extraneous material in any of the 20 slides. Each slide contained only the information that pertained to the slide heading, and all images correlated with the content it illustrated. Conversely, the work sample analyzed for Group B contained two slides possessing images used to enhance the look of the module, but were unrelated to the content. The images were generic stock photography. In addition, the first slide in the Group B sample module contained background audio that played during the narration, making it difficult to understand the vocalized words in the narration. In any event, the remaining 17 slides adhered to the coherence principle.

Signaling

In the framework of the signaling principle, the researchers' analysis of work samples was aimed at identifying instances where instructional designers called attention to seemingly relevant material in the lesson with the use of visual cues like arrows, flashing, and spotlighting or emphasis on spoken words. For this principle, the researcher was looking to locate at least one correct application of the principle within each sample module. Similar to coherence, the analysis of the Group A module showed that the signaling principle was correctly applied throughout three different slides. In those slides, learners were called attention to specific vocabulary terms and important central concepts. The slide accomplished this with bolded text in and spotlighting. Signaling strategies were not observed in the Group B module.

Spatial Contiguity

In the analysis of spatial contiguity application, the researcher sought to identify any images that had associated labels. The aim of this part of the analysis was to learn if instructional designers presented images and corresponding text near each other, rather than far apart. For this principle to be considered *applied*, the researcher observed text information presented near the image it describes. Again, this principle was correctly applied by instructional designers in Group A and violated by those in Group B. In the Group A module, four slides included images that were captioned or described by text in some way. Of those four images, each were properly labeled, and all labels were placed near corresponding illustrations. However, as shown in Figure 4, instructional designers in Group B violated this principle by separating the labels from its

corresponding image and presenting them on opposite sides of the screen. This was the only violation observed for this principle.

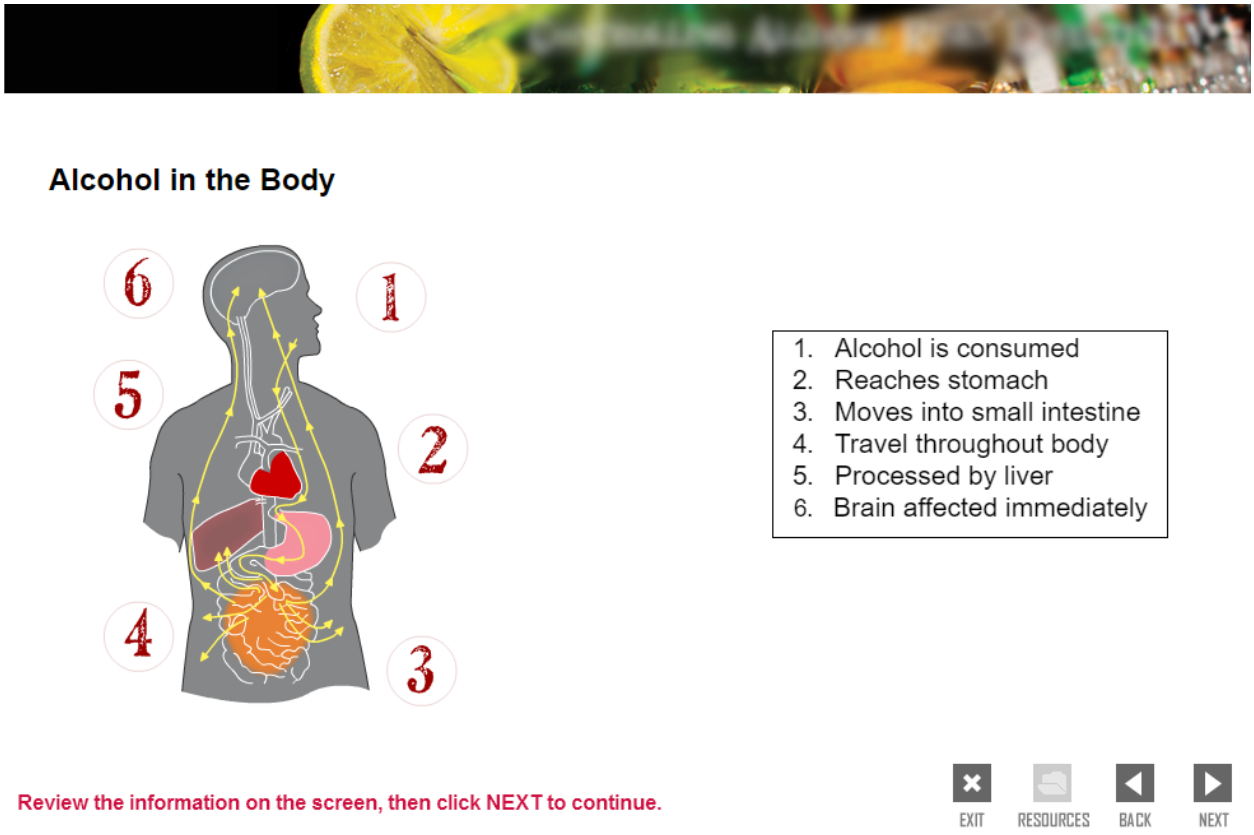

Figure 4 Violation of Spatial Contiguity Principle by Group B

Temporal Contiguity

In analyzing the application of the temporal contiguity principle, the researcher sought to identify any animation or multimedia assets that combined audio and pictorial or textual information. The aim of this part of the analysis was to identify if instructional designers presented corresponding verbal words and images simultaneously, rather than successively. This principle was considered *applied* if the slide narration was presented at the same time as the

corresponding image, text, or animation. Unlike the previous principles, the temporal contiguity principle was violated by both groups. The Group A module incorporated animation in 2 slides. In each slide, the on-screen text was supposed to slowly appear in conjunction with the narration. However, the researcher experienced problems with the syncing of the narration and on-screen-text. This caused a great deal of distraction. For example, in one slide, the on-screen text consistently appeared 5 seconds after the corresponding narration. Another screen progressed with the narration, but the text did not appear until the end. It was unclear how much of the problem was caused by a web browser or the design of the modules. Figure 5 illustrates a sample screen of the animation problem with the Group A sample module.

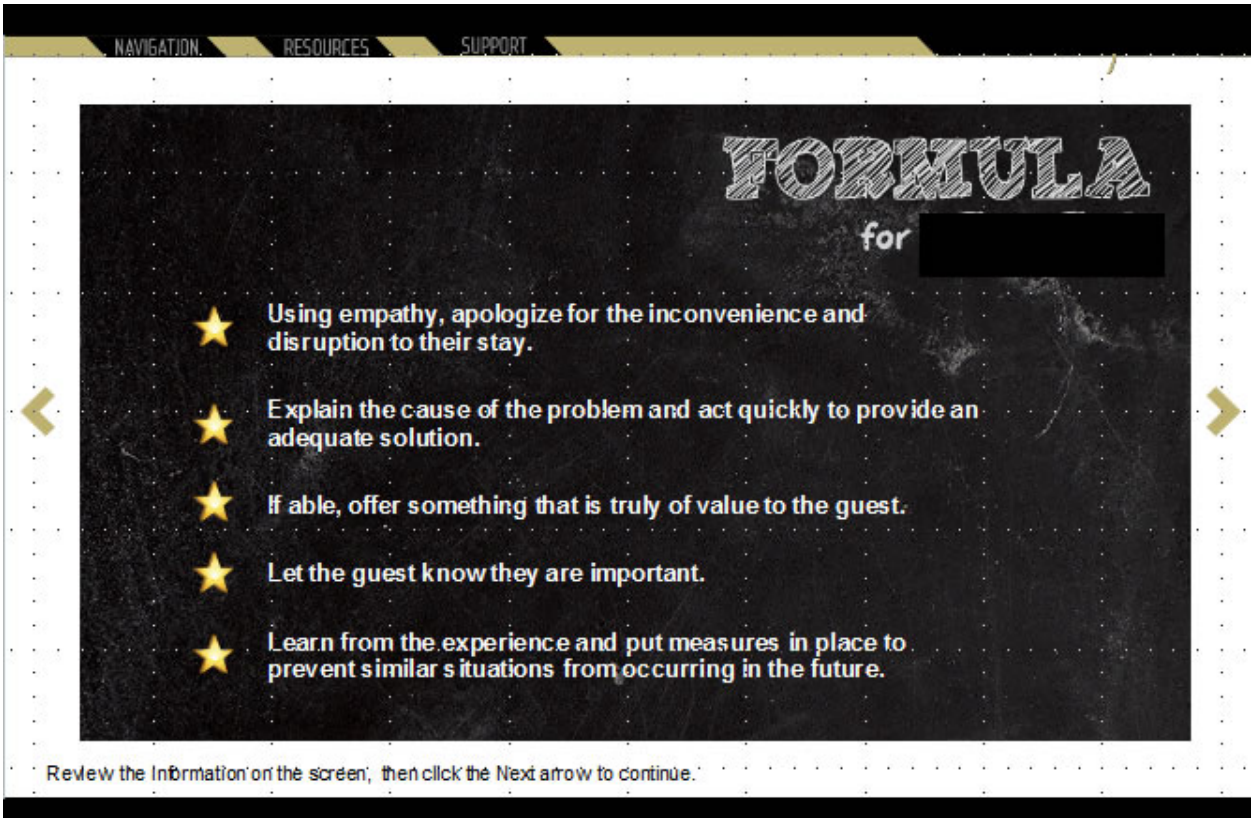

Figure 5: Violation of Temporal Contiguity Principle by Group A

Expectation

To analyze the application of the expectation principle, the researcher sought to identify if learners were shown in advance the types of test items they would have to complete at the end of the module. This principle was considered *applied* if the researcher observed any slide or text at the beginning of the module that informs the learners of that instruction. For example, they will be asked to give examples of instructional principles or complete multiple-choice questions. Unfortunately, the analysis of work samples showed that the expectation principle was violated by both groups. Neither work sample provided learners an explanation of what would be expected of them. Instead, each module began with a brief introduction to the topic.

Segmenting

In the context of the segmenting principle, the researchers' analysis of work samples was aimed at identifying instances of difficult or long bodies of the text information separated into chunks, rather than presented in one long narrative. This principle was considered *applied* if processes were broken into procedural steps, or if text was presented in small amounts. The analysis or work samples showed that the segmenting principle was correctly applied in the Group A module, but violated once in the Group B module. The Group A module presented all textual information in smaller chunks. While instructional designers in Group B also chunked textual information, they failed to divide a process, presented in one slide, by its corresponding procedural steps. Instead, the video played through the entire process.

Pre-Training

To analyze the application of the pre-training principle, the researcher sought to identify if learners were given any form of pre-training in the names and characteristics of the key concepts. This principle was considered applied if the module informed learners of key information they needed to know before they watched a narrated animation. The work sample analysis indicated all instructional designers violated this principle. Neither group called attention to or informed learners of significant information before animations of video.

Personalization

To analyze the personalization principle, the researcher sought to identify whether or not the textual information presented in each module was in a conversational style rather than formal style. This principle was considered *applied* if the written and spoken words in each module were consistently presented in a relatable form using “I” and “you” rather than third-person. This principle was correctly applied by all instructional designers. Each module used the third-person form and presented information in a relatable way, making it easy and enjoyable to read. Figure 6 shows how instructional designers in Group A personalized the text.

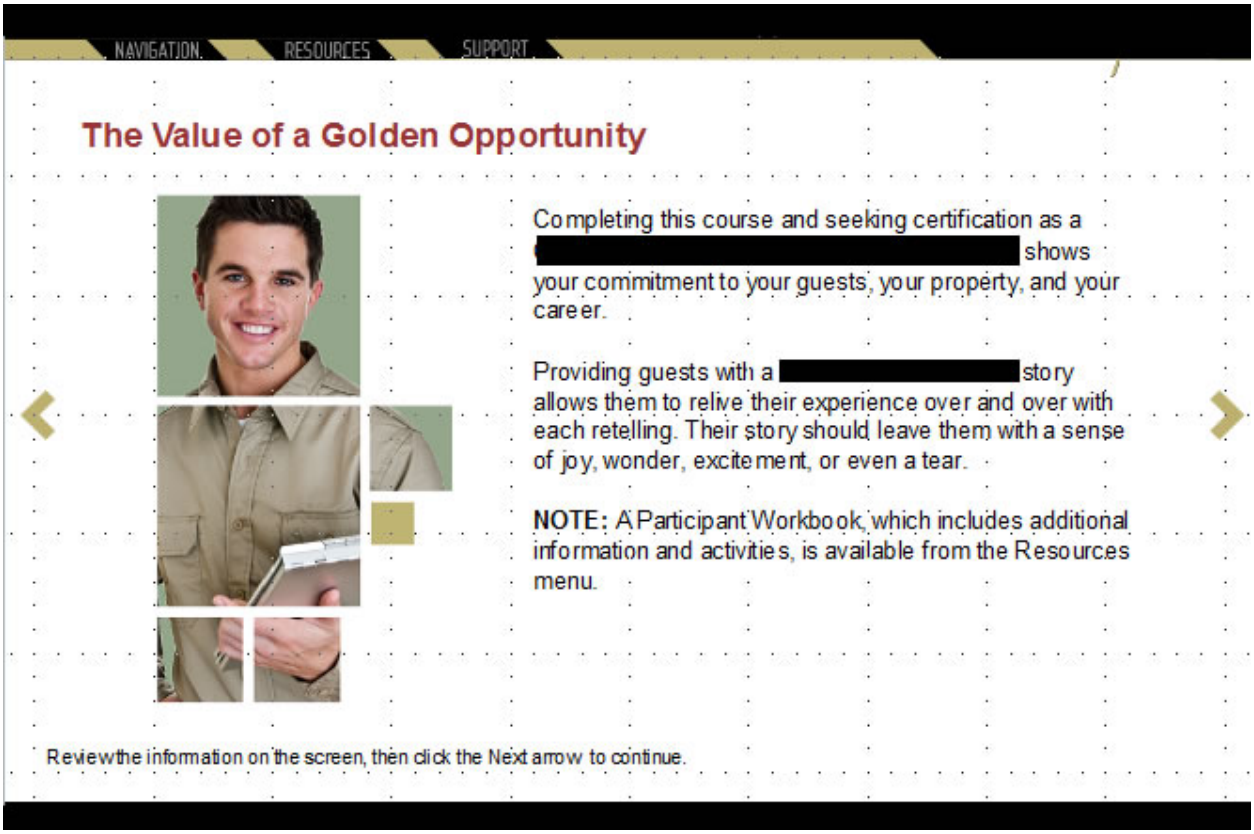

Figure 6: Application of Personalization Principle by Group A

Concretizing

To determine if the concretizing principle was correctly applied, the researcher sought to determine if the instructional designers related unfamiliar material with familiar knowledge to enhance learning. This principle was considered *applied* if new concepts were tied to ideas to which people were already familiar. The researcher did not observe either group apply the concretizing principle in their work sample.

Anchoring

To analyze the anchoring principle, the researcher sought to identify whether or not concepts and ideas were presented in the milieu of a familiar situation. This principle was considered *applied* if the instruction presented concepts in real-world scenarios. The analysis of data showed that the anchoring principle was correctly applied by both groups. In the Group B sample module, several screens provided knowledge checks that were written in real-world scenarios. Figure 7 illustrates the correct application of the anchoring principle by instructional designers in Group B. In this example, instructional designers described a real-world scenario regarding checking identification. Similarly, the Group A module frequently presented content in real-world situations.

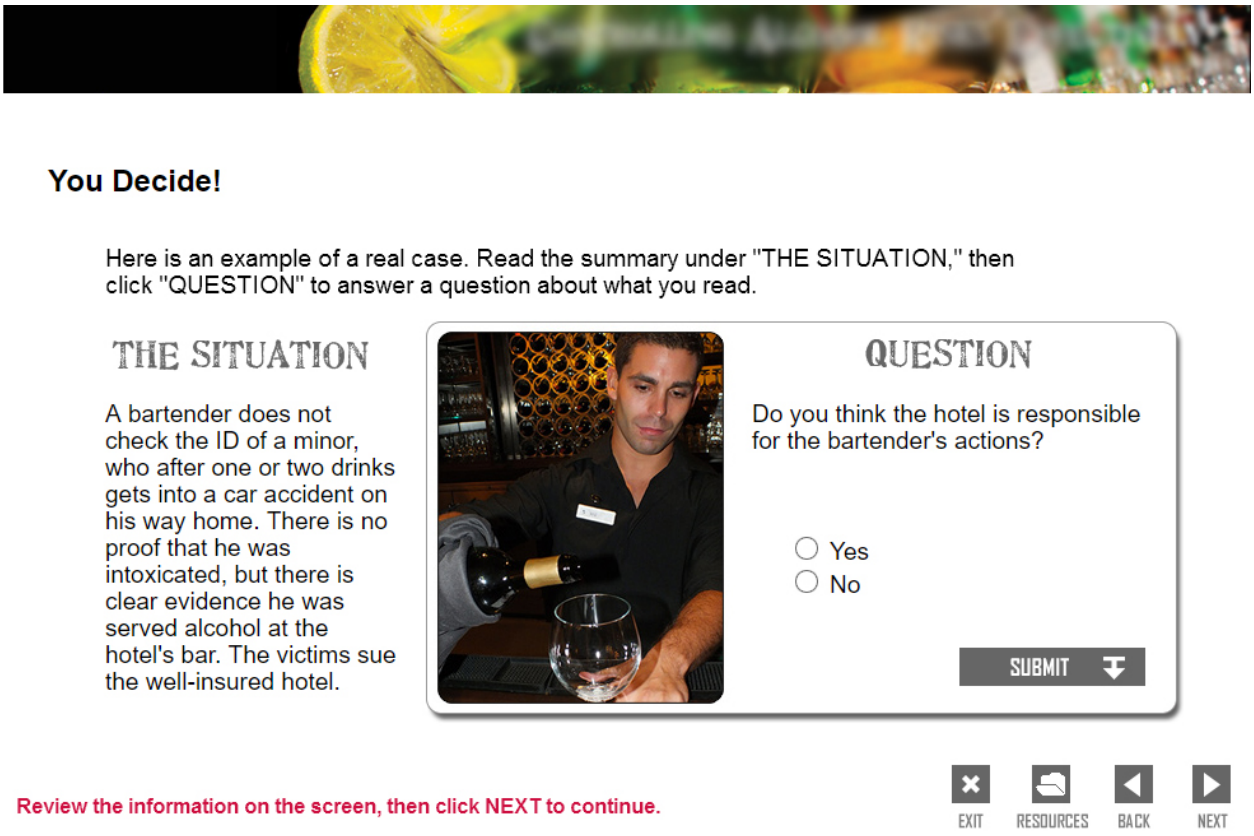

Figure 7: Application of Anchoring Principle by Group B

RQ3: To What Degree Does an Instructional Designer's Knowledge Align with Their Implementation of MLPs

The data collected from the knowledge interview and work sample analysis showed that instructional designers with prior experience using MLPs could apply them more frequently. In fact, exposure to MLPs was the single most important indicator of MLP knowledge and application. Specifically, of the three participants from Group A who correctly defined at least 50% of the principles, all reported varying past experiences using MLPs. As previously discussed, the work sample analysis showed that instructional designers in Group A correctly applied 60% of MLPs. Therefore, the data suggests that exposure to MLPs has a positive

influence on the application of MLPs. However, it is vital to note that the researcher did not observe the complete application of MLPs. This suggests barriers may exist that negatively influence instructional designers' application of MLPs, despite positive prior experiences and knowledge of MLPs.

RQ4: What salient beliefs (attitudes, subjective norm, and perceived behavioral control) affect instructional designers' behavioral intention and actual implementation of MLPs?

To explore instructional designers' salient beliefs and opinions regarding each MLP, the researcher conducted a second, semi-structured interview, containing open-ended questions grounded by Theory of Planned Behavior (TPB) concepts (attitudes, subjective norms, perceived behavioral control). The researcher formatted the interview protocol using an expanded version of the TPB known as the Decomposed Theory of Planned Behavior (DTPB) to establish explicit sections that he used to prompt opinions and beliefs about MLPs. The researcher asked probing questions to clarify the meanings of the responses and to gain insight into the topic being discussed. Data collected from the interviews were coded and analyzed as previously described. The goal of the collection of data was to identify possible factors for instructional designers' decisions not to implement MLPs in their e-learning course design.

Several themes emerged from the analysis of instructional designers' behavioral beliefs. First, all instructional designers (7 out of 7) perceived MLPs as a useful tool for e-learning development and expressed various examples of their usefulness. However, despite instructional designer's positive usefulness beliefs, only 43% of instructional designers (3 out of 7) perceived MLPs as easy to use. Moreover, many participants recognized that MLPs are simpler to implement in some situations rather than others. These beliefs were often tied to specific

principles, situations, or a combination of both. Finally, instructional designers' beliefs about compatibility were split between positive and negative beliefs. Negative beliefs appeared to be tied to judgments held from past negative experiences. Table 8 provides a summary of all MUs coded.

Instructional Designers' Behavioral Beliefs About MLPs

Behavioral belief is defined as instructional designers' views and opinions about using MLPs in their e-learning lesson development (Ajzen, 1985, 1991). Employing the DTPB, the researcher decomposed behavioral beliefs into three belief-based actions. They are perceived usefulness, ease of use, and compatibility (Taylor & Todd, 1995). Perceived usefulness is defined as the extent that instructional designers believe that using MLPs in their e-learning course design will improve their job performance and help improve learner outcomes (Taylor & Todd, 1995). Perceived ease of use is defined as the degree to which instructional designers believe implementing MLPs would be easy (Taylor & Todd, 1995). Lastly, compatibility is defined as the extent to which instructional designers believe that implementing MLPs would be compatible with their existing values, past experiences, and current work environment (Taylor & Todd, 1995).

Table 8: Instructional Designers' Beliefs About MLPs

Indirect determinants	**Belief-based measures**	**Belief responses (Meaning units)**	**Number of IDs coded**	**Number of responses coded**
Behavioral beliefs	Perceived usefulness	Bu1: Provides guide for design	4	10
		Bu2: Improves learner engagement and outcomes	7	23
		Bu3: Grounded in research	5	15
	Perceived ease of use	Be1: Most are easy to implement	3	8
		Be2: Some difficulty in certain situations	4	13
		Be3: Difficult names	4	7
	Compatibility	Bc1: Already implementing some	7	24
		Bc2: Relatable to personal experience as learner	6	11
		Bc3: Contradicts client requests	4	8
		Bc4: Not part of front-end analysis	3	7
		Bc5: Short deadlines	6	11
Normative beliefs	Supervisor influence	Ns1: Familiar with and encourages us of MLPs	2	5
		Ns2: No influence	2	6
		Ns3: Limiting influence	3	4
	Peer influence	Np1: Support best practices	6	9
		Np2: Lack of exposure to MLPs prevents peer influence	5	11
Control beliefs	Facilitating/constraining conditions	Cf1: Changing web browser standards	4	8
		Cf2: Authoring tools are limiting	3	5
		Cf3: PD/training	6	11
	Self-efficacy	Cs1: Can apply with guide	6	8
		Cs2: Confident with practice	7	13

Perceived usefulness (Bu1 – Bu3)

As Table 9 illustrates, all instructional designers expressed mainly positive beliefs regarding the usefulness of MLPs. Moreover, 86% of participating instructional designers (6 out of 7) described more than one way they believed MLPs were useful. The most prevalent belief among all study participants was that MLPs could help instructional designers create e-learning lessons that are more engaging and produce improved learner outcomes (Bu2 in Table 9). In describing how MLPs help instructional designers, one participant stated:

> I think these principles help you design more effective courses. You know, it helps them get the most out of the course. I mean, it depends on what the course is. If it's for them to pass an exam at the end or whether it's for them to apply something that they will apply to their work. I mean, it depends. Your approach might change. But whatever it is, using those principles is going you make course that helps them learn better and perform better, too. (ID7)

Table 9: Summary of Perceived Usefulness MUs

Belief responses (MUs)	**Number of IDs coded**	**Number of responses coded**
Bu1: Guide for design	4	10
Bu2: Improved learner engagement/outcomes	7	23
Bu3: Grounded in research	5	15

Of the instructional designers that identified MLPs as useful in improving learner engagement, 75% associated the benefits and usefulness of MLPs with the overall benefits of

using multimedia in learning situations. For example, ID3 explained that multimedia instruction was more appealing than traditional methods. The individual cautioned, however, that MLPs were crucial in ensuring multimedia is used correctly. ID3 stated:

> I think that when we use these principles to make sure we use multimedia elements correctly, it takes it out the mundane, you know. It's a departure from that. It's a great way to mix it up and teach a concept using, you know, visual and audio, and animation. Anything that activates more of those senses is, I think, going to have more value and more potential to transfer the knowledge. But only if we do it right.

In a similar way, ID1 described multimedia instruction as an enjoyable experience and contrasted it with traditional learning environments. ID1 stated:

> Well, I think it's engaging. I think that it helps the learner retain some information and it makes the learning more interesting rather than just sitting and looking at a slide or listening to an instructor droning on and on. So, I think it's engaging, it's colorful, its pleasing to the eye. Its's kind of like just sneaking the learning in there where maybe they don't feel like its training that they have to endure. It's something that is enjoyable and they walk away with the information they need.

A small majority of instructional designers (57%) expressed positive beliefs about MLPs as a guide for good e-learning development (Bu1 in Table 9). Based on participant descriptions, these instructional designers found MLPs valuable in guiding their decision-making during the design and development phases of e-learning course development because it could help them make design and development decisions. MLPs were often described as an effective way to remove subjectivity in design decisions. Two participants described this in the following way:

> What it does is it gives me a toolkit. That's the way I think about the principles. I have my own sort of gut feelings about what works, in terms of learning. But those are all based on what works for me, pretty much. Or, you know, maybe things I've seen in a classroom or heard from people anecdotally. What MLPs do for me is that they give me a sense about what might work for a larger audience. (ID5)

> All these principles are like guidelines. At least that how I think of them. You know, any time you're given a set of parameters, that's kind of nice. It's almost like a reality check for what you're doing. You know, it helps you color in the lines in a way. When you have parameters to work with you don't have to guess if something is going to work or not. (ID3)

The confidence instructional designers felt in using MLPs as a guide was regularly tied to positive beliefs that MLPs were effective because they are evidence-based and supported by research. In fact, 71% of instructional designers (5 out of 7) perceived MLPs as useful because they are based on research (Bu3 in Table 9). On this point, ID4 commented: "There's a lot of research and methodology that shows that these principles work when put into action." As another instructional designer put it:

> Well there's a reason why learning theory exists. I mean, we're not just putting information out there in, you know, any way that we feel like. There's a reason why we use these principles. They've been proven to be effective to help people retain the information we're trying to present. To actually to be able to use it. (ID7)

However, despite expressing positive feeling regarding the validity of MLPs, one participant expressed feeling conflicted with knowing MLPs were supported by research and what she knows from her past experiences. ID2 explained this in the following way:

> You know, what these researchers say makes sense to me. So, I believe that what they are saying is true. But I don't always agree with everything they say, even though I know they are evidence-based. There are just some things that just don't vibe with my personal perspective. And in those things, it's very possible that I'm not correct because they are research-based.

Perceived Ease of Use (Be1 – 3)

Unlike perceived usefulness, instructional designers mostly held negative views regarding MLP ease of use. As Table 10 shows, only 43% of instructional designers (3 out of 7) believed that MLPs are easy to implement (Be1 in Table 10). Moreover, the majority (86%) of instructional designers recognized issues and challenges in implementing MLPs. One of the challenges expressed was that some MLPs can be difficult to implement in certain circumstances (Be2 in Table 10). These beliefs were often tied to instructional designers' previous experiences creating e-learning training. Three participants conveyed this view when they said:

> I don't think pre-training lends itself to the way that we design courses. We don't have a whole lot of procedural type of e-learning courses. The procedural stuff that we have is generally not in e-learning format. It's more of a print seminar kind of format. So, I'm not saying it couldn't be done. I'm just saying that that's not typically what we do. (ID7)

I guess in some cases it just depends on the topics. You know, there's a course I did recently that was really more informational. It was just information that they needed to know. I didn't really see a need go crazy on these things. These principles. I know that sounds silly, but it was really just something they needed to know to enroll in some benefits. It kind of replaced a PowerPoint presentation that HR was going to give them. (ID1)

Some of them would be easier than others. Some of them apply to the content of our courses more than others. I think we talked about that in the first interview. Some of them just don't lend themselves to the concept that we're trying to teach. So, those would not be easy to implement, but others would be. (ID6)

Table 10: Summary of Perceived Ease of Use MUs

Belief responses (MUs)	**Number of IDs coded**	**Number of responses coded**
Be1: Most are easy to implement	3	8
Be2: Some difficulty in certain situations	4	13
Be3: Difficult names	4	7

In addition to concerns regarding the scope of MLP application, 57% of instructional designers (4 out of 7) expressed negative beliefs regarding the names of MLPs (Be3 in Table 10). Comments in this vein suggest that the formal names of some MLPs can be difficult to understand and may be unappealing to some instructional designers. In this regard, two instructional designers stated:

> I don't think it’s easy to use the principles at times because the names really put you off. It makes them seem very esoteric and very far away from the very practical world of creating e-learning. The explanations of them aren't a whole lot better than the names. They come from such an academic world that they don't translate themselves very well. It's about accessibility, I think, more than anything else. They just aren’t that accessible. (ID2)

> I mean, I know they have to be called something but to me the names are more confusing than the actual explanations of what they are. So, that's where I have a hard time sometimes because I didn’t study them formally. So, when I start hearing about this principle or that principle and some of these names, it doesn't pop into mind necessarily what they are because I haven't studied it that way. (ID5)

Negative comments regarding the names of principles were also noted during the first interview. When asked to define temporal contiguity, ID6 stated: “What the heck is a contiguity?” Similarly, at the beginning of the interview, ID5 stated: “I’ll be honest, before today I hadn’t seen any of these and half of them I can’t even pronounce.”

Compatibility (Bc1-Bc5)

Among all meaning units coded within the behavioral beliefs domain, compatibility items generated the highest number of responses. The most prevalent comments were about current implementation of MLPs. All instructional designers (7 out of 7) expressed beliefs that, while they may have been unaware of the formal names of MLPs, they already implement some MLPs

in their e-learning program design (Bc1 in Table 11). Coherence, signaling, and segmenting were among the most frequently named principles.

Table 11: Summary of Compatibility MUs

Belief responses (MUs)	**Number of IDs coded**	**Number of responses coded**
Bc1: Already implementing some	7	24
Bc2: Relatable to personal experience as learner	6	11
Bc3: Contradicts client requests	4	8
Bc4: Not part of front-end analysis	3	7
Bc5: Short deadlines	6	11

Moreover, many positive ease of use beliefs were tied to instructional designers' past experiences as learners. In fact, 86% of instructional designers expressed that MLPs corresponded with the way they like to learn (Bc2 in Table 11). One participant expressed this view in the following way:

> I think for me personally as a learner, they all make sense. I think it speaks to the way I know that I learn. So, I think it's easy. It makes sense for me to be designing with these principles in mind and making sure principles they are being implemented because I know *oh this is going to help someone understand the content better and learn and retain information better*. So, I think it's easy for me to include them in my design. (ID4)

Despite these generally positive beliefs, 57% of instructional designers (4 out of 7) expressed negative ease of use beliefs related to external clients. This was recognized as a constraining condition (Bc3 in Table 11). The typical comments indicated that clients often make requests that violate some MLPs. Those requests are usually implemented because of clients'

inherently strong influence in the development process. Participants expressed this concern in the following ways:

> I had a client who has a very strong internal culture and they loved to put pictures of their mascot everywhere. I mean, they really loved all of that. Despite my best attempts, and because I wasn't as strongly committed to that principle then, I used their images. The thing was in almost every slide. I didn't make any sense to me but that's what the client wanted. You know, they thought it was great. Now, I will say I'm not sure that the fact that people loved it meant that it was good learning. But, it was good for the client. (ID2)

> You know, sometimes you just have to learn to choose your battles. I know that this was for a client we had already done a course for and this new project was in the same vein as how some other courses have been designed. So, you know, kind of unfortunate because it maybe wasn't as instructionally sound as it could be. I just had to let it go. (ID4)

> There are clients of ours who simply want a page turner. You know, they want a page full of text bullets or they just talking heads. And we're certainly willing to do that, you know, if that's what they're after. A lot of these clients are, you know, either looking just kind of check the box on training or they have a very limited budget or timelines. And, you know we just simply do what they want even though we know it's not in the best interest of the leaner. (ID1)

In addition to negative beliefs regarding external stakeholders, three instructional designers (43%) stated that, because MLPs are not part of the initial design process, instructional

designers may struggle to find time later in the development process to implement the principles. The following participant statements illustrates this view:

> We're pretty good about building time upfront for what we call high-level design. Which is a collaborative event. So, it really allows the IDs to spend time determining how to best present the content. But what I've never seen is us specifically talk about these principles. I've actually been part of these sessions where, looking back now, we definitely violated some of these principles in our design. (ID4)

> I think if that was the case there needs to be some time in that project plan to make sure that everyone is using these principles in and effective manner. And that's hard because you, it's worth it because the training will be better for it. But it's not always seen as important when, you know, sometimes the date is driving everything. That's the unfortunate nature of, you know, when you're making training for a corporation (ID4)

> I mean, you sort of have to work with the principle from the very beginning of the design so that you can think through what is useful or not. And to use the principles, I think you need take a step back and think about the kind of training first before you start to going in and plan. (ID2)

Finally, 86% of instructional designers (6 out of 7) expressed negative compatibility beliefs regarding development timelines (Bc5 on Table 11). Typical comments suggest that instructional designers feel they sometimes work within strict timelines. MLPs were frequently viewed as a process that required additional development time. Participants envisioned having to

choose between which MLPs they had time to apply, if any, to stay on schedule. Instructional designers expressed this concern in the following ways:

> I'm not sure if it would fit well with my normal timelines. Maybe some projects would be OK. But I know other where it might not work. Like, some of these principles requires a little more planning and I don't know if I always have that time. Sometimes we just have to turn the product around quickly to meet whatever deadline the is set. (ID1).

> When timelines are super tight or I'm overloaded with work, it's easy to just jump right into designing. You know, sometimes it's really easy to just jump developing and course and before you know it, you're kind of locked into a design. So, what I would say is that it's challenging to really use all of the principals. It's easier to use the one's that I'm most familiar with than it is to think about all of the principles or to go and check if I've adhered to them. (ID2)

> A lot of times, you know, the timeline for production sort of dominates what you do. I usually do try to think of these principles and ways to do things so that we adhere to them. But, you know, there may be some corner cutting instructionally that are done because you've got to get the thing out. (ID3)

Instructional Designers' Normative Beliefs About MLPs

In the context of this study, normative beliefs describe instructional designers ' perceived social pressure to implement or not to implement MLPs in their e-learning program design (Ajzen, 1985, 1991). This analysis breaks down normative beliefs into two groups: superior's influence (supervisor) and peer influence (colleagues) (Taylor & Todd, 1995). These beliefs

assume that supervisors and colleagues may hold their own beliefs that may support or not support instructional designers ' use of MLPs (Taylor & Todd, 1995).

Similar to behavioral beliefs, instructional designers' normative beliefs were both positive and negative. First, there was a nearly even split in instructional designers' beliefs regarding their supervisors' influence, where 57% (4 out of 7) found their supervisor to have little or no influence on their use of MLPs. Conversely, instructional designers' beliefs regarding peer influence were mostly positive, whereas they also expressed the limiting effect the lack of exposure to MLPs may have on that influence. Lastly, an emerging theme in this domain was external components. The majority (86%) of instructional designers expressed predominately negative beliefs regarding external stakeholders in that they can have a constraining influence on the application of MLPs.

Supervisor Influence (Ns1 – Ns3)

Overall, the instructional designers reported very different experiences in the type of support they received from their supervisor. First, only a few (29%) instructional designers expressed positive beliefs that their supervisor would support their used of MLPs (Ns1 in Table 12). Their comments were unique from other participants in that it appeared these instructional designers have a close professional relationship with their supervisor, who provides guidance in their work. Each participant conveyed this view when they said:

> I'm very lucky that I'm working for an organization that's very much interested in where the rubber meets the road. Their asking question like *What the learner needs? What learner's experience? Is it pleasant? It is a transferring what it needs to transfer?* So, all

of these things push that directive and I think that's something that my supervisor totally embraces and encourages me to do. (ID3)

My boss was the person who trained me on how to be an instructional designer in the first place. Even back then, you know, 11 years ago, these things were around already. We were already talking about them. They were essential to her and they were essential to the company we work and they're still important to all of us. (ID4)

Table 12: Summary of Supervisor Influence MUs

Belief-based Measures (MUs)	**Number of IDs coded**	**Number of responses coded**
Ns1: Familiar with and encourages use of MLPs	2	5
Ns2: No influence	2	6
Ns3: Limiting influence	3	4

Most (71%) instructional designers expressed various negative beliefs regarding their supervisor's influence. Two instructional designers believed that their supervisor did not have much of an influence on their e-learning course design (Ns2 in Table 12). ID1 conveyed this by saying:

I think that depends on the project because she is not necessarily deeply involved in all the projects that I'm involved with. Yeah, I guess it just depends on if she is on the project. When she's not involved in a project I'm in, she's really not that involved in how we design the courses. I think she's got a lot of other stuff going on so she really isn't that available to us all the time. (ID1)

Other participants (43%) expressed negative beliefs regarding their supervisor's constraining influence on design choices (Ns3 in Table 12). The following are some of ways these participants expressed their frustration in having limited flexibility in their work:

> Currently my supervisor has a huge influence because she was there before me and has designed all the templates that she requests I use. So, I'm kind of tied down to what she has laid out in the template and what she likes. You know, she wants all of the courses in this program to all look and feel the same. So, I'm kind of tied down in that regard and it makes it difficult to try something new. (ID5)

> I currently I'm on a project where I have a supervisor who is not well-versed at all in this stuff. So, with the different things I do, I'm having to substantiate what I'm doing. And her response is sometimes *Well I don't think that's important*. Or *Well that doesn't matter*; *That's not how this client thinks*. She's the one that deals with the client, you know, so I have to say OK and just kind of let it go. (ID2)

Peer Influence (Np1 – Np2)

Despite the differences in the views of their supervisor's influence, all instructional designers expressed positive views regarding their colleagues. The majority (86%) of instructional designers (6 out of 7) believe that their colleagues generally support the use of evidence-base best practices (Np1 in Table 13). Two participants described this in the following way:

> I think. It's really expected that we all are understanding these principles and following them. I think obviously, some people have more familiarity and, you know, have

practiced using them more than others. But, we're really good at being collaborative and on any given project there's usually a few of us. We're all interested in making sure that we're making the best training possible and making the best learning experience possible. So, we're pretty good about working together to make sure that those things happen. (ID4)

I've been inspired often by seeing their work and what they were able to do. You know for lack of a better word copying it because I saw it was effective as a learner when I witnessed their work and realize the effect it had for me I realized I wanted to duplicate that in the course that I was creating. So, I would say that's probably more than studying more than reading more than anything else. My coworkers have been the biggest influence for inspiration me. (ID6)

Table 13: Summary of Peer Influence MUs

Belief-based Measures (MUs)	**Number of IDs coded**	**Number of responses coded**
Np1: Support best practices	6	9
Np2: Lack of exposure to MLPs prevents peer influence	5	11

Despite the overwhelmingly positive views regarding peer influence, 71% of participating instructional designers believed that a lack of exposure to MLPs can limit their colleagues' ability to positively influence MLP use (Np2 in Table 13). Two participants described this in the following way:

> I don't think that they would ever say not to use the principal. I think what would happen would be that their coming at some content from a different perspective that just doesn't have those principals in mind. Because they're not coming from an instructional design background or they might not have such working knowledge of the principles. So, I don't think it's ever specifically at the expense of the principles. I think it's just a lack of knowledge that they exist or just not being aware how they could be implemented. (ID4)

> I actually will periodically pull out the principle and read them. I have a few books I use for that. But, you know, not all of my coworkers have had the opportunity to learn these. So, you know, it's not like they can recommend the use of any of them or point out if we violated one because they don't really know them. I think if they did know them they would want everyone to use them. We all want to do good work and create good courses. (ID2)

Instructional Designers' Control Beliefs About MLPs

Perceived behavioral control beliefs refers to instructional designers' opinions that implementing MLPs can be easy or difficult (Ajzen, 1985, 1991). These views are often shaped by previous experiences and may be seen as barriers. This paper divides control beliefs into facilitative conditions and self-efficacy beliefs (Taylor & Todd, 1995). Facilitative conditions are defined as conditions that exist that support or do not support instructional designers' use of multimedia principles (Taylor & Todd, 1995). Self-efficacy beliefs are instructional designer's self-assessments of their ability to implement MLPs (Taylor & Todd, 1995).

Overall, the analysis showed that instructional designers' negative control beliefs about MLPs were focused primarily on external components, rather than internal or personal factors. First, the majority (71%) of instructional designers (5 out of 7) perceived several ways technology could be a constraining condition. Second, training and professional development in MLPs was regarded as a facilitating condition by all instructional designers. Finally, the majority (86%) of instructional designers (6 out of 7) believed they could be successful in applying MLPs; however, instructional designers' facilitating beliefs regarding self-efficacy were often dependent on the use of supportive components such as practice using MLP and resource guides.

Facilitating Conditions (Cf1-Cf3)

Regarding facilitating conditions, changing web browser standards was recognized as a constraining condition by 57% of instructional designers (4 out of 7). Negative beliefs were often based on the effect changes in web browser standards have on the intended user experience of an e-learning environment (Cf1 in Table 14). Comments in this vain suggest that instructional designers feel they have little control or advanced notice of these changes, even though they have a big impact on their work. Moreover, changes in web browser standards were cited as having a negative effect on the way multimedia assets behave, such as the timed progression on an animation or the performance of an interactive activity. Two instructional designers expressed frustration in the following ways:

> You know, one of our biggest issues we find is you put a course out there, you know, and you publish it and then browsers get updated and things that were working fine aren't working fine anymore. But you don't know until the user has already seen the issue

because you don't have time to check it all out all the time. So, I think you know compatibility issues can be another thing to come up. (ID5)

A problem that we seem to run into occasionally is that web browsers get updated and then things break. And to add to that, we have to support multiple web browsers and they get updated at different time. So, a lot of times, you know, we have a course that behaves the way we want in one browser but not the other. So, then we spend hours trying to fix it. Sometimes we can't and we just tell the customer that there's nothing we can do. (ID6)

Table 14: Summary of Facilitating Conditions MUs

Belief-based Measures (MUs)	**Number of IDs coded**	**Number of responses coded**
Cf1: Changing web browser standards	4	8
Cf2: Authoring tools are limiting	3	5
Cf3: PD/training	6	11

Along with web browser problems, 43% of instructional designers (3 out of 7) expressed negative beliefs about authoring tools as a constraining condition (Cf1 in Table 14). The typical comment indicated that instructional designers perceived that authoring tools limited their ability to implement some MLPs. Instructional designers expressed this in the following ways:

I think there are a lot of limitations with using authoring tools that we have come up against. We don't always have a good solution to some of them. Like sometimes publishing a SCORM package can be so problematic and there isn't much we can do about it. So, I think that influences a lot of the design decisions that we make because we just don't have a better option right now. (ID7)

> We're still kind of fighting our way and figuring out how to use the audio in animation. We've only been working with the tool for a couple of months and I've only worked on one or two courses in it. So, there's a learning curve and we're learning and we're trying to figure out ways that we can make those tools better for what we want to produce. Right now we don't have a good handle on it. (ID4)

> One of the ways technology can be limiting is that there are kind of pre-scripted ways that things can be created. You can't always do the kinds of things that you might want. I think part of what happens is that you modify something that already exists. So, you continue violating a principle, for example. Part of that is, you know, sometimes IDs just don't know how to use the authoring tool to fit the principles because they don't know the tool that well. (ID2)

Lastly, all instructional designers (7 out of 7) described professional development or training in MLPs as a facilitating condition. Comments indicated participants believed they could better implement MLPs if they received training. Several participants expressed this view when they said:

> You know, overtime I think you just start to forget some of this stuff. Especially the ones that I didn't already do as part of me e-learning course design. And there so many of them. Years ago, I adopted the ones that made sense to me or were easy to understand. So, what I think would be helpful is to have some sort of training on these (ID2).

> I think for me, because I didn't ever finish a degree in instructional design, I need more training in this kind of stuff. So, professional development to gain a better understanding of it and be able to actually use them and talk about them. (ID7)

> I think we need to have some type of training on how to use these. You know, so everyone knows how they work. You won't want people struggling to make sure that these principles are being implemented. They won't do it if they don't know how. It would just be too difficult. (ID4)

Self-efficacy (Cs)

Although most belief-based measures in the control beliefs domain were described as constraining conditions, all instructional designers expressed positive views about their self-assessed capability to use MLPs. For example, when asked to describe their confidence level in the ability to use MLPs, ID1 stated, "I think because I used them already, even if I didn't know the formal name, I think that I'd be confident in using these." According to ID1, however, a resource or guide would increase his confidence level: "I'd want a resource to make sure that I'm implemented them all correctly; Without one I think I would just be fairly confident." Table 15 provides a summary of self-efficacy belief-based measures.

Table 15: Summary of Self-efficacy MUs

Belief-based Measures (MUs)	**Number of IDs coded**	**Number of responses coded**
Cs1: Can apply with	6	8
Cs2: Confident with practice	7	13

Despite initially positive beliefs when asked follow-up questions about their confidence, most instructional designers mentioned the use of resources as a facilitation condition of those self-efficacy beliefs. Specifically, 87% of instructional designers mentioned the need of a resource, such as a guide or template, when talking about their confidence level (Cs1-Cc2 in Table 15). The most frequently mentioned resources were guides, templates, and time to practice or study the principles. Three participants described it in the following way:

> If I had the time to sit down and read all of this and study it, then I'd feel more confident in my capacity to use them. Since I did not know all of them, I would want time to study them. Or maybe some type of template to help me implement these in my design. Some kind of guide that I can look to if I forget any. That would make me feel better about using these. (ID7)

> I think I'd be able to implement the principle in my current work. I think. But I would probably like to have something as a guide, you know, kind of have training wheels on for the first couple of projects before I'm able to kind of ride the two-wheeler. (ID3)

> A lot of these principles, when you really think about them, are common sense. But, you know, commonsense makes sense when you're thinking about it. It doesn't always make sense when you're practically doing it. So, I think there is a learning curve. It's going to take some trial and error and really playing around with applying them. (ID4)

Summary

The researcher used the DTPB to qualitatively explore four research questions using a MLP knowledge structured interview, salient beliefs semi-structured interview, and work sample analysis. Chapter 3 presented those findings. Throughout the chapter, the research findings were supported by direct quotes from varying perspectives with an emphasis on allowing participant comments to illustrate emergent premises. The researcher believed that an effective understanding of this phenomenon would enable managers and supervisors in learning and development departments, as well as the broader instructional design industry, to proceed from a more informed perspective in terms of supporting and facilitating the proper implementation of MLPs. A more detailed discussion of study finding appears in Chapter 4.

CHAPTER FOUR: DISCUSSION

Introduction

Chapter four presents the researcher's interpretation and synthesis of findings derived from the data analysis presented in the previous chapter. The researcher considered and discussed the findings through the perspective of the research's purpose, which was twofold: (a) understand better the alignment between instructional designers' knowledge and demonstrated implementation of MLPs; and (b) understand the factors that influence instructional designers' intent and actual implementation of MLPs in their e-learning curriculum design. Additionally, presented in this chapter are the findings and interpretations using the DTPB, where the researcher endeavors to present emerging themes and belief-based measures to elucidate the complex and dynamic nature of the phenomena studied. Moreover, the major sections of this chapter include a discussion and interpretation of the findings, implications of the findings, limitations of the study, and recommendations for future research.

This research collected qualitative data using two interviews and an analysis of work samples. Participants in this study included seven experienced instructional designers employed by two similar organizations. The data were coded and analyzed using the DTPB and organized first by data gathering method and then by belief-based measures as described in chapter three. The following four research questions formed the study:

1. To what degree do instructional designers know MLPs?
2. To what degree are instructional designers currently implementing MLPs in the development of online courses?

3. To what degree does an instructional designers' knowledge align with their implementation of MLPs?
4. What salient beliefs (attitudes, subjective norm, and perceived behavioral control) affect instructional designers' behavioral intention and actual implementation of MLPs?

The study used DTPB belief-based measures to collect data regarding instructional designers' salient beliefs. The researcher chose these measures because of their applicability and appropriateness to the study purpose and because they are aligned with the research questions. Moreover, the researcher used belief-based measures to code participant interview responses and to present the findings in chapter three. In his analysis, the researcher primarily sought to find connections between belief-based measures or topics that emerged from the collection of data. This chapter will build on that work and introduce the researcher's interpretive insights on those findings. This is the first study, to the researcher's knowledge, which qualitatively explores MLP knowledge and application behaviors among instructional designers using the DTPB. Collectively, these results provide unique insight into understanding the salient beliefs associated with instructional designers' decision to implement MLPs in their e-learning course design.

The overriding finding in this study revealed that, despite being exposed to MLPs and holding positive behavioral beliefs regarding the usefulness of them, instructional designers might hold negative beliefs and face constraining conditions that pose significant barriers to the utilization of these principles in e-learning course design. Moreover, the data analysis suggests that instructional designers' negative beliefs are largely influenced by their previous experiences developing e-learning courses as well as their experiences as learners engaging in e-learning

environments. Therefore, while exposure and knowledge may somewhat help improve the utilization of MLPs, instructional designers' negative control and normative beliefs may prevent consistent adoption.

RQ1: To What Degree Do Instructional Designers Know MLPs?

The first research question sought to determine to what extent instructional designers knew MLPs. The analysis of data indicated that MLP knowledge varied widely between participants; nearly half of instructional designers held some understanding and experience using MLPs. By comparison, the remaining participants had not. In fact, 71% of instructional designers indicated the study interview process was the first time they learned the names and formal definitions of MLPs. This variation was greatest between groups. Specifically, instructional designers in Group A outperformed those in group B in MLP knowledge. This suggests that instructional designers in Group A had been previously introduced to MLPs before this study, which was confirmed by participant observations throughout the interview process. This finding is consistent with research by Fadde (2009), which suggests that instructional designers' expertise and competence in conducting instructional design activities is supported by exposure and practice. That is, the more instructional designers are exposed to MLPs, the more likely they are to build expertise in using them. Conversely, a lack of exposure would likely result in lower levels of MLP expertise. Accordingly, it would be wise to assume that exposing instructional designers to MLPs is crucially significant in encouraging the use of MLPs.

A possible explanation for participants' lack of MLP knowledge is that instructional designers often design e-learning courses using procedural design methods that conclude in the

development of purpose-built e-learning courses. Explicitly, instructional design organizations often prefer past processes to create the types of e-learning products that fit the business goals and objectives. It may seem logical to assume that instructional designers may be in a "cruise control" state where they continue the same processes they know to work. This may be exacerbated by short deadlines or low budgets, which may make it difficult to introduce variations in the processes used to develop e-learning (Roytek, 2010).

It is worth noting that, of the instructional designers who had prior experience using MLP, it was not apparent that their current employer was the source of those experiences. In fact, none of the instructional designers described being introduced to MLPs by their employer. Of the two participants who reported having prior MLP experience, both explained they learned about MLPs before working in their current position. It did appear, however, that employers had a positive influence on MLP use by providing a supportive environment. Comments made by those individuals in Group A suggested that, while they may not have learned about the principles at their current job, their employer supported the use of MLPs. This was in stark contrast from Group B in that there was no evidence the organization provided an environment supportive of the use of MLPs or other evidenced-based best practices. Comments from all participants in Group B suggested that the leadership in the organization placed a higher value on anecdotal information learned through past experiences with clients, rather than research-based principles.

A possible explanation for the focus on anecdotal information is that instructional design organization are often keenly attuned to their client's needs. Moreover, competition makes it critically important that products meet the perceived needs and expectations of clients. It seems logical to assume that the attainment of client goals is the primary concern for instructional

designers because they support the organization's business objectives. Therefore, the focus of the e-learning design would be to just develop what the customer needs. However, as was observed with Group A participants, an organization that supports the use of MLPs as well as meeting business objectives may have a positive influence on MLP use. As with any profession, organizational support is important in helping employees build professional expertise. Without it, instructional designers are less likely to learn or use MLPs.

RQ2: To What Degree Are Instructional Designers Currently Implementing MLPS in their E-learning Development?

The second research question asked to what extent are instructional designers currently implementing MLPs in their development of e-learning courseware. Unsurprisingly, the analysis of data indicated a significant gap between participants in Group A and Group B. Specifically, instructional designers in Group A implemented MLPs 60% of the time, compared to just 20% for participants in Group B. The disparity observed between groups is logical given that instructional designers in Group B indicated they were unaware of these principles before the interview. Thus, it may be appropriate to associate lack of MLP awareness to poor knowledge and application of MLPs. Lack of MLP knowledge and subsequent expertise in using MLPs is a significant barrier to successful online course design. Since instructional designers learn a majority of instructional designs skill while working in the field, it is vital that employers provide them with the opportunity to build expertise using MLPs. The first step, as previously discussed, is to provide instructional designers exposure to MLPs. Secondly, instructional designers need to receive support and encouragement to seek learning opportunities outside of work environments.

RQ3: To What Degree Does an Instructional Designer's Knowledge Align with Their Implementation of MLPs

The third research question sought to determine to what extent instructional designers' knowledge aligned with their implementation of MLPs. Overall, the analysis of data showed that instructional designers who held prior knowledge and experience using MLPs could apply them more frequently. As mentioned in the discussion of the first research question, this finding is consistent with research by Fadde (2009), which suggests that instructional designers' expertise and competence in conducting instructional design activities are supported by exposure and practice. Of course, it is logical to assume that a lack of exposure to MLPs would result in instructional designers' inability to implement MLPs systematically. Additionally, the data analysis suggests that supervisor support presents a significant role in instructional designers' use of MLPs. However, it is important to note that the researcher did not observe the complete application of MLPs.

As noted in the previous chapter, 40% of MLPs were violated by all participants. This is a crucially important finding because it highlights the need to understand why instructional designers are not implementing a significant number of MLPs. While it may seem the most important course of action is to ensure that instructional designers possess the most accurate understanding of what MLPs are and how they are used, that assumption may be misguided. Research examining the relationship between knowledge and behavioral intent suggests that the accuracy of the information an individual possesses can be irrelevant to their intent because personally held beliefs can moderate intent. For example, Zoellner et al. (2012) found that while individuals possessed accurate information regarding the negative health implications of drinking sugar-sweetened beverages, adoption of healthier options was lower than expected. That is, even

if instructional designers understand each MLP and can accurately describe how they are used, their intent to use MLPs may remain poor if they hold negative beliefs regarding MLPs.

In the context of this study, since instructional designers lack MLP knowledge, it certainly is critical that they learn MLPs. However, it is equally important that this study also focuses on identifying MLP-related beliefs instructional designers possess and explore how they may affect the intention of MLP use (Ajzen et al., 2011). In this regard, the participants expressed various beliefs that both supported and contradicted the use of MLPs, with a majority of those being constraining condition beliefs. These beliefs are thought to have negatively affected participants in all groups, despite their experience or knowledge using MLPs. The following is a discussion and interpretations of finding related to instructional designers' salient beliefs.

RQ4: What salient beliefs (attitudes, subjective norm, and perceived behavioral control) affect instructional designers' behavioral intention and actual implementation of MLPs?

The final research question sought to examine instructional designers' MLP salient beliefs (attitudes, subjective norm, and perceived behavioral control) in an attempt to determine the influence those beliefs may have on instructional designers' MLPs use. Employing the DTPB, the researcher decomposed behavioral beliefs into three belief-based measures. Those measures are perceived usefulness, ease of use, and compatibility (Taylor & Todd, 1995).

Behavioral beliefs

The data analysis indicated that all study participants viewed MLPs as a legitimate tool for integrating multimedia components into e-learning settings. Legitimacy and validity opinions

seemed to be closely tied to the belief that evidenced-based practices are essential in instructional design practice. This idea was reinforced by participant comments suggesting that, when multimedia assets are incorporated into e-learning environments, learner engagement and outcomes are improved. Additionally, positive MLP usefulness views were often tied to instructional designers' preferences as learners engaging in e-learning environments; a theme encountered throughout the study. Unfortunately, however, these positive views seemed to be moderated by instructional designers' mostly negative ease of use and compatibility beliefs.

In the framework of ease of use beliefs, the data analysis indicated that instructional designers perceived some MLPs to be difficult to implement in certain situations. These views appeared to be tied to their unfamiliarity with the principles as well as a lack of understanding of how they are implemented. The researcher observed that during the interviews, instructional designers who expressed similar views became uncomfortable when discussing MLPs they recognized as difficult to use. Interestingly, the names of the principles seem to be the biggest cause of participant uneasiness. The researchers' observations were confirmed by instructional designers' comments regarding the difficulty of some principle names and descriptions. Additionally, participants seemed to correlate past negative experiences dealing with complex instructional design processes with principles they perceived as difficult to use.

Lastly, instructional designers expressed negative MLP compatibility beliefs that were associated with external, versus internal control conditions. The instructional designers expressed very positive beliefs regarding the principles they saw as having a good understanding. However, these positive compatibility views were moderated by their negative views that external influences, such as client request, timelines, and front-end analysis activities made it difficult to

implement all MLPs. Negative compatibility beliefs seem to be strongest regarding principles that were perceived to be more complex compared to principles that were recognized as easy to understand and implement.

Collectively, using the DTPB to analyze salient beliefs suggest that instructional designers' attitudes towards MLPs may be positively affected by their beliefs that MLPs are research-based, align with the broader benefits of multimedia instruction, and align with their personal preferences in e-learning instruction. Unfortunately, however, the instructional designers' positive MLP attitudes may be moderated by their negative beliefs that MLPs are difficult to use in certain circumstances, the names are too difficult to understand, and that external conditions such as client request and timelines prevents their use. Thus, because the instructional designers' plan to use MLPs that relate to their attitudes, it is possible that their predominantly negative beliefs negatively impact their intent to do so (Ajzen, 1985).

Perceived Usefulness

In regard to perceived usefulness, the data analysis indicated that participating instructional designers believed MLPs were useful in providing a set of parameters that guided their work and led to improved results. Among perceived usefulness beliefs, improved learner outcomes and engagement were viewed as the most important results of using MLPs in the development of e-learning courses. This finding is aligned with research by Yanchar, South, Williams, Allen, and Wilson (2010), which suggests that instructional designers value instructional design theory and best practices. In their study, the researchers explained that instructional designers "seemed to appreciate theory as a means of sense-making, a collection of

useful ideas, a rhetorical device, or a mental checklist to consider as they work" (p. 55). Similarly, Reigeluth and Carr-Chellman (2009) suggest that instructional designers observed instructional design models as a way to develop e-learning courses that lead to improved learner outcomes.

Since perceived usefulness beliefs are a notable component of behavioral beliefs and subsequent behavioral intention, it is important that supervisors and lead instructional designers continue to support those positive views by creating a working environment that values the use of best practices. This is particularly valuable in the context of this study because, as mentioned in the discussion of research question two, instructional designers in Group B reported that their organization favored anecdotal practices over theory use. While it is reassuring that the instructional designers reported positive usefulness beliefs despite their employer's lack of support, continuing this practice has the potential to diminish or change the observed positive beliefs. That is, the more instructional designers try to use MLPs and are refused, the more likely they are to avoid using them. Similarly, if supervisors consistently diminish the value of MLPs, instructional designers may feel uneasy about recommending their use, particularly in situations where power struggles exist.

Perceived Ease of Use

As noted in the previous chapter, despite all the instructional designers describing several usefulness beliefs, 57% of the instructional designers (4 out of 7) expressed negative ease of use beliefs regarding MLPs. The majority of these views appeared to be based on a perception that MLPs are difficult to implement in certain situations. This suggests that the instructional

designers' views of MLPs are a prescriptive methodology that either work or do not work. This cursory view of MLPs is likely related to the instructional designers' judgments that instructional design methodologies can be restrictive. In this vein, recent literature has shown that while instructional designers value design theory and methodology, they often find it to be difficult to use (Demiral-Uzan, 2015; Honebein & Honebein, 2015; Reigeluth & Carr-Chellman, 2009; Ritzhaupt & Kumar, 2015; Yanchar et al., 2010). Moreover, it is likely that instructional designers associate MLPs with instructional design models, despite their differences. This finding is consistent with research by Yanchar et al. (2010) who found that instructional designers "did not distinguish between theories, models, and design processes in descriptions of their work" (p. 55).

These views largely placed the instructional designers outside of the development process. As Honebein (2017) suggest, instructional design literature traditionally did not include the judgments of instructional design practitioners. Similarly, Wedman and Tessmer (1993) argue that the underlying tenants of many instructional design models can be uncompromising or difficult to apply in different situations. Moreover, research by Roytek (2010) suggests that these conditions may lead instructional designers to ignore instructional design principles, despite being knowledgeable in them. These examples are indicative of a growing shift from thinking of instructional design methodologies as a linear process to accepting it as more of an adaptive process that varies based on changing needs and circumstances. In the circumstances of this study, it is important that instructional designers' view MLPs as a tool they can use, not a restrictive process. If instructional designers continue to view MLPs as restrictive, these negative beliefs may continue to negatively affect their intent to implement MLPs.

Compatibility

In addition to negative ease of use beliefs, the instructional designers also expressed mixed compatibility beliefs. On the one hand, instructional designers believed using MLPs were compatible with the way they like to design e-learning and how they like to engage in e-learning as a learner. On the other hand, participants viewed MLP implementation as conflicting with client requests, being impacted by short timeframes, and not being part of early design activities. This finding is consistent with research by Smith and Regard (1993) that suggests instructional designers translate principles and theory into mental models used to make specific design decisions when participating in instructional design practice. To do this, instructional designers often consider the situational and contextual constraints of the application of instructional design principles, such as MLPs (Ertmer & Newby, 2013).

Positive compatibility beliefs mostly described instructional designer beliefs that they already implement a select number of principles, such as signaling and coherence. In this sense, participants related the compatibility of MLPs to their prior experiences, which were often described as “second nature” or “obvious.” These comments suggest instructional designers understood these MLPs to be compatible because implementing them in their design of e-learning courses did not require a change in their normal routines or preferred methods. In fact, the same principles were often described as being compatible with the way instructional designers like to design e-learning courses or engage in them. Thus, the data analysis suggests that instructional designers’ preferences and past experiences have a significant effect on their compatibility beliefs. This finding is supported by research that indicates, despite having a significant influence on decision-making, the models and approaches instructional designers

choose are often limited to what they know, understand, and find compatible with their work (Demiral-Uzan, 2015; Yanchar et al., 2010). This is mainly true in situations where instructional designers must problem solve, prioritize many demands, or work with short timelines. Judgments are a significant part of instructional design practice; and instructional designers make many decisions every day. Yanchar et al. (2010) suggest that instructional designers design decisions are often made on the basis of intuition and practical knowledge. This is especially true in situations where instructional designers are required to make multiple decisions in a short period of time. Since instructional designers often work in fast paced environments requiring many daily decisions, having a working understanding of MLPs is necessary to ensure that MLPs are at the forefront of their decisions and that they become part of their personal design theory.

Regarding negative compatibility beliefs, the instructional designers often mentioned that client requests can interfere with the application of MLPs. Participants described clients and external stakeholders as primarily interested in the aesthetic of e-learning courses at the expense of instructional integrity. It is like that clients are principally focused on ensuring e-learning environments are attractive because they think doing so will be more pleasing and will capture the attention of learners. This finding is aligned with the assumptions of the arousal theory which suggest that including features aimed at making learning tasks more interesting may increase the learner's level of arousal, leading to a greater level of attention (Moreno & Mayer, 2000). However, the CTML has shown that adding extraneous information to multimedia learning environments may increase the cognitive load requirements of learners, resulting in negative learner outcomes (Mayer, 2011; Moreno & Mayer, 2000). Thus, it is important that external

stakeholders understand that eliciting the attention of learners must be balanced with cognitive load implications.

The instructional designers also described difficult working relationships where they regularly made concessions to what they believed was in the best interest of the learner to appease a client or "move a project along." This suggests that instructional designers may not have good working relationships with clients and may lack the authority or confidence to defend the use of MLPs. Thus, because perceived level of expertise, shared values, and sharing of meaningful information play a vital role in the relationship between instructional designers and clients, a meaningful exploration of client relationships would be wise.

This finding is similar to research by Honebein (2017), which suggests that designers become upset, often to the point of giving in, when someone with power, such as clients, makes decisions about methodology. In his study, however, the researcher noted that instructional designers sought ways of being creative in meeting their client needs and using best practices. This was described as instructional designers attempts to reduce methods dissonance. Unfortunately, a similar strategy was not observed in this study. Thus, it is important that instructional designers possess the autonomy and knowledge necessary to encourage them to find ways they can use MLPs while meeting their client needs. Ultimately, however, it is imperative that instructional designers develop positive working relationships with external stakeholders, including effective collaboration competencies. On a more positive note, the instructional designers did express the desire to work with external stakeholders to improve their influence in design decision. Instructional designers' desire to build positive working relationships with their clients is supported by research from Yanchar and Hawkley (2015). In their study, participants

expressed that building strong working relationships and understanding client needs and personalities is an important part of being a successful instructional designer. Given participant responses and academic research, it seems probable that providing instructional designers tools and opportunities to help build stronger relationship with clients would help them in implementing MLPs.

Regarding timelines, participants stated they are often required to complete e-learning development quickly because of client requirements, budget constraints, or overall development schedules. Perceptions of short deadlines are common in instructional design practice. Often, instructional designers are faced with business objectives that supersede other factors. These business needs and objectives are often in direct opposition of instructional design best practices and instructional designers can feel powerless in influencing changes in those objectives that may benefit the instructional design process. This is a serious problem because research has indicated that, when timelines are short, instructional designers may decide to ignore instructional design principles in preference of efficiency (Roytek, 2010). This is a paramount finding because instructional designer shortcuts have been associated with poor quality and learner outcomes (Merrill & Wilson, 2007; Roytek, 2010). As we already know, instructional designers make many judgments and decision per day. When time is short, instructional designers will often choose efficiency and prior experience (Roytek, 2010). That is, they will likely choose to cut corners and use methods and principals that are familiar. Since most instructional designers in this study were not familiar with MLPs, it would be prudent to assume they would overlook or chose to ignore MLPs in their design. This is a significant barrier to the proliferation of MLP use.

Similarly, instructional designers' views that MLPs are not integrated into early design activities were often specified as a reason MLPs were not implemented. Participants' comments showed that instructional designers identified going back through their work to analyze MLP application as a laborious activity. Additionally, participants were concerned that making changes after they completed the development of a course would add time to already constraining deadlines. As with perceived ease of use beliefs related to timelines, instructional designers may decide to avoid MLPs altogether if they believe it requires additional effort or time (Merrill & Wilson, 2007; Roytek, 2010). This finding is additionally supported by instructional designers' positive views regarding MLPs. Typical positive compatibility responses were frequently associated with principles they already implement – principles that required little additional effort. Lastly, the findings suggest that instructional designers have not integrated MLPs into their preferred instructional design models. Thus, MLPs are seen as an external condition, not an integrated component of the work they already do.

Normative Beliefs

The data analysis indicated that all instructional designers placed a significant amount of importance on the opinions of their supervisors and peers regarding e-learning development. Ultimately, this created a significant disparity between study participants. Specifically, instructional designers who expressed positive normative beliefs regarding their supervisor applied MLPs more frequently than those who did not. In the context of peer influence, instructional designers again indicated that peer influence was important to them. However,

participants also indicated that many of their peers were unfamiliar with MLPs or held misconceptions about their use.

Collectively, using the DTPB to analyze normative beliefs suggest that, because instructional designers find their influence essential, supervisors and managers must work to provide a supportive environment that encourages MLP use. The data analysis showed that, if instructional designers have a positive supervisor influence on MLP use, they may apply MLP more frequently. Similarly, participants value working relationships with their peers and look to them for guidance. Unfortunately, however, a lack of exposure and understanding of MLPs has mitigated the positive influence of peers. Thus, provided MLP exposure and training can be an important step in encouraging positive peer influence. Further implications regarding these conclusions are discussed in the implications section of this chapter. The following is a detailed analysis of each belief-based measure.

Supervisor Influence

Normative belief measures showed that instructional designers experienced starkly different levels of support from their supervisor, even within the same organization. While the majority of instructional designers expressed negative beliefs, two participants in Group A reported particularly positive experiences. These instructional designers reported receiving support and mentoring from their supervisor in MLPs use. Moreover, their interview responses indicated they held various views of appreciation towards their supervisor. Their positive views also affected their evaluation of their organization. Both participants described their organization as a supportive and collaborative environment that encouraged MLP use. Their positive

experiences and beliefs were supported by their MLP knowledge. Both participants were able to define six principles, which was the highest number defined. This is consistent with results of a past study by Purnomo & Lee (2012), which suggests that supervisor support plays a significant role in supporting and encouraging the behavioral intent of their employees. In the framework of this study, it can be assumed that because these participants received support from their supervisor in the use of MLPs, their intent to use MLPs was enhanced.

Interestingly, the other two instructional designers in Group A, along with those in Group B, described negative normative beliefs related to their supervisors' influence. They reported that their supervisor was not actively involved in their design decisions and mostly left them to work independently. It was also mentioned that supervisor influence was mostly focused on meeting timelines and client expectations. Unsurprisingly, these instructional designers performed poorly in defining MLPs as well as in observed MLP application. These findings suggest that supervisors play a principal role in their employees' use of MLPs. Specifically, the data analysis suggests that a supportive supervisor may help instructional designers learn and employ MLPs. This finding is aligned with recent research by Honebein (2017), which suggests that the influence of supervisors can cause instructional designers to either use or avoid best practices. Namely, supervisors who do not value the use of best practices can have a constraining influence on instructional designers. This is critically important because it suggests that supervisors play a critical role in improving MLP utilization. Ultimately, it may be necessary to explore supervisors' MLP-related beliefs. Since supervisors' values and judgments may influence instructional designers' intent to use MLPs, a critical look into their MLP-related beliefs may be useful.

Peer Influence

Despite the stark differences in participants' supervisor normative beliefs, the data analysis showed that all instructional designers expressed positive views regarding their peers' influence. All participants described collaborative relationships with their coworkers. Many looked to other designers to learn instructional design methodology and best practices. This was not surprising considering that all instructional designers in this study mentioned learning from their peers as the biggest influence in the way they design e-learning courses during the MLP knowledge interview. This finding is similar to that of Yanchar & Hawkley (2015), which suggests that instructional designers learn instructional designs tasks through social learning experiences with other designers. In their qualitative study of instructional designers, all six participants described conversations with colleges, observing their work, and examining what they have produced as the most influential learning in instructional design practice. An instructional designer in that study best surmised this finding when she said, "you can be doing a lot of thing on the Internet, but no one on the Internet quite knows you and your users and your product like the people around you" (Yanchar & Hawkley, 2015, p. 168). In the context of this study, all six instructional designers expressed various beliefs of appreciation regarding personal and social interaction as part of the learning process. Many mentioned preferring it over reading a book or conducting a search engine query.

The positive peer influence observed in participants' responses moderated when they described a lack of exposure to MLPs. Instructional designers explained they believed their coworkers would want them to use these principles, but that because they are not familiar with MLPs, it would be difficult for them to have a positive influence. As mentioned before, exposure

to MLPs is a recurrent theme that must be addressed. Thus, providing MLP exposure and training can be an important step in encouraging positive peer influence. Instructional designers cannot be expected to use MLPs or influence their use if they do not know they exist.

Control beliefs

Control beliefs showed that the main constraints instructional designers observed were authoring tools, web browser performance, professional development, and resources. These constraints were commonly used by instructional designers to describe examples of how MLPs would not be compatible with the way they currently engage in e-learning development. Moreover, a lack of professional development and available resources were two major obstacles to instructional designers' use of MLPs and negatively impacted their MLP use self-efficacy beliefs.

Collectively, using the DTPB to analyze control beliefs suggest that the main constraints perceived by instructional designers were external conditions. Participants were generally in agreement that resources for MLPs existed and that they had access to them, but few described engaging in self-study of MLPs. Also, instructional designers regularly attributed feelings of confidence using MLPs with a guide or training as well as repeated exposure and training. These results suggest that employers should provide specific resources and training in MLPs as well as the authoring tools used to develop e-learning environments. Additionally, instructional designers need a supportive environment to practice implementing MLPs.

Facilitating Conditions

In the perspective of facilitating conditions, organizational changes to web browser standards were a big concern amongst participating instructional designers. Participant comments suggest that instructional designers sensed having little control or advanced notice of these changes, even though they have a big impact on their work. Changes in web browser standards were cited as having a significant effect on the way multimedia assets behave, often causing unintended violations of MLPs. The suggestion that participants perceived having little control over changes in technologies is particularly crucial because it may cause instructional designers to avoid using MLPs due to fears it may add a layer of complexity to an already complex situation. That is, the use of MLP may require instructional designers to work harder to solve problems that arise from changes in web browser versions.

Authoring tools were described as limiting in that they are not updated with enough frequency to handle changing browser standards. Participants also described authoring tools as limiting what instructional designers can do. However, participant interview responses indicated that their negative views regarding authoring tools were likely the result of the instructional designers' limited understanding of how to use the tools. When asked how they learned to use authoring tools, all participants described learning to use the tools by trial and error. Moreover, most participants indicated that there were some features they had not attempted to use because they were unfamiliar with them. This finding is similar to that of Thompson-Sellers and Calandra (2012) who noted that while instructional designers may have access to up-to-date authoring tools, they receive little training on how the tools are used. Additionally, in a qualitative study involving eight instructional designers, Ritzhaupt and Kumar (2015) found that understanding

the general capabilities of authoring tools was more important to instructional designers than competence in using the technology. This is notable because instructional designers may struggle applying MLPs due to a lack of training in using the authoring tools they need to create e-learning environments. Without a deeper understanding of the features and nuances of authoring technologies, instructional designers may continue to struggle utilizing MLPs.

Self-Efficacy

In the context of self-efficacy beliefs, initial responses were relatively positive. All instructional designers expressed various positive beliefs regarding their ability to implement MLPs in e-learning course design. However, the researcher observed these views change when participants he asked them to elaborate on their responses. As they began to reflect on their understanding of the principles, each instructional designer mentioned feeling more comfortable having resources to help them monitor their implementation. Not only did these comments suggest that instructional designers may be self-aware of their limited understanding of MLPs, but they also seemed to be related to their positive usefulness beliefs that MLPs provide a guide to assist in development. That is, instructional designers acknowledge that they lack a deep understanding of MLPs to use them with complete accuracy, and that using a guide could help them. Furthermore, instructional designers' positive beliefs toward resources as an aid is aligned with research by Sugar and Luterbach (2016). In their qualitative study, instructional designers reported that receiving resources, such as a simple tool, was helpful in aiding them in making design decisions.

Participant comments also suggest that the instructional designers perceive MLP applications to be complex, requiring the help of a guide on a permanent basis. The majority of participants mentioned including MLPs in templates and other resources used during initial design activities. This is consistent with research by Tracey, Hutchinson, and Grzebyk (2014), which suggests making the processes easy to understand and repetitive helps to build competence and expertise in that process. By incorporating MLPs into guides and templates already in place, MLPs may be incorporated more easily into procedures that already exist.

In addition to resources, participant comments also suggest that practice in applying MLPs would help instructional designers increase their confidence level in their use. This finding is consistent with research by Hardré and Kollmann (2013), which suggests that instructional designers' self-efficacy beliefs were linked to knowledge and skill development. In their study, the researchers found that initial self-efficacy judgments related to prior experiences and changed in response to current knowledge and practice (Hardré & Kollmann, 2013). Together, the data analysis reading of participants' self-efficacy beliefs align with Fadde's (2009) assumption that professional expertise requires clear standards, guidance and resources, and continuous practice. Additionally, in their study, Yanchar and Hawkley (2015) found that practice and experiences of trial and error help build instructional designer confidence in conducting instructional design activities. Consequently, it would be wise to provide instructional designers with the opportunities to practice MLP implementation to help them build expertise and confidence in implementing MLPs.

Summary and Implications of Findings

The researcher conducted this study to identify conditions that may influence instructional designers' intent to use MLPs to suggest actionable and evidence-based recommendations. In conclusion, the overall study finding suggest that despite being exposed to MLPs and holding positive behavioral beliefs regarding the usefulness of them, instructional designers may hold negative beliefs and face constraining conditions that pose significant barriers to the utilization of these principles in e-learning course design. The following are findings derived from DTPB belief-based measures that build to the overriding study finding:

1. The majority of the instructional designers were unfamiliar with the formal descriptions and uses of MLPs.
2. Some of the instructional designers perceived MLPs to be useful in specific situations.
3. Some of the instructional designers perceived MLP names to be difficult to understand.
4. The majority of the instructional designers believed MLPs were, at times, not compatible with client requests, short timelines, and front-end activities.
5. Many of the instructional designers believed that their supervisor did not provide a supportive influence in MLP use.
6. Some of the instructional designers perceived e-learning authoring tools and changing web browser standards as a constraining condition in the use of MLPs.
7. All of the instructional designers believed they could be successful applying MLPs with the help of resources.

These findings are significant because they suggest the instructional designers may experience serious barriers that inhibit the use of MLPs. Overall, according to the DTPB, instructional designers' negative normative and control beliefs moderate their positive attitudes towards MLPs. Consequently, the instructional designers will experience low levels of intent to use MLPs.

Implications for Instructional Design Organizations

As an industry, we should all be concerned with any barriers that diminish the implementation of best practices. Based on these findings, it is vital that employers provide instructional designers and supervisors professional development opportunities in the form of a series of trainings. Instructional designer professional development should be provided on:

- The use of MLPs in a variety of applications;
- Integrating MLPs into instructional designed methodology;
- Using MLPs to guide the design and front-end analysis activities;
- Methods for improving efficiencies in the development process;
- Converting MLP names to and descriptions to easier to understand language.

Organizations should also provide supervisors and leadership staff professional development on strategies to support the used of MLPs and other evidence-based practices. Furthermore, the objective should be to teach leadership staff how to provide an environment that allows instructional designers to be reflective practitioners so that they can continue to develop their designer identities (Tracey et al., 2014). Moreover, all professional development activities should take advantage of emerging technologies to encourage instructional designers to

share ideas with each other on a continuous basis. This may include, for example, online webinars, forums, and workshops (Scoppio & Luyt, 2017). Creating an online learning community and using a blended learning approach will enable instructional designers to learn in a social setting to build on their knowledge of instructional design practices. Thereafter, collaborative learning environments will allow instructional designers to reflect and challenge one another's perspectives, resulting in a deeper understanding of MLPs (Hardré & Kollmann, 2013).

Organizations should work with instructional designers to create resources, such as guides, that instructional designers can use during the development process to monitor their MLP use. Furthermore, organizations should consider reviewing and modifying their templates and storyboards to include MLP application. This would enable designers an opportunity to review their work during the initial stages to ensure adherence to the principles.

A final implication of this inquiry into the setting of the instructional design industry is continued research. Given the findings of this and other studies, it is important that the instructional design industry continue to explore methods for improving the application of best practices like MLPs. This can only be done through continued research. However, it is also foremost that future research is made available to instructional designers and that the content of studies and their results are accessible to instructional designers.

The need to help instructional designers develop competence and expertise in MLP use is elucidated in the above recommendations. While exposure and practice are key components of expertise building, practice alone is not enough (Hardré, Ge, & Thomas, 2006). Accordingly, organizations must provide instructional designers with a collaborative and supportive

environment where they can learn in a social context. As Sugar and Luterbach (2016) suggest, learning often happens as an unanticipated result of taking part in some type of task or activity. Given that instructional designers learn most of their practice through others, it is important that they have the ability to collaborate and work together.

Implications for Instructional Design Practitioners

Instructional design practitioners must learn how to make judgments about the methods and strategies they use to develop e-learning programs. Of course, this requires that designers understand a broad array of design principles, allowing them to choose the best methods that suit a specific situation. Instructional designers must also keep in mind that instructional design methods are not restrictive procedures that must be strictly followed. For far too long instructional designers have been taught to use these methods as hard set-rules, instead of as a guide. Instructional designers must move beyond this concept and accept that instructional design practice involves making informed decisions and judgments based on the unique needs of the situation. It is significant to note, however, that instructional design practitioners need to prioritize best practices over those that are not founded in research. That is, there should be a concerted effort to implement best practices. Ultimately, a goal of each instructional designer should be to move towards a state of adaptive expertise in MLP use.

Similar to recommendations made by Solomonson (2012), instructional design practitioners need to show assertiveness. It is important, particularly when dealing with clients, that the use of MLPs be defended in a positive and constructive way. This is essential to ensure that external stakeholders and clients understand the importance of adhering to these principles.

To be able to accomplish this, however, instructional designers must first have a good understanding of MLPs and the research that supports their use. Moreover, since every instructional designer plays a vital role in the design of e-learning, it is important they acquire expertise in using MLPs and other evidence-based practices.

Limitations of Study

This study, as is the case with most qualitative studies, is limited in terms of generalizability. First, since the researcher conducted the study in a narrow field with seven instructional designers from two organizations, the results may more closely reflect the beliefs and behaviors of the study group. Consequently, the study may not generalize to all instructional designers. However, the aim of this study was not to provide explicitly broad-based data. Instead, this study sought to present rich information that provided background and a deep understanding of the factors that may affect instructional designers' decisions to use MLPs. The researcher accomplished this by employing a multi-site design that enabled him to collect comprehensive data that may promote transferability (Firestone, 1993). Because of the depth of this data, the researcher's findings may provide key insight into areas requiring future study. Moreover, the researcher endeavored to ensure high validity and integrity throughout the research, as well as the development of useful information (Polit & Beck, 2010). Therefore, the results have the potential for use in the real-world settings through reasonable extrapolation (Polit & Beck, 2010).

Second, due to the interpretive nature of the research design, the findings may be subject to alternative interpretations. To address problems related to clarification, the researcher

provided a detailed explanation of the data collected along with tables and figures that visually present all evidence used in establishing interpretations of the study data. Additionally, the researcher employed an inter-rater process where an independent researcher coded 43% of the interview transcripts to measure agreement.

Third, it is possible that study participants were reluctant to share their honest opinions and thoughts, particularly if they understood their answers could be attributed to job-related performance failures or knowledge gaps. To address problems related to trust, each study participant was reminded that their responses were private and that the researcher would protect their privacy. The researcher conducted two pre-interview calls with each participant to discuss the interview process and the participant's role in the research. During each call, the researcher reiterated the efforts taken to protect their confidentiality. After interviews were completed, the researcher allowed participants to review the transcription of their interview to check for potential problems with accuracy and interpretation. Any potential issues were resolved collaboratively. Additionally, a consent form was provided to each study participant, before the first interview, outlining the measures taken to ensure their privacy. However, despite these measures, a possibility exists that a study participant may have provided inaccurate or biased information.

Fourth, the researcher's background, subjective feelings, and employment could have resulted in researcher bias. To mitigate the presence of bias, interview questions were reviewed by an independent third party who was not employed by either organization nor had a relationship with any of the study participants. During this process, the researcher analyzed each interview to identify and eliminate leading questions or wording bias. Furthermore, the analysis

sought to identify any incidence of question-order bias to ensure beliefs expressed during one questions did not impact participants' beliefs in subsequent questions. Instead, this process ensured that question order elicited additional, more reflective responses from participants. Finally, the researcher was not involved in any development activities related to the e-learning module analyzed during the study.

The researchers' analysis of MLPs was limited in scope. The analysis of MLP application provided a basic understanding of how a group of instructional designers collectively applied or violated MLPs. The study does not differentiate between participants as it relates to MLP application. The analysis simply looked to see if the principles had been applied. While this met the purpose of this study, future examination can benefit from a more individualized analysis of instructional designer work sample to analyze an individual's use of MLP principles.

Future Study

This study served to begin the process of identifying the factors and conditions that may support or discourage instructional designers' application of instructional MLPs. Since, to the author's knowledge, this was the first analysis to qualitatively use the DTPB to explore instructional designers' salient beliefs regarding MLPs, the conclusions have illuminated several areas for future research.

First, future investigation should employ a quantitative approach using the DTPB to explore instructional designer intent fully. This would allow for a larger sample with data that can be more generalizable to a broader population. Additionally, implementing the DTPB in a traditional quantitative review would enable for a more precise measure of intent. To the

researcher's knowledge, there are no quantitative studies that have explored instructional designer's intent to use MLPs in e-learning course design. Thus, a quantitative MLP analysis which employs the TPB has to uncover important data about intent to use as a predictive model. Specifically, it would allow investigators to identify which beliefs are more likely to impact intent.

Second, the current investigation analyzed instructional designers' application of MLPs through a simple analysis process. Future exploration would benefit from a thorough analysis of how MLPs are applied or violated by instructional designs that currently apply them. This should include a comparative analysis of how instructional designers harness principles to learn if there is any variability in their perceptions. This may provide relevant information about misconceptions and approaches to using MLPs.

Third, future studies should examine early design activities. Since the data analysis indicated that instructional designers aren't supported in using principle from the onset of development, future investigation should examine how instructional designers and organizations consider evidence-based principles that augment their current design methodologies and processes. In recent years, investigators conducted a significant amount of investigation on the methods instructional designers choose to apply during their design of e-learning environments. For example, Reigeluth and Carr-Chellman (2009) examined how instructional designers choose specific methods, which they refer to as an individuals' instructional design theory. They argue that each individual's theory can be different and is shaped by past experiences and value judgments. Other studies have looked at how instructional designers struggle using theory to guide their development. For example, Yanchar et al. (2010) argue that, while instructional

designers value instructional design theory, it was often viewed as abstract and difficult to employ in certain situations, similar to the ease of use beliefs some participants expressed about MLPs. However, little attention has been placed on how organizations support the use of front end processes. Most studies focus on the individual designer. Thus, the instructional design industry could benefit from a deeper understanding of how learning and development in organizations influence instructional designers' use of MLPs and other best practices during early design activities.

Fourth, instructional designers likely build mental models to represent knowledge of MLPs and of how they are used in specific instructional design conditions, future studies should examine those mental models and how they change with MLP expertise and/or competence. Mental models are useful because they represent a holistic organization of knowledge (McNeil, 2015). Mental models of MLP use are specific to individual instructional designers, which change as their knowledge and expertise in using MLP changes. Identifying changes in mental models can help uncover issues in the way individuals conceptualize the principles and how they are used. This should be a qualitative analysis that focuses on understanding the complex interplay between knowledge and expertise building. For example, a recent study by McNeil (2015) explored changes in instructional designer mental models as they learned complex instructional design methodology. The researcher sought "use of students' drawings of their own mental models for evaluating their perceptions about the necessary skills to master complex instructional design tasks (McNeil, p. 91, 2015). In her research, she found that understanding instructional designers expressed mental models was critical to understanding their needs and facilitating the learning of instructional design methodology. Thus, future scrutiny on mental

models can help identify methods of assisting instructional designers' understanding and use of MLPs.

Finally, more scholarly attention needs to be paid to the development of empowerment in designers–both novice and expert. Since instructional designers are an integral part of the development process, it is crucial that they feel confident and supported in their ability to defend the use of MLPs and other evidence-based principles, especially with external stakeholders. It will be important to examine these issues in the context of organizational support and self-efficacy, as well as investigate components that may pose as barriers to the development of empowerment and trust beliefs. Recent research has focused on improving the performance of instructional designers as consultants. In this vein, Robinson & Robinson (2008) suggests that, beyond knowledge and expertise in using MLPs, partnering and consulting abilities are an essential part of working with external stakeholders. Thus, exploring instructional designers current consulting skills can provide useful data that can inform interventions geared at helping instructional designers defend the use of MLPs.

Summary

As mentioned in previous sections of this manuscript, the TPB has been used widely in quantitative academic literature to predict behavioral intent in a variety of contexts. This study, however, employed the TPB in a qualitative study of MLP use by instructional designers' during the design and development of e-learning courses. To the knowledge of the researcher, this is the first study to use the TPB to qualitatively investigate instructional designers' use of MLPs. Given the many benefits of using MLPs in e-learning course design, it is critically important to gain a

deeper understanding of the factors that may influence instructional designers'' decision to use or not use MLPs. The overriding finding in this study suggest that, despite being exposed to MLPs and holding positive behavioral beliefs regarding the usefulness of them, instructional designers might hold negative beliefs and face constraining conditions that pose significant barriers to the utilization of these principles in e-learning course design. Moreover, instructional designers' negative beliefs were largely based on assumptions or conclusions developed from earlier experiences. Therefore, while exposure and knowledge may somewhat help improve the utilization of MLPs, instructional designers' negative control and normative beliefs may prevent consistent adoption.

APPENDIX A: IRB APPROVAL LETTER

University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Exempt Human Research

From: **UCF Institutional Review Board #1**
FWA00000351, IRB00001138

To: **Victor Arguelles**

Date: **November 29, 2016**

Dear Researcher:

On 11/29/2016, the IRB approved the following activity as human participant research that is exempt from regulation:

Type of Review:	Exempt Determination
Project Title:	Investigating instructional designers' decisions regarding the use of multimedia learning principles in e-learning course design.
Investigator:	Victor Arguelles
IRB Number:	SBE-16-12687
Funding Agency:	
Grant Title:	
Research ID:	N/A

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these changes affect the exempt status of the human research, please contact the IRB. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

IRB Chair

APPENDIX B: MLP KNOWLEDGE STRUCTURED INTERVIEW PROTOCOL

Instructions
Hello and thank you for participating. During this interview I will ask you about your understanding of multimedia learning principles. There are no right or wrong or desirable or undesirable answers. I would like you to feel comfortable with saying what you really think and how you really feel.

Audio Recording
If it is okay with you, I will be audio-recording our conversation. The purpose of this is so that I can get all the details but at the same time be able to carry on an attentive conversation with you. I assure you that all your comments will remain confidential. I will be transcribing your responses in a report which will contain comments without any reference to individuals. The audio recording will be destroyed after I'm done transcribing our conversation.

Informed Consent
Before we get started, please take a few minutes to read this consent form.

Warm-up
Let's start with a few simple questions to get things started.

Q1. How long have you worked at your current employer?
Q2. Describe your professional experience prior to working for your current employer.
Q3. Describe your formal training in instructional design.

Multimedia Learning Principles
In this part of the interview I am going to ask you a few questions about multimedia learning principles. As I mentioned before, there are no right or wrong answers. This is not a measure of how well you perform at your job. It simply provides background information that will help inform my study on your perceptions of your knowledge regarding multimedia learning principles.

The general process is as follows: I will first ask you to define a specific principle and ask follow-up questions.

Multimedia Learning Principle	**Questions**
Coherence	

Definition: People learn better from a multimedia presentation when extraneous material is excluded. Explanation/Example: Instruction that adheres to this principle would present only what is required, without background audio, sound effects or unrelated imagery. Simply put, it would delete anything that doesn't build on the lesson/topic.	Q1. Define, if you can, the _____ principle in your own words. Q2. How confident are you in your current understanding of this principle? Q3. In what ways have you used this principle in your design of e-learning? Q4. Why or why not have you used this principle in your design of e-learning?
Signaling Definition: People learn better when important information is highlighted or signaled Explanation/Example: Instruction that adheres to this principle would call learner's attention to the critical material in the lesson with the use of visual cues like arrows, flashing, and spotlighting or emphasis on spoken words.	
Spatial Contiguity Definition: People learn better when words and images are presented near each other, rather than far apart Explanation/Example: Instruction that adheres to this principle ensures that text information is presented in close proximity to the image it describes.	
Temporal Contiguity Definition: People learner better when corresponding spoken words and images are presented simultaneously, rather that successively. Explanation/Example: Instruction that adheres to this principle ensures that narration is presented at the same time as the image or animation to help learners make connections between the graphics presented and the words spoken.	
Expectation Definition: People learn better when they are shown in advance the types of test items. Explanation/Example: Instruction that adheres to this principle ensures that instruction informs learners that after instruction, they will be ask to give examples of	

instructional principles, or complete multiple-choice questions, for example.	
Segmenting Definition: People learn better when complex information is presented in manageable chunks. Explanation/Example: Instruction that adheres to this principle ensures that complex explanations are split into smaller parts. For example, the process of building a birdhouse is broken down into multiple steps, instead of it being presented in one long animation.	
Pre-Training Definition: People learn better from a complex lesson when they receive pre-training in the names and characteristics of the key concepts. Explanation/Example: Instruction that adheres to this principle informs learners of key information they need to know before they watch a narrated animation. For example, for a narrated animation on how brakes work, key components of the break system like brake pads, rotors, and break lines are be introduced before learners watch the animation.	
Personalization Definition: People learn better when words in multimedia instruction is presented in a conversational style rather than formal style. Explanation/Example: Instruction that adheres to this principle ensures that written and spoken words are presented in a relatable form using “I” and “you” rather than third-person.	
Concretizing Definition: People learn better when unfamiliar material is related to familiar knowledge. Explanation/Example: Instruction that adheres to this principle makes connections with what people already to what is going to be learned.	

Anchoring Definition: People learn better when material is presented in the context of a familiar situation. Explanation/Example: Instruction that adheres to this principle presents concepts in real-world scenarios.	

APPENDIX C: MLP SALIENT BELIEFS INTERVIEW PROTOCOL

Topic	Probe Questions/Script	Follow-up Questions
Introduction	*Thank you for agreeing to be part of this study. This interview is part of the second phase of my study. I am seeking to understand what beliefs you may hold regarding multimedia learning principles. What we learn from today's discussion may help me improve our organization.* *Remember, as before, I will treat your answers as confidential. I will not include your name or any other information that could identify you in any reports I write. I will destroy the audio recording after I transcribe your responses. Once the study is completed I will destroy all notes I take during this interview.* *There are no right or wrong responses; I am merely interested in your personal opinions. In response to the questions I will ask, feel free to just say whatever comes immediately to mind.* Do you have any questions or concerns about the study before we begin?	
Warm-up	Q1. Talk to me about what things influence your e-learning design choices.	
Coherence Signaling Spatial Contiguity Temporal Contiguity	***Behavioral Beliefs (a)*** Q1a (perceived usefulness) Do you think using multimedia learning principles in your e-learning course design will improve your job performance? How? Q2a (perceived usefulness) If a colleague asked you to describe the value of using multimedia learning	**General Follow-up Questions** • Can you give me an example of that? • What did he/she say? • Why do you feel that way? • And when you say _____, what do you mean by that? • Tell me more about that.

Expectation Segmentation Pre-training Modality Personalization Concretizing Anchoring Multimedia	principles in e-learning course design, what would you say? Q3a. (perceived ease of use) Would using multimedia learning principles in your e-learning course design be easy or difficult? Why? Q4a. (perceived ease of use) Would it be easy for you to become skillful in using multimedia learning principles in your e-learning course design? Q5a. (compatibility) Would using multimedia learning principles in your e-learning course design fit well (support or not support) with your organization's development timelines? Q6a (compatibility) Would using multimedia learning principles in your e-learning course design work well with the way you like to design e-learning courses? ***Normative Beliefs(b)*** Q1b. (supervisor influence) What influences does your supervisor have on your use of multimedia principles in your e-learning course design? Q2b. (supervisor influence) Do you think your supervisor would support your use of multimedia learning principles? Q3b. (peer influence) What influences do your colleagues have on your use of multimedia learning principles in your e-learning course design? Q4b. (peer influence) Would your colleagues think you should use multimedia learning principles? In what situations do you think they would suggest you not use the principles? ***Control Beliefs (c)*** Q1c. (facilitating conditions – resources) If you wanted to use the principles in your design e-learning	• What would that look like? • What influenced you to think this way? **Behavioral Beliefs Follow-Up Questions** • (perceived usefulness) Do you think multimedia learning principles can help you make better design decisions? • (perceived usefulness) What do you perceive to be positive/negative outcomes associated with _____? • (perceived ease of use) Do you find multimedia learning principles to be clear and easy to understand? **Normative Beliefs Follow-Up Questions** • How does he/she help/not help? • How would your colleague/supervisor respond to that? • How do you know they would/would not support you? **Control Beliefs Follow-Up Questions** • Is a principle more appropriate for a certain situation? What one and why?

	course design, what resources might you need that you don't currently have available? Q2. (facilitating conditions – resources) Are there any other issues related to resources that come to mind when you think about the difficulty using the principles in your course design? Q3. (facilitating conditions – technology) Is the e-learning authoring tool you use compatible with using multimedia learning principles? Q4. (facilitating conditions – technology) Would the authoring tool you use to develop e-learning courses help or hinder your use of multimedia learning principles? How? Why? Q5c. (self-efficacy) If you wanted to, do you feel confident in your current ability to use these principles? Q6c. (self-efficacy) Do you feel confident in your understanding of when to use multimedia learning principles?	
Last comments	*We are now reaching the end of the interview. I'd like open the discussion of to any final comments you have to offer reflecting your attitudes, concerns and opinions about creating an online course.* Q2. Do you have any final comments that you feel might be relevant to this study?	
Closing	*I'd like to thank you for your time. Your insight has been extremely helpful.*	

APPENDIX D: COURSE ANALYSIS CHECKLIST

Multimedia Learning Principle	Number of Correct Applications of Principle	Number of Violations of Principle
Coherence – People learn better from a multimedia presentation when extraneous material is excluded.		
Signaling: – People learn better when important information is highlighted or signaled.		
Spatial Contiguity – People learn better when words and images are presented near each other, rather than far apart.		
Temporal Contiguity – People learner better when corresponding spoken words and images are presented simultaneously, rather that successively.		
Expectation – People learn better when they are shown in advance the types of test items.		
Segmenting – People learn better when complex information is presented in manageable chunks.		
Pre-training – People learn better from a complex lesson when they receive pre-training in the names and characteristics of the key concepts.		
Modality – People learn more deeply when words are spoken rather than printed.		
Personalization – People learn better when words in multimedia instruction is presented in a		

conversational style rather than formal style.		
Concretizing – People learn better when unfamiliar material is related to familiar knowledge.		
Anchoring – People learn better when material is presented in the context of a familiar situation.		
Multimedia – People learn better from words and picture, rather than from words alone.		

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APPENDIX E: HRP-508 -
SUMMARY EXPLANATION FOR EXEMPT RESEARCH

Title of Project: Investigating instructional designers' decisions regarding the use of multimedia learning principles in e-learning course design.

Principal Investigator: Victor Arguelles

Faculty Supervisor: Richard Hartshorne, Ph.D. (Dissertation Chair)

You are being invited to take part in a research study. Whether you take part is up to you.

Purpose of the research study: The goal of instructional design practice is to develop eLearning courses that lead to improved learner outcomes. As you know, however, instructional design practice varies greatly throughout our industry. To this end, the purpose of this research is to identify and understand the factors that challenge the use of evidence-based practices in instructional design, specifically multimedia learning principles derived from cognitive learning theory.

What you will be asked to do in the study: You will be asked to participate in two separate interviews designed to explore your experiences working as an instructional designer. Interviews can be conducted over the phone or face-to-face, at a location chosen by you. Interviews will not be conducted at your workplace. Interview questions will focus on multimedia learning principles in instructional design practice. You do not have to answer every question.

Time required: I expect that you will be in this research study for one week. The first interview will take no more than 20 minutes. The second interview will take no more than 60 minutes. A report will be developed of the interview session with the researchers' interpretation of your responses. This report will be shared with you, if you so desire, for your feedback on accuracy.

Audio recording: Since interviews may be face-to-face, the researcher will ensure that the location where interviews are conducted is private and that you feel comfortable that the privacy and the confidentiality of your comments will be protected. While it is not vital that interviews be audio recorded, it is preferred. However, if you do not want to be audio recorded, you will still be allowed to be part of the study and the researcher will take notes of the responses.

If your interviews are audio-recorded, I will be the only individual granted access to the recording. Within three days of the interview, I will transcribe each interview, removing any personally identifiable information. Once the interview has been transcribed, the audio recording will be will be erased/destroyed.

You must be 18 years of age or older to take part in this research study.

Study contact for questions about the study or to report a problem: If you have questions, concerns, or complaints, or think the research has hurt, you can contact Victor Arguelles, Doctoral Candidate in the College of Education at UCF (phone: 860-805-8508; email: varguelles@knights.ucf.edu), or Dr. Richard Hartshore, Dissertation Chair, in the College of Education at UCF (phone: 407-823-1861; email: richard.hartshorne@ucf.edu).

IRB contact about your rights in the study or to report a complaint: Research at the University of Central Florida involving human participants is carried out under the oversight of the Institutional Review Board (UCF IRB). This research has been reviewed and approved by the IRB. For information about the rights of people who take part in research, please contact: Institutional Review Board, University of Central Florida, Office of Research & Commercialization, 12201 Research Parkway, Suite 501, Orlando, FL 32826-3246 or by telephone at (407) 823-2901.

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