TECHNOLOGY-BASED RICH MEDIA TRAINING COMPARED TO TRADITIONAL MEDIA TRAINING IN BLUE-COLLAR EMPLOYEES

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Doctor of Education

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by

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DEDICATION

To my wife and children, you make me look forward to every day. To my mother, father, and sister, I hope to make you proud. I love you all.

ABSTRACT

Guidry, Joseph L., *Technology-based rich media training compared to traditional media training in blue-collar employees*. Doctor of Education (Instructional Systems Design and Technology), May, 2021, Sam Houston State University, Huntsville, Texas.

The objective of this study is to determine the effects of traditional training compared to technology-based rich media training and the results upon course dissemination and completion corresponding course indicators, reaction, learning, and behavioral change quantified using Kirkpatrick's four-level training evaluation model. The study aims to determine the efficiency of the porting of existing traditional training materials to technology-based rich media training.

The subjects of this study are blue-collar participants of an adult learning course. The quantitative methods used in this case will facilitate the exploration of the result that compare a traditional training program to a training program with technology-based rich media using Kirkpatrick's model. The research seeks to inform businesses on generational response in blue-collar workers to traditional versus technology-based training.

KEY WORDS*:* Synchronous, Asynchronous, Video, Forum, Chat, Course

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PREFACE

Before you lies the dissertation “Technology-based rich media training compared to traditional media training in blue-collar employees.” It has been written to fulfill the graduation requirements of the College of Education at the Sam Houston State University. The researcher was engaged in researching and writing this dissertation from February 2018 to May 2021.

I would like to thank my committee and chairs for their guidance throughout the entire process.

Joe Guidry

Texas, February 6, 2018

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CHAPTER I

Introduction

The way individuals interact with and utilize media has changed with the advent of the Internet, social media, and mobile devices. The consumption of print and broadcast media (traditional media) has continued to decline, and traditional media organizations are adjusting their structures in terms of content, brevity, formatting, and delivery of new media to stabilize attrition (Guo, 2018). Many social media platforms are centered on short, unstructured text and user-generated images and videos (Lee, 2019). New media are characterized by brevity, succinctness, and multi-way interaction, such as social media (Lee, 2019). Traditional media are characterized by length, depth, detail, one-way communication, and assumed authority, such as print and broadcast media (Bolin, 2016a).

Background of the Study

The speed of transition from traditional to new media has created generational differences in the way individuals consume content (Bolin, 2016b). Prensky (2009) characterizes these differences, coining the terms digital natives and digital immigrants. An individual's media consumption preferences reinforce future consumption preferences (Creighton, 2018); they also affect their modes of communication (Bolin, 2016b) and their ability to extract meaning (Roof & Polush, 2016). The creation and utilization of training materials in social, educational, and business contexts need to be congruent with the consumption behaviors of the target audiences. For example, organizations market via traditional and new media to reach different generational demographics (Aleksić & Stamenković, 2018). For that reason, the format of training materials should be congruent

with consumption behaviors and appropriately targeted. The training format should have an impact on a training's satisfaction, perceived learning, and behavioral intention (Gupta et al., 2010). The costs of developing training utilizing new media and the efficacy of doing so are largely undetermined (Hawkridge et al., 2018). Organizations have limited resources that can be applied to training development (Farb et al., 2017), and therefore they need to know beforehand that a positive return on investment is possible. To ascertain the efficacy of training, organizations need to apply models that address the input (costs) and outputs (benefits) (Andrews & Laing, 2018).

The focus of this study is to establish, using the Kirkpatrick model, whether technology-based rich media training materials are more or less effective than traditional media training materials on a population of blue-collar workers in terms of satisfaction, perceived learning, and behavioral intention and whether differences between digital natives and digital immigrants exist with regard to preferred media types.

Need for the Study

The research will examine the satisfaction of the trainees regarding the training materials, perceived learning, behavioral intention, and the comparative efficacy of the two types of training. Although several studies have been conducted that compare traditional and technology-based training or learning, the rapid change in technology and the advent of social media, the Internet, and mobile devices would suggest that the landscape has changed dramatically in interactivity and content creation (Ball et al., 2019). As a result, many prior studies are less relevant as technologies change (Islam & Want, 2014), and for that reason, previous results need to be revisited. Almost all research studies (e.g., Cruz, 2018; Eden & Veksler, 2016; Giacumo et al., 2018; Mulvaney, 2019;

Noe, 2017; Taylor, 2017) that compare traditional media training with technology-based training have been conducted in a secondary and post-secondary school context or in white-collar industry contexts that found mixed or no differences in training. The results are questionably applicable in a blue-collar context, particularly in the light of documented concerns with text-based comprehension by traditionally low-skilled or unskilled workers (Graham, 2012; Junior et al., 2011; Mikulecky, 1982; Nchai, 2011).

Individual studies additionally investigated the effect of training modality on different dimensions of learning (satisfaction, perceived learning, and behavioral intention). However, those studies tended to examine only one or two of those dimensions (Marchetti & Valente 2018; Mayer, 2009; Sprecher, 2014; Thomas et al., 2013). As a result, the linkage between the three dimensions is understudied.

Prensky's (2009) categorization of people into digital immigrants and digital natives, addresses the generational differences resulting from different technology-oriented environmental conditions during a person's formative years. Studies indicate that generational differences exist (Reeves & Oh, 2008) but as one of a range of factors, including geographical location, gender, and age (Aleksić & Stamenković, 2018). However, studies on the differences between digital immigrants and digital natives are almost exclusively targeted at secondary and post-secondary institutions (Akman Yeşilel, 2016; Ball et al., 2019; Creighton, 2018; Guo et al., 2008; Helsper & Eynon, 2010; Jabłońska & Zajdel, 2019; Šorgo et al., 2017; Thang et al., 2015). Many authors directly refer to the concept as being a white-collar issue (Marchetta et al., 2018; Martin, et al., 2018). Academic research targeting the issue of generational differences specifically in blue-collar workers towards preferences in learning environments is largely non-existent.

In Table 1 a search of the ERIC database (https://www.eric.ed.gov/), for example, produced the following results:

Table 1

Eric Database Blue-Collar Technology Keyword Results

Term	All-Field Count	Title Count
1. Blue-Collar	830	96
2. Blue-Collar or Synonyms	3,963	541
3. Instructional Technology	49,393	1,227
3.1 Instructional Design	18,993	1,518
3.2 Educational Technology	61,549	2,359
4. Multimedia	12,506	2,676
5. Multimedia or Synonyms	12,656	2,707
5.1 Technology	169,847	31,637
5.2 Media	64,596	11,018
6. #1 and #3	0	0
6.1 #1 and #3.1	1	0
6.2 #1 and #3.2	7	0
7. #1 and #5	2	0
7.1 #1 and #5.1	74	1
7.2 #1 and #5.2	22	0
8. Kirkpatrick	447	26
9. #3 and #8	28	0

(Continued)

9.1 #3.1 and #8	12	0
9.2 #3.2 and #8	32	0
10. #5 and #8	0	0
10.1 #5.1 and #8	74	1
10.2 #5.2 and #8	11	0

The evidence suggests that differences in reaction to technology exist between those considered digital natives and those considered digital immigrants and that they include differing access patterns and usage (Thinyane, 2010). This study will evaluate and establish whether these differences continue to exist.

Statement of the Problem

The past two decades have been characterized by significant developments in device access and media presentation, which has transformed consumption habits of individuals (Akherfi et al., 2018). The changes in habits necessitate a change in training media development for improved efficiencies and employee and organizational performance because preferences toward new media rather than traditional media exist throughout society and organizations (Becker et al., 2012; Kane et al., 2016; Khan et al., 2011; Khan et al., 2018; Owoyemi et al., 2011; Sultana et al., 2012). There are many models available for training assessment (Kraiger, 2014). The efficiencies and performance of a training can be measured using Kirkpatrick, D. L., & Kirkpatrick, J. D. (2006) four-level training evaluation model, as it can further inform the analysis, design, development, implementation, and evaluation (ADDIE) model for training development (Beal, 2007); however, this is commonly done in white-collar settings, leaving blue-collar

sectors with no substantial literature regarding technology-based rich media and training (Cruz, 2018; Eden & Veksler, 2016; Giacumo et al., 2018; Mulvaney, 2019; Noe, 2017; Taylor, 2017). Those divergent consumption preferences comprising of digital natives versus digital immigrant groups of employees are often not addressed by organizations, potentially affecting satisfaction, perceived learning, and behavioral intention (Bolin, 2016a; Bolin, 2016b; Jabłońska & Zajdel, 2019; Marchetta et al., 2018; Prensky, 2009; Šorgo et al., 2017). Additionally, training materials tend to exhibit inertia because of a desire to contain costs (Harris & Cannon, 1995).

Purpose of Study

The purpose of this study is to determine the impact of technology-based versus traditional media training on satisfaction, perceived learning, and behavioral intention in a blue-collar setting as measured by the Kirkpatrick, D. L., & Kirkpatrick, J. D. (2006) four-level model (Reeves & Oh 2008; Wrobel-Lachowska et al., 2018). In addition, this study will examine the impact of generational differences on satisfaction, perceived learning, and behavioral intention (Aleksić & Stamenković, 2018). This study may provide evidence of differences between organizational roles (i.e., blue-collar versus existing white-collar research) as measured by training type and evaluation. The study may yield the potential value of categorizing a population into digital natives and digital immigrants within a blue-collar training context. Finally, the study may present evidence regarding shifting media consumption preferences as a variable in training modalities.

Research Questions

1. What impact does the delivery model of training, technology-based versus traditional media, have on the satisfaction, perceived learning, and behavioral intention of blue-collar workers?
2. How does the covariate of generational consumption of technology-based rich media training and traditional media training impact the satisfaction, perceived learning, and behavioral intention of blue-collar workers?

Hypotheses

From the aforementioned research questions, the following null hypotheses have been made:

H_{o1}: Satisfaction of blue-collar workers trained with traditional media = Satisfaction of blue-collar workers trained with traditional material

H_{o2}: Perceived learning of blue-collar workers trained with traditional media = Perceived learning of blue-collar workers trained with traditional material

H_{o3}: Behavioral intention of blue-collar workers trained with traditional media = Perceived learning of blue-collar workers trained with traditional material

H_{o4}: Satisfaction of digital native blue-collar workers trained with traditional media = Satisfaction of digital immigrant blue-collar workers trained with traditional material

H_{o5}: Perceived learning of digital native blue-collar workers trained with traditional media = Perceived learning of digital immigrant blue-collar workers trained with traditional material

H_{o6}: Behavioral intention of digital native blue-collar workers trained with traditional media = Behavioral intention of digital immigrant blue-collar workers trained with traditional material

Delimitations, Limitations, and Assumptions

Delimitations

The population of this study will be employees of a lumber yard who are responsible for the operation of heavy equipment and other duties. A single traditional training will be used for interpretation and augmentation into a technology enhanced rich media training.

Limitations

A single instructional technologist will be responsible for the creation of rich media course materials. The sample is a convenience sample. The geographic area will be the southern United States, in a single industry, with a limited number of physical branch locations. The results of this study may not be compatible with cases in other industries or with different geographical locations. Motivation in the workforce may be different than motivation in educational settings, and previous training results may be skewed by motivation, content, or presentation. The divide between digital natives and digital immigrants is a controversial topic with differing opinions of academics; thus, the division of populations proposed and the resultant analyses within this study will determine if those differences may exist.

Assumptions

Several assumptions underlie this study. First, the researcher assumes that the participants are a representative sample of blue-collar workers in a lumberyard. Second,

the basic utilization of technology should be possible by all the participants, including using basic navigation features of a user interface.

Significance of the Study

Kirkpatrick's four-level model in a blue-collar work setting will be used to measure the generational impacts in effectiveness of technology-based rich media training compared to traditional training.

Theoretical Framework

The Kirkpatrick four-level model allows for the examination of training modules and the associated costs of the substitution or appending of new media with the goal of using pedagogically sound, cost effective, and efficient training materials that adhere to and are fundamentally based upon research findings (Gaponova & Korshunov, 2018). Several studies have been conducted using the Kirkpatrick model: Ying et al. (2019) utilized the model to determine the effects of enterostomal therapist training to determine student course satisfaction, teacher satisfaction, and studying conditions**;** Vizeshfar et al. (2018) used the model to evaluate the effectiveness of first aid health volunteer training to measure trainers, content, learning, facilities, and program outcomes**;** Heydari et al. (2019) applied it in measuring the effect of a new teaching and learning methods workshop for health care staff; Bijani et al. (2018) utilized the model to evaluate the effectiveness of a continuing education program for the prevention of occupational exposure to needlestick injuries; and Abdelhakim et al. (2018) used it to evaluate the airline cabin crew food safety training. These studies will be described in further detail in Chapter 2.

Laughey (2007) defines media as technologies that communicate messages to audiences in any location. Media consumption has changed significantly in the last two decades. The decline of printed material consumption, in conjunction with the growth of the Internet, and new media provide opportunities for evolution and adaption of traditional media (Aleksić & Stamenković, 2018). Consumption of media has changed to any media, any device, on demand, where consumption is dictated by the user (Ley et al., 2014). Oregon et al. (2018) state that media richness theory emphasizes the ability of media to communicate with the least vagueness and distortion while maximizing the magnitude and quality of feedback, prompts, message tailoring, and emotions. The creation of rich media has become easier. Furthermore, the porting of existing training materials to rich media with internal business professionals that can inform or work in conjunction with an instructional designer are the focus of this study (Demyan, 2014).

Definition of Terms

Blue-Collar. Blue-collar workers are traditionally low-skilled or unskilled workers (Graham, 2012; Junior et al., 2011; Mikulecky, 1982; Nchai, 2011).

Cost. Cost is the direct or indirect monetary outlay by an organization or individual (Mishan & Quah, 1976).

Digital Native. "Students (called digital natives) are those born roughly between 1980 and 1994, [who] represent the first generation to grow up with new technology and have been characterized by their familiarity with and confidence in, with respect to Information and Communication Technologies (ICT)." (Creighton, 2018, p. 133).

Digital Immigrant. A digital immigrant is "Those of us who were not born into the digital world, but have, later in our lives, adapted to and began to use this new

technology… and [those of us who] retain [our] ‘accent,’ that is, [our] foot in the past (consumption preferences)” (Creighton, 2018, p. 133).

Learning Preference. Rezler and Rezmovic (1981) define learning preferences as the learner's choice of one learning alternative versus another.

Learning Style. Kirschner (2017) states that learning style has been discredited as opinion lacking evidentiary and theoretic basis. Learning style is understood as referring to an individual’s learning preference (Shepherd, 2020).

Rich Media. Oregon et al. (2018) state that media richness theory is a computer-mediated communication theory that emphasizes the ability of media to communicate with the least vagueness and distortion while maximizing the magnitude and quality of feedback, prompts, message tailoring, and emotions.

Traditional Media. Traditional media refers to print and analog broadcast media, including radio, television, newspapers, and magazines (Skoric & Poor, 2013).

Technology Rich New Media Terms

Asynchronous Video. Asynchronous video is an on-demand video that is facilitated by media, such as email and discussion boards, and that supports work relations among learners and with teachers, even when participants cannot be online at the same time. Therefore, asynchronous video is a key component of flexible e-learning. Many people take online courses because of their asynchronous nature, combining education with work, family, and other commitments. Asynchronous e-learning makes it possible for learners to log on to an e-learning environment at any time and download documents or send messages to teachers or peers (Hrastinski, 2008, p. 51).

Blog. Web logs, or blogs, are the hybridization of written and spoken media through text, which are published on a web-based platform that traditionally encourages participant interaction. They are a cross between static HTML homepages and forums/newsgroups or other computer-mediated communication (CMC) platforms (Bondi, 2018).

Podcast. Podcasts are audio recordings used in education for the transmission of course materials, feedback, and authentic listening practice, as a supplement to other course materials (Phillips, 2017).

Really Simple Syndication (RSS). RSS "is a lightweight XML application which summarizes website information. RSS feeds allow the users to be notified when the content of certain data on the web has changed…" (Tarhini et al., 2015, p. 31)

Social Media. Social media refers to "Interactive platforms via which individuals and communities share, co-create, discuss, and modify user-generated content … [They are used to] maintain current relationships, to create new connections, to create and share their own content, and, in some degree, to make their own social networks observable" (Treem et al., 2016, p. 768)

Synchronous Video. Synchronous video is "Supported by media such as videoconferencing and chat, [and it] has the potential to support e-learners in the development of learning communities. Learners and teachers experience synchronous e-learning as more social and avoid frustration by asking and answering questions in real time. Synchronous sessions help e-learners feel like participants…" (Hrastinski, 2008, p. 53).

Web 2.0. Caruso (2018) states that Web 2.0 technology is the sum of the changes in World Wide Web technology (hardware) and design (software), as a means for continuous accessible learning through social, video, self-monitoring, and collaborative text.

CHAPTER II

Review of Literature

Introduction

Blue-collar employees are subject to organizational training that may not align to their media consumption preferences and modalities, with unknown consequences for training reaction, learning, behavior, and results that they yield through their knowledge, action, and behaviors. This chapter includes an introduction, the theoretical framework for the study, descriptions of traditional training modalities, technology-based training modalities, and structured approaches to the development and assessment of corporate training. This chapter also includes research associated with efficacy of the selected development model, research associated with comparisons of the efficacy and efficiency of traditional and technology-based training, and generationally based changes in media consumption. Furthermore, an historical review of technology-based training is included. As technology changes at a rapid pace, only recent work is most relevant as new elements such as interactivity and accessibility of media on different types of devices become available (Costley et al., 2017; Erffmeyer et al., 1992; Islam & Want, 2014). The literature related to the efficacy of technology-based training provides the foundation for the study. However, most available studies targeted both professional (white-collar) or young people. Studies addressing blue-collar workers' attitudes to corporate training are rare in literature. Differences regarding media consumption and rich media access include parents' occupations; specifically, technical, administrative, clerical, and marketing occupations are more likely to have access to and positive attitudes towards the Internet and connected devices. This factor remains significant irrespective of income or ethnicity

(Losh, 2009; Mesch & Talmud, 2011). This study therefore is an attempt to fill a gap in the literature related to changes in satisfaction, perceived learning, and behavioral intention, resulting from both traditional and rich media training targeting unskilled, semi-skilled, or purposefully skilled workers (blue-collar) from different generational groups (digital native and digital immigrants). To structure the remainder of the chapter, the topics have been categorized as indicated in Table 2 below.

Table 2

Overview of Existing Related Literature

Topics	Literature
Theoretical framework	(Abdelhakim et al., 2018; Aleksić & Stamenković, 2018; Bijani et al., 2018; Demyan, 2014; Gaponova & Korshunov, 2018; Heydari et al., 2019; Ley et al., 2014; Vizeshfar et al., 2018; Ying et al., 2019)
Traditional training modalities	(Collins, 1973; Jeske et al., 2017; Lacerenza et al., 2017; Noe, 2017)
Technology-based training modalities	(Colbert et al., 2016; Gomes et al., 2018; Marchetta et al., 2018)

(Continued)

Structured approaches to the development and assessment of corporate training	(Andrews & Laing, 2018; Bahnson & Olejnikova, 2017; Becker et al., 2012; Bellanca & Brandt, 2010; Christoph et al., 1998; Chyung, 2008; Collins & Halverson, 2009; Cruz, 2018; Cullen et al., 1978; Eden & Veksler, 2016; Farb et al., 2017; Field, 2006; Gaponova & Korshunov, 2018; Giacumo et al., 2018; Harris & Cannon, 1995; Hawkridge et al., 2018; Henderson & Venkatraman, 1999; Ingersoll, 2008; Khan et al., 2011; Khan et al., 2018; Ko et al., 2018; Kraiger, 2014; Kumpikaitė, 2007; Mulvaney, 2019; Owoyemi et al., 2011; Phillips & Phillips, 2016a; Phillips & Phillips, 2016b; Poteliene & Tamasauskiene, 2013; Roof & Polush, 2016; Schols, 2016; Sultana et al., 2012; Taylor, 2017; Thomas et al., 2013; Trout & Vela, 2016)
Research associated with efficacy of the selected development model	(Abdelhakim et al., 2018; Abuloum et al., 2019; Alliger et al., 1997; Arthur et al., 2003; Bates, 2004; Bijani et al., 2018; Bouck et al., 2016; Cairns, 2012; Chyung, 2008; Craig, 1996; Felea & Stanca, 2019; Gaponova & Korshunov, 2018; Graham, 2012; Heydari et al., 2019;

(Continued)

	Jonny, 2016; Junior et al., 2011; Kirkpatrick, 1959; Kirkpatrick & Kirkpatrick, 2006; Madvari et al., 2018; Martin et al., 2018; Melnarowicz, 2018; Mikulecky, 1982; Nchai, 2011; Perez-Soltero et al., 2019; Phillips & Phillips, 2016b; Praslova, 2010; Reio et al., 2017; Ruiz & Snoeck, 2018; Stickles, 2015; Turnbow & Zeidman-Karpinski, 2016; Vizeshfar et al., 2018; Warschauer, 2007; Weisberg, 2011; Yardley & Dornan, 2012; Ying et al., 2019)
Research associated with comparisons of the efficacy and efficiency of traditional and technology-based training	(Bavelier et al., 2010; Debele & Plevyak, 2013; Gorghiu, 2016; Latham & Carr, 2015; Lee & Clarke, 2019; Loertscher & Koechlin, 2016; MacFarlane, 2016; Mulvaney, 2019; Nasir & Bargstädt, 2017; Okojie et al., 2006; Reeves, 1995; Rivera et al., 2002; Tatar et al., 2015)
Generationally based changes in media consumption	(Akherfi et al., 2018; Akman Yeşilel, 2016; Alam et al., 2016; Aleksić & Stamenković, 2018; Bahnson & Olejnikova, 2017; Beyer, 1987; Bhowmick et al., 2007; Boileau, 2011;

(Continued)

Bolin, 2016a; Bolin, 2016b; Bolliger & Armier, 2013; Bonner & Roberts, 2017; Brar & van der Meij, 2017; Cairns, 2012; Cho et al., 2016; Church et al., 2015; Chute, 1993; Clark et al., 2015; Cohen et al., 2018; Colbert et al., 2016; Costley et al., 2017; Czeropski, 2012; Daft & Lengel, 1986; Danielson et al., 2015; De Lange et al., 2015; De Villiers & Walsh, 2015; Delmarter et al., 2007; Demyan, 2014; Dutta-Bergman, 2004; Earl 2013; Eden & Veksler, 2016; Feldman & Weiss, 2010; Fleming et al., 2017; Frechette & Williams; 2015; Girod, 2008; Gomes et al., 2018; Guo et al., 2008; Guo, 2018; Guzey & Roehrig, 2009; Ha & Fang, 2012; Han & Stoel, 2017; Helsper & Eynon, 2010; Henderson & Venkatraman, 1999; Hew, 2009; Howlett & Waemusa, 2018; Huat See & Gorard, 2015; Hughes, 2007; Islam & Want, 2014; Jabłońska & Zajdel, 2019; Judd, 2018; Kato et al., 2016; Koedinger et al., 2015; Kostyrka et al., 2017; Laanpere et al., 2014; Lee, 2019; Lee & Mayer, 2015; Leijen et al., 2008; Leinonen et al., 2016; Ley et al., 2014; Lian,

(Continued)

2017; Lou et al., 2006; Lyons et al., 2012; Madden et al., 2017; Madden et al., 2016; Maican et al., 2016; Mao, 2014; Marchetta et al., 2018; Marchetti & Valente, 2018; Mason et al., 2017; Mayer, 2009; Menzies & Johnson, 2016; Misner, 1994; Nhedzi, 2019; Niederhauser et al., 2000; Papa, 2015; Pavlovic et al., 2016; Pitta et al., 2012; Prensky, 2001a, 2001b; Prensky, 2009; Reeves & Oh, 2008; Reich et al., 2015; Rivera et al., 2002; Rose, 2017; Rourke et al., 2001; Salcudean & Muresan, 2017; Selwyn, 2009; Shaikh, 2017; Sink & Bales, 2016; Šorgo et al., 2017; Sprecher, 2014; Stedman & Adams, 2014; Sullivan & Puntambekar, 2015; Sung & Mayer, 2012; Tefertiller, 2018; Tewksbury, 2005; Thang et al., 2015; Themelis, 2014; Thinyane, 2010; Thomas et al., 2013; Toftness et al., 2018; Treem et al., 2016; Tukachinsky & Eyal, 2018; Wang, 2015; Wang & Antonenko, 2017; Wrobel-Lachowska et al., 2017; Yaman, 2016; Zainuddin, 2018; Zheng & Ni, 2006)

(Continued)

Historical review of technology-based training	(Aleksić & Stamenković, 2018; Crespin & Austin, 2002; Demyan, 2014; Ley et al., 2014; McHarg et al., 2006)

Models used in education to design, communicate, provide purpose, and measure outcomes of classroom instruction include Gerlach and Ely; Heinich, Molenda, and Russell; Dick and Reiser; Hunter (1982); and Kemp (Gustafson & Powell, 1991). These models are designed to improve classroom instruction within the constraints placed upon the instructor (Gustafson & Powell, 1991). Educational product development models include Van Patten; Leshin, Pollock, and Reigeluth; and Bergman and Moore (Gustafson & Powell, 1991). The product models are to focus students on creating products with required characteristics (Gustafson & Powell, 1991; Plotnick, 1997). Educational systems development models include instructional development institute; in-services procedures for instructional systems development; Dick and Carey; Seels and Glasgow; and Diamond (Gustafson, & Powell, 1991; Yıldız & Uzunboylu, 2018). The systems development models are to guide the development of instructional outputs, which make them useful for adaptation outside of education (Gustafson, & Powell, 1991; Yıldız & Uzunboylu, 2018).

Within the corporate world, other structured approaches, including Kirkpatrick (1959) or the Phillips-Kirkpatrick model (Phillips & Phillips, 2016b), are utilized. Other models, such as Kaufman and Keller try to encapsulate the Kirkpatrick (1959) model with availability of resources and societal and satisfaction outcomes (Kraiger, Passmore, dos Santos, and Malvezzi, 2014). Kraiger et al. (2014) state that models such as context,

input, reaction, and output (CIRO) or context, input, process, and product (CIPP) are academic in nature. They also posit that models such as Brinkerhoff's six-stage model and Bushnell's input, process, output (IPO) model includes formative and summative assessments but lack specificity in the identification of shortcomings of the studied training. Organizations are focused upon results and the direct impact from their training, and Kraiger et al. (2014) state that Kirkpatrick's model is widely used and accepted across disciplines for clear, unsophisticated, ease of use.

Kirkpatrick's (1959) four-level model is extensively used in corporate, white-collar settings, or academic training environments (Abuloum et al., 2019; Bouck et al., 2016; Stickles, 2015; Warschauer, 2007; Weisberg, 2011). Literature regarding training in a blue-collar setting is lacking. Focus is placed on three complementary components relevant to this study: (a) a description of the most widely used training development model and its capabilities and limitations; (b) consideration of prior work investigating the effectiveness of technology- and media-based training; and (c) the role that generational status may correlate with efficacy of traditional versus rich media-based training.

Theoretical Framework

Education is thought of as a holistic, generic, long term "breadth and depth," and obligatory academic preparation for an individual to fulfill their roles in society, whereas training uses education as a canvas to prepare individuals for occupation specific considerations, such as safety or machinery operation, and specialized vocational or career roles (Collins, 1973; Dearden, 1984; Hallak & Caillods, 1981). The main impetus of the historical shift in vocational training to use information technology was the

professional requirements for occupations which leverage technology, and once attained, those skilled vocations further necessitate access to the Internet and rich media (Chandrasekhar, 2006; Dearden, 1984). Traditional training modalities used by an organization allow stakeholders to gain information, skills, and ultimately modify participant behavior for organizational goals (Noe, 2017). Technology-based training allows for the utilization of new media, preferred devices, and real time social experiences (Marchetta et al., 2018). New technologies and methodologies integrated into learning can improve participant achievement and flow throughout the learning process (Chang et al., 2018).

Kirkpatrick's four-level model is an evaluation model designed to measure reaction, learning, behavior, and results, with limitations (Chyung, 2008). Limitations of the Kirkpatrick four-level model include (a) the model is incomplete, (b) assumptions of intersubjectivity, (c) false assumptions of increased rank as the model's levels are ascended, (d) lack of form and procedure level interventions and assessments (Bates, 2004; Reio et al., 2017).

Recently, several studies have been conducted using this model to evaluate training in various forms, and the overall results from these studies are that the Kirkpatrick model produces quantifiable, actionable results regarding positive organizational outcomes. In the literature, few studies regarding Kirkpatrick's model and blue-collar workers exist.

Media-oriented training and the general consumption of media has changed to a user-dictated choice in the type of media and the preferred device and in it being on demand and interactive (Ley et al., 2014). New rich media are characterized by on-

demand access to interactive multi-way communication of content (Bolin, 2016a; Lee, 2019; Treem et al., 2016). The creation of rich media has become easier thus allowing instructional designers to easily port artifacts between media (Kalaitzidis et al., 2016). This study will explore the value of porting existing training materials by organizations in conjunction with an instructional designer to create training materials to facilitate training to fit user preferences (Demyan, 2014).

Prensky (2009) classifies digital users into two categories: digital natives, who are individuals born after the 1980s, who have had access to Internet-connected devices their entire lives; and digital immigrants, who are individuals born before 1980, who have evolved into a world with connected devices (Prensky, 2001a; Prensky, 2001b).

Thinyane (2010) believes that an important area of research is deliberations regarding the existence of digital natives and the need for education to meet the needs of digital natives. Reeves and Oh (2008) found that generational differences exist in the workplace regarding media, technology, and their consumption and usage, including the time spent on media, access methodologies, and social participation. A common misconception with digital native groups is that they are actually rich media literate and that older generations cannot learn to solve problems regarding the utilization of rich media (Sink & Bales, 2016; Šorgo et al., 2017). Compared to older generations, the younger generations are immersed in technology and rich media throughout their life. Furthermore, the merits of rich media need to be tested by instructional designers (Reeves & Oh, 2008). Younger generations are fast, immediate-feedback oriented, individualistic, yet highly interconnected, and they prefer and are accustomed to sharing and collaborating through rich media versus text (Desai & Lele, 2017).

In literature, few studies regarding the consumption of rich media by blue-collar workers exist. Wrobel-Lachowska et al. (2017) show that knowledge management is key to address the differences in mature workers in a blue-collar context compared to their millennial peers who are continually exposed to technology. Eden and Veksler (2016) acknowledge that further research on CMC should be conducted in populations which consist of generations that are heterogeneous in nature. Blue-collar workers consist of both digital natives and digital immigrants; therefore, their reception to traditional training and technology-based rich media training warrants analysis (Gaponova & Korshunov, 2018; Prensky 2009; Thinyane, 2010; Wrobel-Lachowska et al., 2017).

Training

Definition of Training

Training is "a planned effort by a company to facilitate [the] learning of job-related competencies, knowledge, skills, and behaviors by employees" (Noe, 2017, p. 8) Training is usually focused upon the trainee's "short-term" acquisition of a skill rather than education's "long-term" valuing of knowledge acquisition (Collins, 1973). Collins (1973) states that a trained individual can fall prey to knowledge loss due to timespan intervals and technological advances, where an educated individual will be able to adapt and learn new systems within an organization's technological advancement.

Bretz and Thompsett (1992) describe traditional training as lecture based, sometimes incorporating traditional media, with integrative learning methods taking into consideration behavior as a function of the person and environment in order to account for variables such as ambiance and delivery methods. Erffmeyer et al. (1992) describe traditional training modalities in order of perceived effectiveness to include role playing,

case study, conference/discussion, games, films or traditional physical based media video, lectures, sensitivity training, and recorded, traditional, physical-based media lectures. Traditional training modalities allow stakeholders to gain information, skills, and ultimately modify participant behavior for organizational goals (Noe, 2017).

Training performance can be shaped by personal and organizational resources, including individual characteristics and traits (Jeske et al., 2017). Resources include the totality of physical, climate, methodologies, and personal attributes. Personal resources include prior experience, on the job training, and influence of their personal beliefs on their characteristics as a person, and organizational resources include training time and autonomy, ensuring a positive team climate, and participative training methodology (Jeske et al., 2017).

Training Development

Training development refers to typically mandatory face-to-face or online programs that are created and systematized by an organization (Noe, 2017). The training instructional design process is referred to as the ADDIE model (Noe, 2017). Budoya et al. (2019) state that the ADDIE model is effective, ubiquitous, dynamic, and flexible, and although many instructional design models are available, their various structures adhere to the ADDIE models phases. Lacerenza et al. (2017) posit that learning is positively affected by first conducting a needs analysis, utilizing multiple delivery methods, and focusing on hard skills. After completing a meta-analysis of leadership training program modules regarding leadership training interventions, they also found that needs analysis, utilizing multiple delivery methods, and focusing on hard skills have an impact on learning, transfer, and results.

Information transfer is positively affected by face-to-face interactions, multiple settings, and voluntary attendance. It is beneficial for organizational results to hold the training on site, and the longer the training, the better (Lacerenza et al., 2017). Different training modalities are used by an organization to allow stakeholders to gain information, skills, and ultimately modify behavior for organizational goals. This is evident in training performance being shaped by individual and organizational resources. The addition or substitution of rich media in training through technology by organizations warrants review.

Erffmeyer et al. (1992) describe technology training modalities in order of perceived effectiveness to include interactive video, technology-assisted instruction, technology-based assessment, and online meetings. New technologies and methodologies can improve student achievement through accessibility and flexibility (Chang et al., 2018), for material access and content availability. Johnson (2015) states that "online training is more flexible than traditional face-to-face delivery while maintaining the learning experience," and common pitfalls, such as unsatisfactory internet access and issues with downloads, are no longer existent with occupational training.

Technology-based multimedia can include images, audio, text, and varying combinations and permutations thereof (Zhuang et al., 2008). Content creators should be innovative and not assume the technological skill level of their learners. They should avoid digital distractions and create materials that have real-time feedback and social interactions (Marchetta et al., 2018). According to Chang et al. (2018), computer-based learning and digital gamification of materials provides increased learning achievement, satisfaction, and focus, with significantly higher achievement and flow, or satisfaction

and focus, in the digital game-based learning groups. Training information and media can be easily created and distributed by content creators and managers to the end users of a digital training with a connected device regardless of location (Gomes et al., 2018).

Not all training materials are created equal, regardless of whether the materials are traditional or technology oriented; the quality of the materials and the context in which those materials are presented are significant factors in determining learner response and the effectiveness of the process (Artino, 2008). Colbert et al. (2016) state that the digital workforce should be comfortable with technology-based rich media instruction; however, the content and layout of that media may vary. Technology-based training yield methodologies that can improve student achievement.

Historical Review of Technology-Based Training

Crespin and Austin (2002) identify several training benefits associated with the introduction of technology into training systems. The major benefit realized through the utilization of technology is the shortened feedback loop between material presentation and the assessment of the students or trainees (Crespin & Austin, 2002). The use of technology in training offers advantages, such as (a) quicker feedback loops from assessments (the time from assessment to feedback), (b) decreased physical media costs (being able to deliver content digitally), (c) increased security (administering and receiving communication securely), (d) temporal advantages in scheduling (allowing for asynchronous communication with instructors and participants), (e) inclusion of rich media, and (f) analytics (the use of computers to analyze interactions within a system to discover information to provide automation and support) (Baalsrud Hauge et al., 2015; Courtney & Wilhoite-Mathews, 2015; Crespin & Austin, 2002; Hew, 2009). Learning

analytics in technology-based instruction allows for the collection of data throughout training to improve all elements of the educational process, and through tailored learning experiences, personalized support, and recommendations based upon student performance (Baalsrud Huage et al., 2015).

The utilization of technology in training has disadvantages, including frustration related to unfamiliarity with computers for some users, necessitation of access to devices and proper supporting infrastructure, and privacy concerns (Crespin & Austin, 2002; Lian, 2017). Crespin and Austin (2002) state that one of the first uses of technology included automation and enhancing existing traditional training by assessment, grading automation, and test distribution; however, the present-day utilization of learning analytics allows the entire learning process to have built in automation and support (Baalsrud Huage et al., 2015).

Traditional Versus Technology-Based Training

In David Warlick's 2014 report to the European Commission, *On New Modes Of Teaching And Learning In Higher Education*, Warlick states, "We need technology in every classroom and in every student and teacher's hand, because it is the pen and paper of our time, and it is the lens through which we experience much of our world" (MacFarlane, 2016, p. 3). The incorporation of technology into learning environments has consistently attracted advocates and critics in equal measure (Lee & Clarke, 2019; Marchetta et al., 2018; Mulvaney, 2019; Tatar et al., 2015). Technological innovation should take an "evolutionary rather than revolutionary" approach, and if that innovation results in significant social and environmental disruption and change, these changes also

carry both the potential and the risk to disrupt the learning environment (Zhao & Frank, 2003).

Researchers have identified several characteristics that technology-based training must possess for such training to be accessible, properly structured, easily navigated, and effective. The basis of technology utilization in training must adhere to pedagogical best practices (Rivera et al., 2002). McHarg et al. (2006) report that digital access to training and support must have clear navigation and that access to a digital library does not replace a physical library, as users reported problems in ergonomics and costs.

Organizations must follow guidelines in technology usage in training and substituting rich media for traditional media does not negate the need for structured development with a focus on goals and objectives for the training and mechanisms to appropriately assess and adjust training, which can be automated through analytics. Technology's effect on human brains is multifaceted and significantly modifies human behavior, but the purposeful utilization of technology can surpass the traditional educational model, for example, using customized learning platforms informed through analytics (Bavelier et al., 2010). In traditional education, personalized learning was available through teachers receiving and processing student data, technology can deliver those experiences anywhere as the current state of technology is conducive to distance learning or asynchronous learning (Mulvaney, 2019; Pane et al., 2015).

Education and training need to change to meet student needs, and the usage of andragogy versus pedagogy in literature principally concludes that andragogical learning is self-directed or content-oriented, versus pedagogy, which is teacher-directed. However, the terms are occasionally used interchangeably as approaches to instruction based upon

student age alone (Monts, 2000; Okojie et al., 2006). Rivera et al. (2002) indicate that pedagogy must change to meet technology, but technology must yield to pedagogical roots. Okojie et al. (2006) state that the proper use of technology in a training setting is deployed in a learner-centric way and applied to areas in which the instructor finds the utility worthwhile. Furthermore, they state that the implementation is focused upon existing deficiencies in course materials that are created with technological interventions in mind. Tatar et al. (2015) state that training environments which thoughtfully employ new technologies and which allow for knowledge construction and cooperative work tend to lower overall anxiety. Regarding the utilization of specialty technologies, Debele and Plevyak (2013) acknowledge that instructors must systematically prepare their participants for technology use.

Instructors use technology to foster interactive communication between themselves and learners and aim to promote and facilitate conversation and discussion. Mulvaney (2019) confirms that instructors can promote learning at a distance through the utilization of technology through the use of online training modules and group discussion. Risk is associated with adding online course materials to learning environments by instructors to communicate (Latham & Carr, 2015; Reeves, 1995). Gorghiu (2016) and Loertscher and Koechlin (2016) report that educational practices are fueled by new perceptions and technology allows training to reach individuals, small groups, and large groups while utilizing “learning content boosted by a very rich information” environment, which is aimed at providing participants with knowledge to become functional in their career and life.

Lee and Clarke (2019) assert that high-tech industries are the core of many economic development plans and initiatives should be taken to increase the utility of low- and mid-skilled workers to offset the rising costs that technological growth yields. While, arguably, no single training program can raise a worker's skill level from low to medium, Nasir and Bargstädt (2017) recognize that issues with poor communication, particularly with traditionally low-skilled workers, can lead to poor productivity, task questions, rework, and hazardous work conditions. Furthermore, the authors recognize the poor reception to paper-based materials by some employees (i.e., English language learners and workers with literacy issues). In an effort to assist the aforementioned groups, employers created virtually animated building information model tutorial videos, detailing construction tasks adhering to the ADDIE model.

Summary

Industries have technology integration in their future (Lee & Clarke, 2019). Organizations are responsible for preparing employees for the utilization of technology-based training (Debele & Plevyak, 2013). Additionally, employers must adhere to instructionally sound andragogical practices in technology-based training and rich media (Nasir & Bargstädt, 2017). The role of technology in training has expanded from automation into delivery and assessment. Through the utilization of technology, a facilitator can realize the benefits of a shortened feedback loop and gain benefits from the informational bandwidth and omnipresence of rich media for their organization. The facilitator needs to base their creation of training in solid andragogical practices with a culmination of research-based best practices for technology use and resource availability.

Media Platforms and Consumption

The distinction between technology-based rich media and traditional media comes into play with a moving target time shifting continuum. However, there is a distinction that does not move, when the technology becomes ubiquitous, embedded, active, and interactive, not a fixed technology. New rich media are characterized by on-demand access to interactive multi-way communication of content (Bolin, 2016a; Lee, 2019; Treem et al., 2016).

Changes in Media Platforms

Media creation, participation, and consumption changes as technology progresses, and the Internet allows for media to be accessed on more devices and in more locations. With technological advances and access to technology in the past two decades, rich media can be created more efficiently. Digitization affects all media types, including physical or broadcasted text, audio, and video. The resultant digitized artifact is easier to transmit and utilize with the proliferation of devices that can access and display popular media formats (Bolin, 2016b). Content experts and instructional designers can collaborate in porting existing training materials to rich media to create rich media training materials (Demyan, 2014).

Chattopadhaya and Mohanty (2018) state that daily life necessitates digital literacy and rich media consumption in most of the world, but there are some subsets that still primarily use traditional media. Free enterprise influences society's production of artifacts for consumption through the ease of marketization. While some European and Asian countries use advancements in technology to publicly broadcast or distribute state-controlled messages, the landscape of media and information diffusion is appropriated by

"commercial competitors" or business organizations, except in instances where dictators would prevent their existence (Bolin, 2016b).

The decline of the local newspaper can be attributed to the rise of Internet penetration, as commonly sought information can be easily accessed online. Nonetheless, larger national print media outlets seem less affected by the proliferation of the Internet media channels, as local newspapers are likely dependent upon classified advertisements for solvency (Cho et al., 2016). Ley et al. (2014) assert that device-shifting or device-roles choice occurs in which the easiest device to use a specific media (i.e., text, video, email, and music). The usage is spread throughout the day rather than at specific times and in multiple device households. Certain devices are used for specific activities according to the cognitive biases of the individuals. Some traditional media, such as magazines, are preferred by all generations because of the physical attributes, content quality, and lack of advertising (Bonner & Roberts, 2017).

Engagement with the media format and the learning structure inherent to media are equally important. Mason et al. (2017) posit that consistent integration between text and corresponding picture and video elements increase learning, processing, and comprehension. Stedman and Adams (2014) state that instructors should design curriculums within frameworks, and while face-to-face instruction is powerful, they should encourage independent learning through active information seeking in external media. Misner (1994) describes word-of-mouth as the most powerful and least researched method of information diffusion through interpersonal communication.

According to Stedman and Adams (2014), critical thinking is highly sought after by employers, but traditional high scoring individuals are averse to cooperative

environments because they thrive on the typical instructor centered courses. Madden et al. (2016) show that social media usage in a higher education setting facilitates positive critical thinking, teamwork, collaboration, student enjoyment, connection to large outside firms (worldview), and problem solving across all groups. However, there are individuals that noted issues with the usage of technology when using new or unfamiliar platforms. Therefore, organizations should facilitate the onboarding and utilization of technology (Madden et al., 2016).

Traditional Media and Technology-Based New Media. Traditional media consumption is characterized by specific, daily, non-interactive events and is a means of receiving curated and trusted content from media outlets (Bolin, 2016a). New media consumption and participation is largely recurrent through the day (Bolin, 2016b). The Internet and new media platforms cannibalize nearly every traditional media that they supplant, and those media that do not realize large decreases in users are bound to track users scattered among new media platforms (Dutta-Bergman, 2004; Tewksbury, 2005).

Lian (2017) states that digital literacy and new media knowledge are the responsibility of both instructors and participants to improve traditional computer instruction. However, with little incentive to learn new skills, older generations prefer more traditional electronic media (Lian, 2017). Newer media require consumers to have knowledge to use them and complement the existing traditional media (Aleksić & Stamenković, 2018; Nhedzi, 2019). Pavlovic et al. (2016) report that educators with more years of service prefer traditional electronic media, despite having access to new media platforms, where the younger generations are most actively consuming media.

Traditional media and news outlets must create content within the requirements and affordances of the various social media platforms, and content must match the character of various unique new media platforms. Lee (2019) confirms that existing traditional news and media outlets utilize Snapchat to reach younger audiences by creating short, concise videos that are consumed easily. According to Frechette and Williams (2015), sight is our primary sense, and the introduction of photography, cinema, and television has transformed the Western civilization into an "imaged based culture," which allows for "instant minded" generations through technology to create and collaborate with rich media (Desai & Lele, 2017). This spontaneity could allow for miscommunications and sensationalized media. Salcudean and Muresan (2017) state that traditional media are slower than new media in releasing breaking news or information and are subject to censoring and emotional portrayal of information.

Rich Media and Web 2.0. Delmarter et al. (2007) state "Though I speak with the tongues of humans and angels, and even have interactive Applets embedded in my PowerPoints, but have not pedagogy, I am become as sounding brass and a clanging cymbal." New rich media are characterized by on-demand access to interactive multi-way communication of content (Bolin, 2016a; Lee, 2019; Treem et al. 2016). Traditional media can have or provide access to rich media components but are largely consumed in a one-way, non-interactive format (Bolin, 2016a). The costs of development and deployment of such media are rarely quantified (Bahnson & Olejnikova, 2017; Henderson & Venkatraman, 1999).

Rich media is an evolving, progressively more embedded media format that allows for clear and intuitive communication and access to large quantities of

information. Daft and Lengel (1986) state that media richness (i.e., rich media) is defined as media that provides the means for reductions in uncertainty of the information transmitted. Han and Stoel (2017) describe rich media as information access, transformation, collaboration, and sharing regardless of the platform and format of media. Spalding et al. (2009) describe rich media as containing callouts, interactivity, video, and portions that allow for the expansion and elaboration on content from within the original container. Church et al. (2015) state that rich media includes pictures and video that are conducive to sharing and form the basis for electronic and visual word-of-mouth communication.

Web 2.0 is a progression along the continuum of evolving media platform access through web services. Hughes (2007) depicts Web 2.0 as the second iteration of web services that are both delivered through the Internet as a platform of largely database driven applications, which allow for user-created and syndicated media submission and retrieval. Papa (2015) describes media rich technologies and Internet-based Web 2.0 application communication channels, these include forums and social media or other applications that allow for the transformation of static technologies and media leveraged through transformation. Papa (2015) posits that sharing, considered previously impossible, is empowered in collaborative online environments through cloud storage, mobile applications, flipped classrooms, bring your own device and bring your own technology, compatible personal learning environments, massive open online courses, games and gamification, content management systems, and learning management systems.

Web 2.0 technologies, or technologies that use advancements in both hardware and software capabilities to further connectivity and defusal of media, including social networking, video sharing, and other communication platforms, are widely accessible by today's workers (Boileau, 2011). Social networking and gaming can be a part of Web 2.0, and while gamification can increase test scores and provide a means for autonomous ownership of learning (Zainuddin, 2018), it requires specialized tools and knowledge outside of the realm of most interorganizational instructional designers or human resource departments and will not be focused on in this study. Free and open-source tools and achievement-based systems with social networking components will also not be focused on in this study (Maican et al., 2016).

Within education, particularly distance education, a learning management system is a Web 2.0 application, which provides digital information transmission, documentation transfer, and retrieval options between instructors and attendees. Courtney and Wilhoite-Mathews (2015) state that distance education has origins in correspondence courses, in which physically dispersed learners can take advantage of print technology but suffered in latency of feedback and course material delivery to learners. This latency can be eliminated through learning management systems. Laanpere et al. (2014) state that teaching and learning could be equated to energy flow or dissemination. Furthermore, they state that the learning management system is a digital platform in which energy flows within the loop of interactions between teacher and student, and interactions deemed to be parasitic in nature should be minimized to ensure optimal message transmission and retrieval.

In addition to latency and organization considerations, another benefit of the utilization of new media and Web 2.0 technologies are the opportunities to provide choice in communication. Koedinger et al. (2015) and Madden et al. (2017) agree that hybridized, technologically assisted models of communication allow students to choose different means of communication to serve different needs. Rose (2017) and Sprecher (2014) reveal that face-to-face interactions are the most favorable, particularly the use of technology that facilitates student-teacher collaboration and learning environment interactions.

Commonly used by digital natives and digital immigrants alike, Web 2.0 video access and Youtube.com specifically has changed the ecology in which all individuals can learn (Duffy, 2008). Lyons et al. (2012) show that online videos increase social presence, interactivity, evaluation, and perceived learning. Van der Meij and van der Meij (2016) explain that video tutorials, or demonstration-based training materials, adhere to Bandura's (1977) theory of observational learning, or attention, retention, production, and motivation. Furthermore, Brar and van der Meij (2017) assert that purposefully created videos, which are course materials covering a technical topic (i.e., a *t*-test in SPSS) and adhering to the demonstration-based training model approach, yielded high engagement scores and satisfactory scores on a knowledge and performance test. However, videos utilized for review did not have a conclusive effect on attention or knowledge retention due to experiment design. Cohen et al. (2018) confirm that students performed better on the posttests in an intentional viewing of test materials, pre- and post-test, and in an incidental non-informed unaware viewing of test materials, measured through post-test only, after viewing an instructional video. Demyan (2014) states that instructional videos

can be quickly and effectively created and allow for instructional designers to quickly "show-and-tell" in chronological fashion to their students with integrated methods of incorporating mastery. Cairns (2012) maintain that companies, such as Sun Microsystems, have created social learning exchanges where employees can post any type of created video to share their knowledge with the organization, and this functionality is found in most current cloud-based (Google Apps) or connected office suites (Microsoft Office 365).

Video length, composition, synchronicity, and focus all determine the benefits of video usage (Costley et al., 2017). The utility of video in a computerized learning environment has been scrutinized since its inception and correlates to antiquated analog technologies in early literature (Chute, 1993). Clark et al. (2015) state that synchronous video is superior to text-based communication in conjunction with asynchronous video when it is used to foster a social and teaching presence. Teacher presence through synchronous video communication allows for identity and authenticity, which enable the favorable pedagogical design and expectations, interpersonal skills, and dialogue (Rourke et al., 2001; Themelis, 2014). According to Themelis (2014), tele-cognition and tele-social presence through synchronous video communication encourages immediacy and intimacy in communication and is useful for review, as well as iteration of course material purposes through conscious mindful learning. Kato et al. (2016) show that quality interactions through synchronous video improve understanding, skill, and proficiency through collaborative learning activities. Toftness et al. (2018) acknowledge the benefits of pre-questioning in authentic lecture video materials, but the benefits are greater in short 2-minute videos, and no benefits to learning are discovered for longer 20-

to 22-minute videos. Clark et al. (2015) report that builing upon past literature regarding the pedagogical strategy of asynchronous video to facilitate discussion combined with synchronous video, provided feelings of greater social connection and teaching efficacy for students compared to text-based discussion. According to Wang and Antonenko (2017), picture in picture viewing of an instructor in online video course materials has no actual impact on learning transfer but increases perceived learning, effort, satisfaction, and engagement, which are valuable to an organization's training and development. Costley et al. (2017) recognize that the key considerations when designing video include utilizing clearly defined goals (including the compulsory nature of viewing the videos), distinct tasks, temporal constraints, instruction on how to interact with the media, and considerations for age (media length).

Other media types can have a positive impact on the overall learning process. Marchetti and Valente (2018) acknowledge that improvements to audio creation and access, such as on the fly creation, social interactions, timestamping, and gamification aspects, are easily created and implemented in existing systems. According to Sung and Mayer (2012), instructive graphics greatly improve recall test performance, but popular culture or ornamental graphics yield negative or no performance changes, respectively. Clark et al. (2015) acknowledge that video provided students of a course greater teaching and social presence than text-based materials. However, Reich et al. (2015) maintain that the preponderance of course materials, produced by both the instructor and student are typically text, and thus suggest the use of computer-assisted reading to traverse through the large quantities of data generated. Sullivan and Puntambekar (2015) state that using digital text with simple hyperlink navigation can allow for access to learning goal

content. However, even simplistic systems, such as text navigation through hyperlinks, can require facilitation and training of the students (Demyan, 2014; Madden et al., 2016).

De Lange et al. (2015) state that people are engaged on their devices with all sorts of "new media" and the effects are expansive and broad amongst user groups. Devices have changed the way individuals interact with each other, notably the smartphone, which is characterized by an LCD screen, wireless Internet connectivity, digital camera, sufficient computing power for advanced applications and operating systems, and battery to allow for prolonged use (Zheng & Ni, 2006). Šorgo et al. (2017) determine that device ownership does not affect information literacy; in fact, owning a tablet computer is a negative predictor to information literacy. According to Kostyrka et al. (2017), younger generations still utilize traditional media such as televisions. Nonetheless, tablets, smartphones, and desktop and laptop computers are becoming a preferred method of media consumption, with multi-device use prevalent among users.

Changes in Media Creation and Consumption.

Media consumption by subject matter and desired outcome varies among user groups. Bhowmick et al. (2007) assert that for simple tasks the type of media does not affect learning performance or temporal and accessibility consideration. However, with complex tasks, audio and text, video and text, or video, audio, and text are the best alternatives, with video and synchronized text being the optimal combination for time spent and accessibility. Menzies and Johnson (2016) claim that individuals from different fields within academia were found to have largely the same interactions with new media and are considered instruments or "tools" by most scholars. Dutta-Bergman (2004) reveals that those who viewed online political, sports, science, health, informational,

entertainment, or business news sources followed the respective offline news more closely.

Yeşilel (2016) posits that, while incorporating technology into their materials, educators should immediately make clear the purpose and the value of the utilization of technology and media to their students. Mao (2014) states that teachers should consult new media for frameworks and affordances in which to design course content and make technology choices. Mayer (2009) and Lee and Mayer (2015) postulated that individuals achieve better learning results when presented with both text and images compared to text alone. Furthermore, Mayer (2009) and Lee and Mayer (2015) note that the use of video can provide a prompt for the viewers to create connections by viewing what is happening on screen and to synchronize it with the underlying meanings of the course materials. Poorly created media can negatively affect student performance. Therefore, Mayer (2009) provides 12 principles for multimedia design for facilitators that improve results. The principles include

- coherence
- signaling
- redundancy
- spatial contiguity
- temporal contiguity to reduce processing
- segmenting
- pre-training
- modality to manage essential processing
- multimedia (the multimedia principle)

- personalization (informal)
- voice (human)
- image (on screen image of speaker).

The Internet and new media platforms have a competitive displacement effect on traditional media (Bolin, 2016b). As users become more acclimated to the use of the Internet, the more disruptive new media becomes to traditional media platforms (Ha & Fang, 2012). Traditional television, the primary source of information for the masses, is in a state of flux as users that see perceived advantages and value in cord-cutting move to Internet delivered media (Tefertiller, 2018). In the United States, 55% of people who predominantly use television to inform themselves on a daily basis access the Internet for information and 62% of those who primarily seek information from the Internet on a daily basis also use the television to inform themselves (Shaikh, 2017). According to Guo (2018), audiences are now split, consuming media among different media and various platforms. For that reason, traditional media must integrate with new media platforms to ensure long-term viability.

Colbert et al. (2016) postulate that the workplace of the future will require digital fluency, digital communication skills, digital leadership, and the continuously interconnected nature of Internet platforms, such as email and social media; media consumption and creation in the domains of personal and work life are further obfuscated. Media consumption differences occur across generations, and while millennials are not as homogenous in their consumption as may be assumed, the efficacy of long-established traditional training materials may be called into question as consumption changes to ubiquitous access on preferred devices (Pitta et al., 2012). The

smartphone is the most commonly used device in individuals' lives, regardless of age, and is the easiest means of conveying information (Gomes et al., 2018). Frechette and Williams (2015) and Bolin (2016a) concur that different generations actualize, learn, and interact within the media that defines them, and the younger generation is defined by portable devices and omnipresent media access. In addition, Frechette and Williams (2015) state that students are no longer drawn to text, thus, traditionally created education media are not effective in capturing student interest.

Globally, a convergence of media types is occurring among generations of all ages. The primary source of information consumption in the baby boomer generation or older individuals was through the television, but in Generation X and younger individuals, a combination of television and Internet consumption is customary (Towner & Lego Munoz, 2016). New media has allowed for sharing and making connections among individuals in ways that are not available to traditional media. It is worth noting, new media platforms are subject to censorship as private ownership can curate the content (Shaikh, 2017).

Generationally Based Changes in Media Consumption

The literature suggests that research regardless of users' age, instructional designers should focus on specific components of both technology and andragogy in the design of course materials (Thomas et al., 2013). Regarding andragogy, most individuals use technology for self-directed learning and that same technology is available to utilize by organizations for training regardless of employee demographics (Mao, 2014). Specific to hardware that defined media consumption for a generation, released in 1999, the

Blackberry 850, was the first wide market adopted internet connected device that featured ample battery life, email, and mobile web browsing (Islam & Want, 2014).

Learning and Rich Media

Mayer (2011) states the acknowledged definition of learning is a change in the learner's knowledge due to experience. He suggests taking a learner-centered approach when utilizing innovation in technologies and media (Mayer, 2009). Since the 1920s, educators expected each innovation in technologies and media to fundamentally change learning and education but failed as the educators expected the participants to adapt to the new innovations (Cuban, 1986).

Artino and Durning (2012) agree with Richard Clark's and other educational technologists' position that media is only a delivery "vehicle" and the "instructional method" is where educators should focus (p. 46). However, Oregon et al. (2018) finds media richness theory as the ability of media to communicate with the least vagueness and distortion while maximizing the magnitude and quality of feedback, prompts, message tailoring, and emotions. This is a media's ability to maximize its clarity, throughput, and satisfaction, possibly to the extent of the industry standard face-to-face learning experience (Lacerenza et al., 2017; Roseth et al., 2011).

According to constructivist learning theory, learning occurs when learners make sense out of their environment to create their own knowledge (Mayer, 1999), and with the advent of omnipresent connected devices, instructors must adapt to meet learners in their familiar environment (Clark & Mayer, 2016). The adaptation of materials to learner's preferred media does lead to positive perceptions and general satisfaction of the material (Gee, 1990; Thanyaphongphat & Panjaburee, 2017). Regarding instructional design

models, the utilization of rich media could fulfil portions of John Kellar's ARCS model, or attention, relevance, confidence and satisfaction, in learners (Havice et al., 2010; Kaučič et al., 2011; Keller, 1987). Learning style preference models and their interaction with media show that students respond positively to perceived media preference accommodations and substitutions (Gee, 1990; Ocepek et al., 2013).

Learning Preferences and Learning Outcomes

For effective learning or e-learning to take place, students learning preferences should be taken into consideration as they make the learning process more practical and pleasant for the end user (Razzak et al., 2019). Students, whether online or face-to-face, are mostly balanced in their learning preferences (Chen et al., 2018). Results are mixed on student achievement and test scores regarding learning preferences (Chaudhry et al., 2020; Childs-Kean et al., 2020; Huang et al., 2018; Razzak et al., 2019; Sankey et al., 2011; White, 2020).

Mayer's (2009) multimedia principle states that two media which work in synergy are better than one media alone. Citing Mayer's (2009) multimedia principle, Pastore (2016) claims that learners prefer multiple representations and color images, text, and sound over other combinations of media. Sankey et al. (2011) have found that catering to a student's learning preferences can aid in advancement, "retention", and a "joy of learning" (p. 32). Students "perceive learning resources with higher representations of content to assist their comprehension, understanding and retention of content, and to be more interesting and enjoyable to use" (Sankey et al., 2011, p. 31). White (2020) states that adaptive learning technologies, which actively personalize content based on user learning preferences, do more to effect student perspective rather than student

achievement. Tyagi et al. (2020) have found that participants prefer mobile instructional content and facilitators use this could increase engagement and ultimately learning. Diversity is a key instruction for intergenerational groups as each learner is an individual, and almost every individual's learning style preference can be reached with diversified instruction (Shepherd, 2020).

Digital Immigrants Versus Digital Natives

Individuals raised in a device ubiquitous, interactive technology environment, have internally consistent conceptual framework as digital natives. In relation to this, DeVaney's (2015) study found the following:

> Social scientists contend that there are four generations in American society: the silent generation, the baby boomers, Generation X, and Generation Y—also known as the millennial generation (Meredith & Schewe, 1994; Strauss & Howe, 1991). The silent generation was born between 1930 and 1945. Early events in their lives were the Great Depression and World War II. The baby boomers were born between 1946 and 1964. Early events in the boomers' lives were economic prosperity and the growth of the suburban middle class. Generation X was born between 1965 and 1979 or 1981. Early events for Generation X were the Vietnam War and the energy crisis. The millennials were born between 1980 and 2000. Early events in the millennials' lives were globalism; the attacks on September 11, 2001; and the Internet Age (National Endowment for Financial Education, 2015).

Autry and Berge (2011), in their study of perceived usefulness of technology in training programs, found that a new rich media language is evolving that is commonplace among more technically savvy individuals. They also note that digital natives and immigrants

span across generational groups, silent generation, the baby boomers, Generation X, and Generation Y (millennials). Each group's preferred methods of interacting through technology with media vary, with younger generations perceiving greater usefulness of technology in training contexts (Autry & Berge, 2011).

Judd (2018) argues that there exists little evidence to support the notions put forth by Prensky (2001a, 2001b) because individual consumption of media is varied, and analytics data does not support digital natives' preferences or aptitudes in learning or teaching. In addition, other factors, such as time, perspective, and position, can affect engagement with online material and content consumption (Jabłońska & Zajdel, 2019). However, the larger issue could be that the practitioners, teachers, or trainers that are utilizing new devices and media do not know how to effectively use connected smart devices (Akman Yeşilel, 2017; Howlett & Waemusa, 2018). Digital natives should experience a unified integration of technology and pedagogy, be trained in the use of technology, use technology as a means of immersion, and incorporate constant feedback, updates, and social aspects of new media (Marchetta et al., 2018). The Equal Employment Opportunity Commission through the Age Discrimination in Employment Act of 1967 prevents discrimination to individuals above the age of 40 and should declare "digital native" as a biased age qualifier because it implies technological skill and, implicitly, the term implies youth (Sink & Bales, 2016).

Thinyane (2010) states the differences between Prensky's digital natives and immigrants are

> Prensky's notion that digital natives and digital immigrants brains are different is very controversial, with neurophysiologists and cognitive psychologists

> suggesting these differences stem from: (a) working memory differences (Baddeley & Logie, 1999; Niederhauser et al., 2000); (b) fluid intelligence/spatial ability differences (Ackerman et al., 2002; Anderson, 2000); and (c) physiological evidence of substrate uniformity (Eimer et al., 2002; Shimojo & Shams, 2001; Wright et al., 2000). His (Prensky's) distinction between digital immigrant educators and digital natives has spurred a substantial amount of debate between academics from both developing and developed countries. The disputations occur around two key claims "...that a distinct generation of 'digital natives' exists; and...that education must fundamentally change to meet the needs of these 'digital natives'"

Šorgo et al. (2017) state that (a) digital natives are not necessarily information-literate, (b) the use of a wide assortment of technology applications does not represent information literacy, (c) device ownership does not affect information literacy, and (d) information technology courses positively influence student confidence pertaining to information literacy. The characterization of young people as having high technological skills is factually erroneous, and older age groups bring decision-making and problem-solving skills absent in their younger counterparts (Sink & Bales, 2016).

Differences Between Digital Immigrants and Natives

The difficulties with communication between digital natives and digital immigrants are that digital immigrants speak with an obsolete pre-tech language and digital natives are speaking an entirely new language (Prensky, 2001b; Swingle, 2016). Although varied and not as stratified as commonly portrayed, digital natives and digital immigrants differ in their experiences in consuming, accessing, and incorporating media

into their lives (Selwyn, 2009). According to Bolin (2016a), individuals born in specific time periods are often labeled by the media (radio, TV, and mobile) that is considered to define the generation, which, in turn, actualizes itself. While prior media had limited feedback from consumers, apart from focus groups, technological advances in computer hardware, such as smart phones, facilitate instant and immediate feedback from media participants (Bolin, 2016a). Through the proliferation of cloud-based computing, standardized network connections, and further standardization of middleware, smartphones and other mobile devices will have access to computing power equal to the budget of the device's user (Akherfi et al., 2018).

Mao (2014) states that digital immigrants should consult new media for frameworks on which to design communication and course content to bridge the differences in their comprehension of technology. Thang et al. (2015) state that, like previous generations, digital natives prefer a teacher-centered classroom. They also claim that digital natives and immigrants should work collaboratively to realize the possibilities to bring change to education through technology. Wrobel-Lachowska et al. (2017) conducted a study to determine the differences in technological competency in logistics companies to better serve older generations and found that facilitating access to andragogical content is important, especially for mature workers in a blue-collar context.

Mao (2014) reveals that students utilize new media for self-directed learning. Teachers seldom use the new media to reach students, and the designation of digital native or digital immigrant is much less important than the purposeful, thoughtful use of the platform to transmit information. Guo et al. (2008) show that there is no difference in information and technology-literacy test scores between digital natives and digital

immigrants, and Fleming et al. (2017) determine no difference in the use of e-learning or technology-based training in respect to employee age or generation.

Guo et al. (2008) suggest that differences in digital natives and digital immigrants are a product of social interactions, psychological barriers, and perceptions. Wang (2015) states that teachers and students from different generations should work together to improve learning regardless of technological acuity. Furthermore, Helsper and Eynon (2010) suggest that digital natives and digital immigrants are not subject to a hard break within a temporal change facilitated by the presence of technology that modifies schema. Instead, society is on a progressive timeline, and the information needed for future studies measures actual technology usage by households and the resultant peer interactions. Fleming et al. (2017) state that perceived difficulty, authentic learning, and technical support, determines the future intention to utilize and enhance employee satisfaction of e-learning. However, generational groups may react differently to training due to their media consumption habits, and Wang (2015) states that teachers should embrace technology and use new media to deliver essential course materials.

White-Collar and Blue-Collar Generational Concerns.

Generational differences exist in the workplace regarding media, technology, and their consumption and usage (Reeves & Oh, 2008). They also state that the customization of instructional design and modes of technology usage is not needed. The use of rich media to correspond to blue-collar workers' learning preferences could affect enjoyment, retention, and perception (Sankey et al., 2011; White, 2020). Information management and presentation is integral to address generational technological proficiencies in organizations, particularly in blue-collar workers (Wrobel-Lachowska et al., 2017).

Summary

Although researchers reported various results on the worth of the designation of digital native and digital immigrant, the perceived utilization in literature, practice, and even in law warrants further examination within this study (Fleming et al., 2017). Generational groups may react differently to training due to their media consumption habits, and blue-collar employees may approach training with a different lens as compared to personal media consumption as it is a work-related task.

Structured Approaches to the Assessment of Corporate Training

Organizational Training Evaluation Models

Multiple models are available to assess corporate training with varying strengths and weaknesses (Kraiger et al., 2014). Assessing training has problems inherent in the approaches and nature of the subjects and outcomes being assessed (Farb et al., 2017). Training modalities and the translation or addition of technology-based rich-media are the focus of cost benefit arguments in training (Christoph et al., 1998; Hawkridge et al., 2018). This section includes organizational training evaluation models, organizational training problems, and training quantification.

The most popular, well known, and widely used training evaluation model is Kirkpatrick's framework of reaction, learning, behavior, and results (Kraiger et al., 2014). Models such as Kaufman and Keller's (1994) try to encapsulate Kirkpatrick's model with availability of resources and societal and satisfaction outcomes. CIRO or CIPP models are academically focused, Brinkerhoff (1988) six-stage model and the IPO model (Bushnell, 1990), use assessments, but fail to fully quantify training (Kraiger et al., 2014). Organizations are focused on results and the direct impact from their training, and

Kraiger et al. (2014) state that Kirkpatrick is widely used and accepted across disciplines for clear, unsophisticated, ease of use.

Table 3

The Evaluator's Project Report Summary

	Kirk Four Return on Investment (ROI)	Kirk Three - On-the-Job	Kirk Two Tests	Kirk One Feedback
Analysis	What are the business challenges and the financial and competitive goals?	What performance supports overall goals on the job? What performance problems or obstacles make it difficult to support the goals?	What exactly do top performers do that supports overall goals and that can be observed and measured?	How can employees best learn how to perform in ways that support overall business goals?
Design	How can one show connection with business goals throughout the program?	If employees forget details, which job aid or other resources can they use as a reminder?	What is an effective sequence for teaching the concepts, information, skills, and attitudes needed in order to achieve performance goals?	What are some alternatives to abstract, some-times boring, slide lectures?

(Continued)

Development	Is there a clear connection between e-learning content and the need to support department and organiza-tional goals?	Does the e-learning program have the look and feel of real-world challenges, so participants learn what they need to do on the job?	Are key concepts and skills presented, demonstrate-ed, practiced and reviewed ... not just lectured about?	Are the program activities and materials what participants want as well as need?
Implementa -tion	Is there organizational support for e-learning at the executive level?	Is it job-related?	Are performance objectives and learning content in sync?	Is it user friendly?
Evaluation	Return on investment in e-learning, based on business needs/goals	360 interviews or on-the-job assignment-s, etc. to check achievement of performance goals	Paper and pencil tests or observed or scored activities (role play, simulation, presentations)	Reaction and Feedback Questionn-aire with ratings and comments (Smile sheets)

Note. Reprinted with permission from "ADDIE Meets the Kirkpatrick Four: A 3-Act Play.," *The E-learning Guild Research, 1(1), 1-12.* p. 8, by Beal, T. 2007

Beal (2007) states that each level of Kirkpatrick's model can be used to further inform the ADDIE model for training development. Beal's (2007) proposed matrix

includes intersections of the ADDIE model and Kirkpatrick's model. Beal (2007) created a fictional projector evaluators matrix to include the intersections for each component, and an example includes the intersection of the implementation portion of the ADDIE model to reaction ("Kirk One – Feedback 'Is it user friendly?'"), the intersection of the implementation portion of the ADDIE model to learning ("Kirk Two – Tests 'Are performance objectives and learning content in sync?'"), the intersection of the implementation portion of the ADDIE model to behavior ("Kirk Three – On-the-Job 'Is it job-related?'"), and the intersection of the implementation portion of the ADDIE model to results ("Kirk Four – ROI 'Is there organizational support for e-learning at the executive level?'").

Table 4

Eleven Popular Evaluation Models and Their Criteria

Evaluation models	Evaluation criteria
Kirkpatrick's Model	1 Reaction 2 Learning 3 Behavior 4 Results
Kaufman and Keller's Model	1 Enabling and Reaction 2 Acquisition 3 Application 4 Organizational Outputs 5 Societal Outcomes
CIRO Model	1 Contents/Contexts 2 Inputs 3 Reaction 4 Outcomes
CIPP Model	1 Context 2 Input 3 Process 4 Product

(Continued)

Phillips Five-Level ROI	1 Reaction and Planned Action 2 Learning 3 Applied Learning on the Job 4 Business Results 5 Return on Investment
Brinkerhoff's Six-Stage Model	1 Goal Setting 2 Program Design 3 Program Implementation 4 Immediate Outcomes 5 Intermediate or Usage Outcomes 6 Impacts and Worth
IPO Model	1 Inputs 2 Process 3 Outcomes/Outputs
HRD Evaluation and Research Model	1 Learning 2 Individual Performance 3 Organization
Success Case Method	1 Evaluation Focus and Planning 2 Impact Model Creation 3 Administration of a Survey to Gauge Success Rates 4 Conduction of Interviews with Success and Nonsuccess Instances 5 Formulation of Conclusions
Dessinger-Moseley Full-Scope	1 Formative Evaluation 2 Summative Evaluation 3 Confirmative Evaluation 4 Meta-Evaluation
SOAP-M Model	1 Self 2 Other 3 Achievements 4 Potential 5 Meta-Analysis

Note. Reprinted with permission from The Wiley Blackwell Handbook of the Psychology of Training, Development, and Performance Improvement, p. 138, by K. Kraiger, 2008,

Chichester, West Sussex: Wiley-Blackwell

Organizational Training Problems.

Organizations have training materials that consist of media that may no longer be effective as a result of shifts in media consumption preferences, and they replace instructors with click-through training that "gave e-learning a reputation as boring, unpleasant, unengaging material" (Taylor, 2017, p. 13). Turnover of training materials tends to exhibit inertia because of a desire to contain costs (Harris & Cannon, 1995). In both business and education, knowing how to use information and communication technologies is a prerequisite skill that workers and students must possess in the information economy (Bellanca & Brandt, 2010; Collins & Halverson, 2009; Field, 2006; Schols, 2016). However, the lack of course content available for businesses, or access to a technologist to create such training content clearly, leaves organizations with materials lacking parrhesia (communicating clearly and boldly), and prevents participants from further understanding the topic, relatability, and the meaning applied to the individuals (Roof & Polush, 2016).

The study of individuals from various age groups, and the underlying elements of the technology should be further studied. The current workforce is more diverse, and research on should be conducted regarding media consumption consisting of generations that are heterogeneous (Eden & Veksler, 2016). Thomas et al. (2013) suggest that future research should focus on specific components of both technology and pedagogy.

Training Quantification

Training needs will increase, and organizations will need to quantify both the cost and benefits for an organization. While best practices are emerging in literature for

technology-based training, including maximizing engagement (Tyagi et al. 2020), the acquisition and usage of such knowledge is seldom known by organizations without access to instructional systems design technology staff. This subsection will cover the costs of training, traditional versus technology-based training, training context, and contradicting evidence found on the utilization of technology-based training.

Cost of Training. Organizations view employees and training as cost centers, and traditional trainings are not necessarily an effective benchmark. Cruz (2018) states that employees should be treated as an investment, and a survey conducted by Pricewaterhouse Coopers found 35% of millennial employees state the availability of training as an attraction to a company. Ingersoll (2008) states that cost controls are essential for business survival, that not all modes of training are cost effective, and that traditional organizational information distribution trainee models are neither inherently effective nor efficient.

Organizations armed with big data and access to the computing power to parse it will gain insights to aspects not only limited to cost and benefit comparisons. Potelienė and Tamašauskienė (2013) describe overall educational data evaluation as the total costs of the education minus the private, social, and labor return. Giacumo et al. (2018), in addressing the organizational big data readiness, found that the costs and complexity of new technologies are constantly compared to organizational productivity increases, cost reductions, and innovations that technology can provide. They also show that the overall "technology, organization, and environmental (TOE) contexts of an organization, with subsets of indicators such as culture, capacity, and resources facilitate the diffusion of innovation" (Giacumo et al., 2018, p. 109).

Organizational units are typically classified as revenue or cost centers with training typically considered to be a cost center (Henderson & Venkatraman, 1999). Hawkridge et al. (2018) state that the need for training within organizations will continue to increase and costs will continue to increase disproportionately for smaller organizations. The authors further note that 80% of training modules are instructor-led, stand-and-deliver style training. Hawkridge et al. (2018) also state that individuals who utilize technologies or other specialized expensive techniques must validate their costs with superior comparative organizational results. The barriers to technology usage in training are not exclusive to smaller businesses; well-funded organizations lack backing, support, infrastructure, and adequate funding for staff training (Ko et al., 2018). Khan et al. (2018) agree with Becker et al. (2012), Khan et al. (2011), Owoyemi et al. (2011), and Sultana et al. (2011) "that training and development and e-learning have greater efficiencies; and increases employee commitment, performance and productivity, thereby increasing organizational performance, competitiveness and innovation" (p. 137).

Training efficacy and the costs inherent to the production and upkeep of technology-based rich media training compared to traditional media training are the key metrics for human resources and instructional technology units (Christoph et al., 1998; Hawkridge et al., 2018). Kumpikaitė (2007) states that both hard and soft data received from training can be converted into monetary terms, through quantification and valuing at the organizational level and special attention should be given by organizations to qualitative data. Phillips and Phillips (2016a) state that ROI is related to a cost/benefit ratio and that the useful aspect of the utilization of ROI to quantify training programs is

the analogous investment measurement terms generated, which are familiar with the organization management personnel.

Andrews and Laing (2018) state that ROI measurement of training can be inconsistent with most training goals. However, legal compliance, safety of stakeholders, business hygiene, culture, values, and strategic intent are quantifiable and profit-driven aspects of an organization. Andrews and Laing (2018) utilized a variant of Cullen et al.'s (1978) model to quantify a case study in which they studied the inputs and outputs that determined the effectiveness of a training and determined the inputs and outputs that should be quantified.

Phillips and Phillips (2016a) denominated specifics on how to quantify the collection of data, the isolation of training effects, and the conversion of those training effects into monetary values. They state that one should (a) focus on observable behavior, (b) limit ideas to single descriptors of behavior, (c) utilize reverse scoring on surveys, (d) avoid section headings in instruments, and (e) collect from multiple participants or use multiple instances with the same participants.

The costs of materials for courses are under scrutiny, and organizations are wary of the unsustainability of expensive coursework (Farb et al., 2017). Additionally, Farb et al. (2017) state that organizations are not looking inward to take advantage of existing materials and resources to produce more useful, meaningful course content and materials. Bahnson and Olejnikova (2017) question the return on investment in the creation of rich media to supplement course materials and yield a positive ROI due to the increased fixed costs of hardware and software, as well as variable costs of administrative, instructional, and support staff. Trout and Vela (2016) state that through economies of scale, savings

are inherent, and therefore it is possible for learning organizations to virtually accommodate large numbers of enrollees without significant variable costs.

Summary

A wide variety of assessment models exist that an organization can choose when assessing their training efforts. Kirkpatrick's four-level model allows for the granular examination of training modules and substitution or appending with new media with the goal of using pedagogically sound, cost effective, and efficient training materials (Gaponova & Korshunov, 2018; Kraiger et al., 2014; Phillips & Phillips 2016a).

Research Associated with Efficacy of the Selected Model

Definition of Kirkpatrick's Four-Level Model

Kirkpatrick's four-level model is an evaluation model designed to measure reaction, learning, behavior, and results (Chyung, 2008). This section includes the definition of Kirkpatrick's four-level model, the evolution of the model, its instructional flexibility, its critiques, and its training and learning contexts.

Kirkpatrick's model measures the sum of the different aspects shown in literature to have a positive effect on learning and organizational results. It is a widely used training evaluation model used in white-collar or academic contexts (Abuloum et al., 2019; Bouck et al., 2016; Stickles, 2015; Warschauer, 2007; Weisberg, 2011). Kirkpatrick and Kirkpatrick (2006) state that this model progresses through four levels, including reaction, learning, behavior, and results. Phillips and Phillips (2016a) added Return on investment (ROI) as a fifth element to the model. Return on investment is one portion towards an integrative evaluation model of training. Others include participant willingness and value of training, knowledge and skill attainment, behavior modification,

goal realization, participant value placed on the utility of the training (Perez-Soltero et al., 2019).

Kirkpatrick (1959) defines reaction as the participant's view of the overall training. He further states that participants' reactions can be easily ascertained through anonymous surveys that contain valid prompts, an area for free formed responses, and easily quantifiable results (such as the Likert scale). Kirkpatrick additionally states that members of an audience could be swayed by powerful presenters, and those with less charismatic performances could be presenting greater quality and quantity of information. Alliger et al. (1997), through a meta-analysis of training programs, found that affective reactions have zero correlation to learning.

According to Kirkpatrick (1959), learning refers to "principles, facts, and techniques" that are gained by the attendance of a led session. Kirkpatrick further explains that each attendee must have before and after, objective, quantifiable, and statistically analyzed learning outcomes, such as student performance in the classroom or preferably tests given before that note total score and items missed compared to tests after which are analyzed in comparison to a control group. Alliger et al. (1997) have found that immediate behavior or skill demonstration correlates to immediate learning and knowledge retention.

Kirkpatrick (1959) defines behavior as applying learned concepts in practice. He quotes Robert Katz' 1956 article in the Harvard Business Review, which states that in order for behavior change to occur an individual must want to change, recognize areas that are in need of change, have an environment which accommodates changes, and have a mentor to assist. Kirkpatrick (1959) suggests that behavior can be measured through on-

the-job statistically analyzed systematic appraisals by one or more stakeholder groups (the individual, “their superior[s], their subordinate[s], and peers”) with post checks to ensure validity. The results should be compared to a control group consisting of people who did not participate in the training. Alliger et al. (1997) have found that immediate learning correlates positively with results and performance. However, these were present in only two of the total studies analyzed.

Kirkpatrick (1959) defines results as the stated and desired outcomes of attendees upon completion of a training program. He additionally states that besides measuring tangible results from training modules, the use of the scale developed by Dr. Rensis Likert (1932) is useful in determining factors such as “loyalty, attitudes, interest, and work environment.”

Evolution of the Model

Chyung (2008) describes Kirkpatrick’s model evolution (circa 1996) as taking the goals and objectives of an organization, performance objectives, instructional objectives, and motivational objectives as a point of approaching in reverse of the aforementioned reaction, learning, behavior, and results model.

Table 12. The Relationship between Goal Setting and Evaluation

Goals and Objectives	Evaluations
1. Organizational goals ↓	8. Results ↑
2. Performance objectives ↓	7. Behavior ↑
3. Instructional objectives ↓	6. Learning ↑
4. Motivational objectives →	5. Reaction ←

Note: Although the terms *performance objectives* and *instructional objectives* are used synonymously in some of the literature (e.g., Dick, Carey, and Carey, 2005), in this case, a performance objective refers to an objective that focuses on behavioral changes *on the job* after completing instruction, whereas an instructional objective refers to a learning outcome to be accomplished *within a given instructional context.*

Figure 1. Reprinted with Permission from Foundations of Instructional and Performance Technology, p. 67, by S. Chyung, 2008, Amherst, Mass: HRD Press.

Furthermore, Chyung (2008) explains a fictional situation in which reactions are judged by a Likert scale, learning is judged by pre- and post-tests, behavior is judged by running reports looking for flags based upon the actions sought from the training, and the results compare numbers (losses/gains) before and after the training has occurred.

Phillips' and Kirkpatrick's Model

Phillips and Phillips (2016a) consider the five-level ROI framework to be a modernization of Kirkpatrick's model with in-depth analysis to determine the ROI of a training. Cairns (2012) states that the appending of ROI in 1996 by Phillips allowed for training facilitators to assign values to the benefits of each result of a training. Phillips and Phillips (2016a) append a fifth level of ROI calculation to the Kirkpatrick model and state that the alternatives of Kaufman's five levels of evaluation deals with a fifth level of

societal impact, the CIRO approach, and finally the CIPP model. Turnbow and Zeidman-Karpinski (2016) state that both "the ABCD model and the Kirkpatrick Four-Level Evaluation Model provide frameworks for (trainers) to improve LOs (learning outcomes)."

Multifactor Studies

Two Modalities. Alliger et al. (1997) state that "Affective and utility reactions were correlated more strongly with each other (r = .34) than with other measures, and immediate and retained learning measures were correlated more strongly with each other (r = .35) than with other measures as well" (p. 351).

Three Modalities. Alliger et al. (1997) define training criteria taxonomies as reaction, in terms of both affective and utilitarian judgement; learning, consisting of immediate knowledge, retained knowledge, and behavior and skill demonstration; behavior, as indicated by ongoing behaviors; and results, in terms of overall organizational impact. Alliger et al. (1997) found that affective reactions have zero correlation (r =.00) to learning, or skill gain.

In a meta-analysis of 162 training programs, Arthur et al. (2003) reported that

> Although newer approaches to, and models of, training evaluation have been proposed … Kirkpatrick's (1959, 1976, 1996) four-level model of training evaluation and criteria continues to be the most popular … We used this framework because it is conceptually the most appropriate for our purposes. Specifically, within the framework of Kirkpatrick's model, questions about the effectiveness of training or instruction programs are usually followed by asking,

> "Effective in terms of what? Reactions, learning, behavior, or results?" Thus, the objectives of training determine the most appropriate criteria for assessing the effectiveness of training. (p. 235)

According to Felea and Stanca (2019), the theme that saturates through technological academic success literature is the need for student engagement through independent learning, or self-directed autonomous learning. Ruiz and Snoeck (2018) acknowledge that Kirkpatrick's model (a) is flexible for assessing learning and education in various settings, (b) bridges the need for synchronization between models and practice methods and instruments, (c) achieves consistent learning outcome evaluations through formal assessment, and (d) provides a feedback loop for the instructional portion of a course or training. Kirkpatrick and Kirkpatrick (2006) state that a solid evaluation procedure allows observers to quantify the metrics that can lead to and predict successful outcomes. They similarly explain that the four levels in Kirkpatrick's model are subsequently ascended through the strengthening of course corrections consisting of practical, interesting, and enjoyable materials that ultimately end with observable change.

Critiques of Kirkpatrick's Four-Level Model

Bates (2004) observes three limitations of Kirkpatrick's four-level model, which include (a) the incompleteness of the model, (b) the assumptions of causality, and (c) false assumptions of increased importance of information as the model's levels are ascended. Reio et al. (2017) state that the major limitations of Kirkpatrick's model include the lack of form and procedure level interventions and assessments. Martin et al. (2018) and Ruiz and Snoeck (2018) agree that the last levels of Kirkpatrick's model are

hard to employ and, therefore, these levels are often not utilized. For this reason, the reaction of the training should be split into the categories of utilitarian reaction to the training and affective reaction to the training. It should also be used to determine what and how "concretization" of the proposed method of evaluation within the original model is utilized. Additionally, Martin et al. (2018) state that the temporal aspects of the third and fourth levels (i.e., behavior and results) can only be measured once training participants have had time to implement their new knowledge.

Regarding the use of the Kirkpatrick model in medicine, Yardley and Dornan (2012) explain that the third and fourth levels are not often achieved in medical interventions because stakeholders are not easily quantifiable. In addition, the questions asked at various levels lack context, or are "soft" and therefore the data acquired is not usable. Furthermore, Yardley and Dornan (2012) state that evaluation of multifaceted epistemological interventions should be met piecewise with constructed arguments and the weighting of review questions based upon proven research to construct a final synthesis.

Training and Learning Contexts of Kirkpatrick's Four-Level Model

Research comparing traditional media training with technology-based training has so far been conducted in secondary and post-secondary school contexts or in white-collar industry contexts (Abuloum et al., 2019; Bouck et al., 2016; Stickles, 2015; Warschauer, 2007; Weisberg, 2011). The utilization of the model in a blue-collar context, particularly regarding documented concerns with technical and text-based comprehension by traditionally low-skilled or unskilled workers (Graham, 2012; Junior et al., 2011; Nchai, 2011; Mikulecky, 1982).

Populations Utilizing Kirkpatrick's Four-Level Model

Education. Praslova (2010) employed the Kirkpatrick's model in higher educational settings. Alliger et al. (1997) define training criteria taxonomies as reaction, in terms of both affective and utilitarian judgement; learning, consisting of immediate knowledge, retained knowledge, and behavior and skill demonstration; behavior, as indicated by ongoing behaviors; and results, in terms of overall organizational impact. Yardley and Dornan (2012) evaluated the framework of Kirkpatrick's model regarding medical education, with an emphasis on the simple nature of the model not being capable of measuring interventions with stakeholders other than the participants. However, Turnbow and Zeidman-Karpinski (2016) state that level three and four of Kirkpatrick's model are possible if purposefully created throughout the design of a training.

Blue Collar. Madvari et al. (2018) utilized Kirkpatrick's model to evaluate the effects of a training intervention on increasing the workers' use of hearing protective equipment in the tile production industry. The researchers only completed the first two levels of the model, reaction and learning, and the legitimacy of the research falls into the critiques of the incomplete usage of the evaluation model (Madvari et al., 2018).

White Collar. Martin et al. (2018) utilized Kirkpatrick's model in a study to determine the confidence and knowledge of participants given four modes of training modules (online, video conference, face-to-face, and blended) for healthcare professionals in Australia. They acknowledge that the use of the same trainer, and assumedly the same pedagogical approach, means that facilitation is a determinate factor in achieving positive outcomes. Craig (1996) regards Phillip's work as the way to measure and report information because it provides denominations to Kirkpatrick's

model, level 4. As a result, Craig (1996) reports that in times of business downturns, organizational management will analyze the components of a business to determine their viability regarding profitability, including training. Jonny (2016) evaluated one of Indonesia's largest companies, PT XYZ, using Kirkpatrick's model to measure reaction, learning, behavior, and the ROI of the training regarding the indicated results. In addition, Jonny (2016) utilized the model for its "fitness and suitability to address the company's problem and need," (p. 138) which allowed for the testing of existing training programs, according to a preset (15%) return on investment.

Organizational leaders focus on how human capital and the increasing lack of interoperability of the traditional human resource departments and the ability to provide results through training for an increasingly technology-centric workforce and marketplace is a problem that impacts organizational results (Phillips & Phillips, 2016a). (A better way to demonstrate L&D's ROI, 2017) Company ExecOnline state that they have successfully utilized a project-based approach to reach the fifth level that Phillips added on to Kirkpatrick's model with both business schools and organizations through the following five steps:

Step 1: Project Selection. Program participants select a project to complete that is within their span of control.

Step 2: Project Implementation. Throughout the program, participants apply the tools and concepts they learn to their project. The program culminates with an executable plan to implement the project.

Step 3: Forecast Impact. At the end of the program, the participants forecast the impact of their project to see if it was successfully implemented. This includes changes in outputs and financial outcomes.

Step 4: Project ROI. HR leaders forecast the projected ROI for the entire program. As organizations utilize the project-based approach, they can build their own forecast model.

Step 5: ROI Confirmation. HR leaders should survey program participants and their managers 3, 6, and 12 months post-program. The goal of the surveys is to track whether projects were implemented and evaluate whether their fiscal impact was greater or lower than the forecast. After the 12-month survey, organizations can confidently report the realized financial impact.

Strengths and Weaknesses of Previous Studies. Using Kirkpatrick's model to determine the effects of enterostomal therapist training, Ying et al. (2019) note that students were pleased with the training, which significantly improved their abilities. However, the researchers did not measure recordable events on the behavior and results levels. Vizeshfar et al. (2018) used Kirkpatrick's model to evaluate the effectiveness of first aid health volunteer training, and the researchers reported that participant first aid knowledge and skills improved. However, this study should be examined closely because of the small sample size in one health center and the use of self-assessment for terminal levels of Kirkpatrick's model. Heydari et al. (2019) applied the model to measure the effect of a new teaching and learning methods workshop for health care staff. The limitations of this study included small sample sizes, but tangible behaviors were measured for the terminal levels. Bijani et al. (2018) used the model to assess the

effectiveness of a continuing education program for the prevention of occupational exposure to needlestick injuries in nursing staff. Promising results were noted; however, Bijani et al. (2018) questioned the use of the model in a niche area. Abdelhakim et al. (2018) used the model to evaluate airline cabin crew food safety training; however, results should be viewed with caution because only a small sample size of 20 airlines was selected for the study.

Summary

Kirkpatrick's model provides a template for organizations to measure reaction, learning, behavior, and results. This model is used commonly in educational and white-collar settings. Although measured training criteria, such as reaction, learning, behavior, and results are important organizational phenomena to assess these four areas each should be compartmentally viewed. The information gained from each level of Kirkpatrick's model should be evaluated according to the best practices stated in the literature.

Conclusion

In this chapter, the researcher presented a review of literature concerning the theoretical framework for the study; descriptions of traditional training modalities; technology-based training modalities; structured approaches to the development and assessment of corporate training; research associated with efficacy of the selected development model; research associated with comparisons of the efficacy and efficiency of traditional and technology-based training; and preference, time-based and generationally-based changes in media consumption. An historical review of technology-based training was included.

Training is considered a cost center that organizations spend billions on annually, and the new media and generational access are on a moving continuum that will continue to evolve. Technology-based training and the benefits derived from its implementation offset the cost of creation. Media creation, participation, and consumption changes as technology progresses, and the Internet allows traditional media to be accessed on more devices in more locations. Technological advances have made the creation of rich media commonplace.

Measuring training criteria, such as reaction, learning, behavior, and results is important to evaluate training programs. Each level of Kirkpatrick's model should be compartmentalized and evaluated according to research-based best practices. The utilization of new media, and the separation of participants by the introduction of a broad market device, the Blackberry 850 in 1999, aligns our study with literature regarding digital natives and digital immigrants.

CHAPTER III

Methodology

The chapter includes specific information that summarizes the methods and procedures used in this study. The purpose of this study is twofold. The first purpose is to examine whether a difference in satisfaction, perceived learning, and behavioral intention to practice ergonomics exists between a technology-based rich media training program (i.e., treatment program) and a traditional media training program (i.e., comparison program) among blue-collar workers. The second purpose is to determine whether the treatment differences depend on the generational groups (i.e., digital natives versus digital immigrants).

The research context, procedures, measures, and ethical concerns are primary components of this chapter. In this study, survey results will be analyzed to determine whether a technology-based rich media training program is more impactful than the traditional one in a blue-collar context.

Research Questions

Two research questions guide this study:

1. What impact does the delivery model of training, technology-based versus traditional media, have on the satisfaction, perceived learning, and behavioral intention of blue-collar workers?
2. How does the covariate of generational consumption of technology-based rich media training and traditional media training impact the satisfaction, perceived learning, and behavioral intention of blue-collar workers?

Research Context

Media consumption preferences have changed with the advent of new technologies. Those preferences differ in generational groups. This study seeks to see if blue-collar worker's media consumption preferences are different among generational groups guided by the aforementioned research questions.

Participants

The chain of lumberyards has a total population of approximately 300 employees. This chain has been chosen because nearly all the employees are blue-collar workers. The target population were recipients of a training program at one of the southern United States lumberyard branch locations. These blue-collar workers are members of a sales and service-oriented business, responsible for the utilization of heavy machinery, staging orders, manual labor, and material delivery. For the purposes of this research, participants have been chosen who work for the same privately-owned company but are located at different physical branch locations throughout the southern United States. The participants in the training programs are blue-collar workers, or unskilled, semi-skilled, or skilled manual labor employees. Individuals with multiple roles were included in the training; one role is locally referred to as a "stager." These individuals are responsible for pulling customer orders for delivery or pickup. The drivers are responsible for the transportation of pulled orders to customer locations.

Among these trainees, the status of digital natives and digital immigrants is determined by the cut-off age of 40. The rationale for this categorization is that individuals who are under 40 years old were born into a society where the Internet, social media, and mobile devices were omnipresent in the environment (Islam & Want, 2014).

Individuals who are over 40 years old were not born into a technology rich environment but evolved into it at a later age (DeVaney, 2015; Prensky, 2009; Swingle, 2016).

The demographics of the sample in the study are as follows. The ages of the participants ranged from 18 to 77. The genders of the participants were 14 female, 53 male, and 1 individual who preferred not to say. The racial and ethnic population included 2 American Indian or Alaska Native, 19 Black or African American, and 47 White participants.

Recruitment

A convenience sampling was used in the current study (Fowler, 2014). The locations had a rostered list of employees with information on their age that would go through the company's training. The researcher obtained the permission to access the list (see the letter of support in Appendix F). Trainees were first divided into two pools, digital natives and digital immigrants, based on their age. Then, the researcher recruited an equal number of participants from each pool. The trainees were offered ergonomics training by their respective location and then were asked to sign an informed consent form to participate in this study (Appendix C). The invitation was sent to the branches and delivered by the branch managers, who had key information about the research study, including the purpose of the study; the procedures of the study, including risks, inconveniences, safeguards, and confidentiality; and the voluntary nature of the study, including benefits, incentive details, and researcher contact details. Due to the nature of the study, the Covid-19 exposure risk was considered low, and the safeguards including handwashing, face covering, social distancing, and cleaning and disinfecting of

technology were observed. The sample consists of approximately 68 participants as determined by the power analysis in the later section.

Research Procedure

Prior to the training, and after reading the recruitment letter and signing the consent letter, an equal number of digital natives were randomly assigned to either a technology-based rich media training program or traditional training program. The same process was applied to digital immigrants. This random assignment process led to 17 digital natives and 17 digital immigrants in the treatment program and 17 digital natives and 17 digital immigrants in the comparison program. Each participant was given an alpha numeric token on a sheet of paper to identify their sub-group and complete the survey.

The researcher arrived at the location with traditional training and technology-based training materials. The participation of the data collection began, and the manager summoned employees to training in small groups or individually, depending on their availability. The participants who reported to the meeting area provided their token to identify their subgroup and were instructed by the researcher to complete their respective training and then take a survey on an Android tablet. The training lasted for 10 to 15 minutes. The researcher provided the type of training to the participants randomly. The researcher did not interact with the individuals whilst they were working through the training materials.

Both trainings were adopted from government created public domain ergonomics training and verified by a content area expert. The traditional training consisted of a binder with approximately 30 duplex pages with text and images. The technology-based

rich media training consisted of an Adobe Captivate of the same content as the traditional training with text, images, voice over sound, and arrows and home buttons to navigate the content.

Participants in the treatment program were given an Android tablet with headphones that allowed them to navigate through ergonomics and proper lifting techniques and with text, images, and voice over sound. Android tablets were provided with a link to a Qualtrics survey in which they entered their token to complete (see Appendix B). Participants in the traditional program were offered a printed packet with text and images about ergonomics and proper lifting techniques. They were also provided with an Android tablet with a link to the Qualtrics survey at the end of the training in which they entered their token to complete. The participants completed the training and took the survey. They were free to leave after they had completed the survey, and their participation ended.

Research Hypotheses

From the research questions the following alternative hypotheses have been made according to literature consensus regarding technology-based rich media (i.e., treatment) training program and the traditional media (i.e., comparison) training program:

Research Question 1

H_{a1}: Participants in the treatment program will be more satisfied with the training than those in the comparison program.

H_{a2}: Participants in the treatment program will have higher perceived learning than those in the comparison program.

H_{a3}: Participants in the treatment program will have a higher intention to practice ergonomics than those in the comparison program.

Research Question 2

H_{a4}: Participants who are digital natives in the treatment program will be more satisfied with the training than those in the comparison program.

H_{a5}: Participants who are digital natives in the treatment program will have higher perceived learning than those in the comparison program.

H_{a6}: Participants who are digital natives in the treatment program will have higher intention to practice ergonomics than those in the comparison program.

H_{a7}: Participants who are digital immigrants in the comparison program will be more satisfied with the training than those in the comparison program.

H_{a8}: Participants who are digital immigrants in the comparison program will have higher perceived learning than those in the treatment program.

H_{a9}: Participants who are digital immigrants in the comparison program will have higher intention to practice ergonomics than those in the treatment program.

Measures

The survey was composed of 14 questions with Likert-type response scaling. The survey includes demographic information, satisfaction, perceived learning, and behavioral intention to practice ergonomics. All the survey items can be found in Appendix B

Demographics

Demographic information includes participants' age, education level, gender, and ethnicity.

Satisfaction

Artino's (2007) subscale was adapted to assess participants' satisfaction about the training programs in this study. The scale is composed of four 7-point Likert-type scale items (1 = completely disagree, 7 = completely agree). Items were validated through exploratory factor analysis, as reported by the author. Cronbach's alpha was reported as being .91 in Artino's (2007) study. Sample items include "Overall, I was satisfied with my training experience" and "This training met my needs as a trainee."

Perceived Learning

Barzilai and Blau's (2014) subscale was adapted to assess participants' perceptions of their learning following the training programs in this study. The scale is composed of four 6-point Likert-type scale items (1 = very much disagree, 6 = very much agree). The scale is valid, as shown by the authors, and it was highly correlated with flow experience and enjoyment. Cronbach's alpha was reported as being .90 in Barzilai and Blau's (2014) study. Sample items include "The training added to my knowledge" and "The training will help me remember the things I learned."

Behavioral Intention to Practice Ergonomics

Teo's (2011) subscale was adapted to assess participants' intention to practice ergonomics following the training programs. The scale is composed of three 7-point Likert-type scale items (1 = strongly agree, 7 = strongly agree). The scale was validated through confirmatory factor analysis, as reported by the author. Cronbach's alpha was reported as being .96. Sample items include "I intend to continue to use ergonomics in the future" and "I expect that I would use ergonomics in the future."

Data Analysis

The data obtained from the surveys were summarized to provide a description of the satisfaction, behavior, and learning. The data were assessed to ensure that they meet the necessary assumptions for the statistical analysis that will be performed, including outliers, homogeneity of variance, normality, and linearity (Field, 2013).

Research Question 1

To address Research Question 1, independent *t*-tests were employed to determine if there was any significant difference in satisfaction, perceived learning, and behavioral intention between the treatment and comparison programs (Field, 2013). Cohen's *d* was computed to gauge the magnitude of the differences (Cohen, 1992).

Research Question 2

To address Research Question 2, 2 x 2 factorial ANOVAs were employed to determine if there was a significant interaction between the training programs and the generational groups in relation to satisfaction, perceived learning, and behavioral intention (Field, 2013). Cohen's *d* was computed to gauge the magnitude of the interaction effect (Cohen, 1992). All the analyses were conducted in Stata 16.1.

Power Analysis

Prior to the recruitment, power analysis was conducted to determine the minimum number of participants that are needed to be able to detect the magnitude of the difference between groups, as informed by the existing literature. In Blanch-Hartigan et al.'s (2012) meta-analysis, it was found that in the context of interpersonal training, the effect size ranged from $d = .72$ to $d = 1.71$ (Cohen, 1992). Arthur et al. (2003) found in their meta-analysis of the effects of training programs on motor skills and tasks that the effect size

ranged from $d = .71$ to $d = .80$. Therefore, in this study, the minimum meaningful effect has been set at $d = .71$.

For Research Question 1, a priori power analysis was conducted using G*Power 3 (Faul et al., 2007). With $\alpha = .05$, power = .80, and an equal number of participants in each group, 66 people are needed to detect an effect size of $d = .71$ or higher. For Research Question 2, a priori power analysis was conducted using G*Power 3. With $\alpha = .05$, power = .80, and an equal number of digital natives and digital immigrants in each training program, 65 people are needed to detect an interaction effect of $d = .71$ or higher. These required sample sizes are larger than similar studies that have been undertaken in regard to student engagement with media in online training (Rogers, 2013). Based on the results of power analyses, the current study intends to recruit 68 participants with 34 digital natives and 34 digital immigrants.

Ethical Concerns

The researcher engaged in ethical procedures throughout the study. Informed consent forms were provided to and read to the participants before the beginning of any training. The risks to the participants of this study were minimal. All subjects of the research were over the age of 18, had full mental capacity, and were employed and functioning members of an organization. All information gathered was kept confidential, destroyed accordingly after use, and no personally identifiable information was gathered. Furthermore, the correlation of pre- and post-test was completed through a user generated acrostic.

Summary

The purpose of this chapter was to describe the research methodologies used to answer research questions pertinent to this study. Kirkpatrick's model informed by a survey was used to determine whether a technology-based rich media training program is more impactful than a traditional media training program in enhancing satisfaction, perceived learning, and behavioral intention in blue-collar workers. The study also examined the interaction between training programs and the generational groups.

CHAPTER IV

Results

This study examined the interaction between training programs and generational groups. The results of the survey are reported below.

Sample

Digital natives and digital immigrants were determined by the cut-off age of 40. A convenience sampling was used in the study. Each location's employees were first divided into two pools, digital natives and digital immigrants, and were recruited to complete the training and survey.

The demographics of the sample in the study are as follows. The ages of the participants ranged from 18 to 77, with an average age of 44.59. The genders of the participants were 14 (20.59%) female, 53 (77.94%) male, and 1 (1.47%) individual who preferred not to say. The racial and ethnic population included 2 (2.94%) American Indian or Alaska Native, 19 (27.94%) Black or African American, and 47 (69.12%) White participants. The education levels of the participants are 41.17% high school graduate or GED, 20.58% not graduating high school, and 16.17% with an associate degree or trade training or higher, and 22.06% with some college credit, but no degree.

Data Collection

Digital natives and immigrants were randomly assigned to either a technology-based rich media training program or traditional training program. This random assignment process led to 17 in each of the four covariate groups. Those covariate groups are digital native traditional training, digital native rich media training, digital immigrant traditional training, digital immigrant rich media training.

The researcher arrived at the location with traditional training and technology-based training materials. The 10-to-15-minute training began as employees of the lumberyard reported to the predefined area. Participants in the traditional program were offered a printed packet with a prompt for the survey at the end of the materials, and the technology-based rich media training had a link directly to the survey. They were identified by their assigned token, and no further interaction from the researcher was provided until they were ready to complete the survey.

Data and Analysis

The study used a quantitative approach. The three types of questions asked in the survey (Appendix B) was given to blue-collar employees after going through the training materials. Upon completion of the technology-based rich media training or the traditional media training, the participants completed a Qualtrics survey on an Android tablet. The control group received traditional paper training, and the treatment group received technology-based training on an Android tablet.

The objective of the survey was to answer the following research questions: What impact does the delivery model of training, technology-based versus traditional media, have on the satisfaction, perceived learning, and behavioral intention of blue-collar workers? How does the covariate of generational consumption of technology-based rich media training and traditional media training impact satisfaction, perceived learning, and behavioral intention of blue-collar workers?

Descriptive Statistics and Bivariate Correlation

The following analyses were conducted in Stata 16.1. A correlation test between the question types on the survey included satisfaction, learning, and behavioral intention.

There was a significant correlation between all of the question types: learning and satisfaction (.6191*), behavioral intention and satisfaction (.6048*), and behavioral intention and learning (.5498*). Table 5 through Table 13 present the descriptive statistics from this research.

Table 5

Technology-Based Rich Media Versus Traditional Training, Traditional Training: Satisfaction, Perceived Learning, and Behavioral Intention

	Mean	Std. Dev.	Min.	Max.	Skewness	Kurtosis
Satisfaction	6.31	1.04	3.33	7	-1.53	4.24
Perceived learning	5.32	.85	3.25	6	-.94	2.61
Behavioral intention	6.29	.86	3.33	7	-1.50	5.25

Table 6

Technology-Based Rich Media Versus Traditional Training, Technology-Based Rich Media: Satisfaction, Perceived Learning, and Behavioral Intention

	Mean	Std. Dev.	Min.	Max.	Skewness	Kurtosis
Satisfaction	6.04	.98	3.33	7	-.90	2.99
Perceived learning	5.01	1.14	2	6	-.95	2.61
Behavioral intention	5.96	1.18	3.33	7	-.83	2.29

Table 7

Technology-Based Rich Media Versus Traditional Training, Digital: Digital Immigrants, Perceived Learning, and Behavioral Intention

	Mean	Std. Dev.	Min.	Max.	Skewness	Kurtosis
Satisfaction	6.18	1.03	3.33	7	-1.09	3.05
Perceived learning	5.08	.98	3.25	6	-.51	1.67
Behavioral intention	6.03	1.15	3.33	7	-.91	2.49

Table 8

Technology-Based Rich Media Versus Traditional Training, Digital: Digital Natives, Perceived Learning, and Behavioral Intention

	Mean	Std. Dev.	Min.	Max.	Skewness	Kurtosis
Satisfaction	6.17	1.01	3.33	7	-1.30	3.89
Perceived learning	5.25	1.04	2	6	-1.59	4.96
Behavioral intention	6.21	.93	3.33	7	-1.43	4.68

Table 9

Technology-Based Rich Media Versus Traditional Training, Digital: Traditional Training, Digital Immigrants, Perceived Learning, and Behavioral Intention

	Mean	Std. Dev.	Min.	Max.	Skewness	Kurtosis
Satisfaction	6.29	.94	4.33	7	-.98	2.42
Perceived learning	5.07	1.02	3.25	6	-.44	1.63
Behavioral intention	6.19	1.06	3.33	7	-1.35	4.00

Table 10

Technology-Based Rich Media Versus Traditional Training, Digital: Traditional Training, Digital Natives, Perceived Learning, and Behavioral Intention

	Mean	Std. Dev.	Min.	Max.	Skewness	Kurtosis
Satisfaction	6.33	1.16	3.33	7	-1.82	4.91
Perceived learning	5.57	.56	4.25	6	-.98	2.71
Behavioral intention	6.39	.61	5.33	7	-.63	2.15

Table 11

Technology-Based Rich Media Versus Traditional Training, Digital: Technology-Based Rich Media Training, Digital Immigrants, Perceived Learning, and Behavioral Intention

	Mean	Std. Dev.	Min.	Max.	Skewness	Kurtosis
Satisfaction	6.07	1.13	3.33	7	-1.07	3.02
Perceived learning	5.08	.98	3.5	6	-.58	1.71
Behavioral intention	5.88	1.24	4	7	-.57	1.71

Table 12

Technology-Based Rich Media Versus Traditional Training, Digital: Technology-Based Rich Media Training, Digital Natives, Perceived Learning, and Behavioral Intention

	Mean	Std. Dev.	Min.	Max.	Skewness	Kurtosis
Satisfaction	6.01	.84	4.33	7	-.47	2.18
Perceived learning	4.94	1.31	2	6	-.99	2.79
Behavioral intention	6.03	1.15	3.33	7	-1.12	3.13

Table 13

Bivariate Correlation Between Satisfaction, Perceived Learning, and Behavioral Intention

	1	2	3
Satisfaction	—		
Perceived learning	0.61*	—	
Behavioral intention	0.60*	0.54*	—

Note. * $p < .05$

To address Research Question 1, independent *t*-tests were employed to determine if there is any significant difference in satisfaction, perceived learning, and behavioral intention between the treatment and comparison programs (Field, 2013). The results show that there was no significant difference in satisfaction ($t(66) = 1.07$, $p = .29$, $d = .26$), perceived learning ($t(66) = 1.26$, $p = .21$, $d = .31$), and behavioral intention ($t(66) = 1.32$, $p = .19$, $d = .32$) between the treatment and comparison programs. Table 14

presents the bivariate correlation. Satisfaction, perceived learning and behavioral intention were all positively and strongly correlated with one another.

Table 14

Differences Between Traditional Versus Technology Treatment Conditions

	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	
Satisfaction	-.2647059	.2466144	-1.07	0.287	-.7570875	.2276757
Perceived learning	-.3088235	.2449286	-1.26	0.212	-.7978393	.1801923
Behavioral intention	-.3333333	.2519598	-1.32	0.190	-.8363873	.1697206

To address Research Question 2, 2 x 2 factorial ANOVAs were employed to determine if there was a significant interaction between the training programs and the generational groups in relation to satisfaction, perceived learning, and behavioral intention. The results show that there was no significant interaction between the training programs and generational groups in satisfaction ($F(1, 64) = .04$, $p = .85$, $d = .05$), perceived learning ($F(1, 64) = 1.75$, $p = .19$, $d = .33$), and behavioral intention ($F(1, 64) = .01$, $p = .84$, $d = .02$) between the treatment, or technology-based rich media and comparison, or traditional programs.

Table 15

Differences Between Treatment Conditions in Generational Groups

	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	
Satisfaction	-.0980392	.5007204	-0.20	0.845	-1.098343	.9022647
Perceived learning	-.6470588	.4888462	-1.32	0.190	-1.623641	.3295237
Behavioral intention	-.0392157	.5098039	-0.08	0.939	-1.057666	.9792347

Implications

For Research Question 1, no significant difference was found in satisfaction, perceived learning, and behavioral intention between the treatment and comparison programs. The effect sizes were small to medium. Therefore, these results suggest that the delivery model of training had no significant effect on a training's satisfaction, perceived learning, and behavioral intention among blue-collar workers. Regarding Research Question 2, no significant interaction between the training programs and digital generations was found in any of the outcome variables. The effect sizes for the interaction effects ranged from extremely small to medium. These findings suggest that the effects of the delivery model of training were not moderated by digital generations. That is, digital immigrants were not perceived to have significantly better training outcomes in the traditional media training program than in the technology-based one. Similarly, the

technology-based training program did not lead to significantly better training outcomes for digital natives compared to the traditional media one.

Conclusion

This chapter contained the quantitative results and analysis. Based on the results of power analyses, the current study recruited 68 blue-collar participants with 34 digital natives and 34 immigrants. The results of independent *t*-tests showed that the technology-based training program did not lead to better learning outcomes in terms of satisfaction, perceived learning, and behavioral intention than the traditional media training program among blue-collar workers. The results of 2 x 2 factorial ANOVAs shows that the effects of the delivery model of training did not differ by digital generations. All of the alternative hypotheses in this study were rejected by the data.

CHAPTER V

Discussion

This chapter includes a discussion of the quantitative results, implications, recommendations for future research, and conclusions. The purpose of this quantitative study was to examine whether a difference in satisfaction, perceived learning, and behavioral intention to practice ergonomics exists between a technology-based rich media training program and a traditional media training program among the covariate of digital native and digital immigrant blue-collar workers. This chapter includes a discussion of the findings of the study related to the literature on blue-collar technology training, implications for organizations, recommendations for future research, and limitations.

Quantitative Results

In this study, survey results were analyzed to determine whether a technology-based rich media training program is more impactful than a traditional media training program in a blue-collar context. The study recruited 68 participants with 34 digital natives and 34 immigrants to meet the necessary power requirements.

In addressing Research Question 1, independent *t*-tests found no significant difference in satisfaction, learning, and behavioral intention between the treatment and comparison programs (.287). Therefore, the delivery model of training has no significant effect on satisfaction, perceived learning, and behavioral intention of blue-collar workers. The positive reactionary response expected from technology-based rich media training was not found in this study (Oregon et al., 2018). The use of rich media to accommodate blue-collar workers learning preferences in this study did not affect satisfaction, learning, and behavioral intention (Sankey et al., 2011; White, 2020).

In addressing Research Question 2, 2 x 2 factorial ANOVAs found no significant difference in satisfaction (.845), learning (.19), and behavioral intention (.939) between the treatment and comparison programs. Therefore, the delivery model of training has no significant effect on satisfaction, perceived learning, and behavioral intention of either digital native blue-collar workers or digital immigrant blue-collar workers. Digital immigrants are characterized as seeking technological media with collaborative instantaneous feedback (Desai & Lele, 2017), and brevity, succinctness, and multi-way interaction are the predominant characteristics of technology-based rich media (Bolin, 2016a; Lee, 2019; Treem et al., 2016). Bolin's (2016a) research in which a media and generational group labeling as a product of their predominant media (TV generation) as a self-fulling prophecy is not seen prevalently in this study of digital native blue-collar workers as traditional training scored higher regardless of generational group. Thompson (2015) has found that digital natives and previous generations prefer choice in technology and an instructor-centered classroom, but the lack of an instructor and the use of technology did not significantly affect satisfaction, perceived learning, and behavioral intention in either group in this study. Attributes including the temporal engagement with media, schema, perceptions, social interactions, and technological acuity were not necessarily present among homogenous generational groups (Guo et al., 2008; Helsper & Eynon 2010; Wang, 2015).

Implications

Many industries have technology integration in their future (Lee & Clarke, 2019). Blue-collar workers consist of both digital natives and digital immigrants; therefore, their receptiveness to traditional training and technology-based rich media training warranted

analysis (Gaponova & Korshunov, 2018; Prensky, 2009; Thinyane, 2010; Wrobel-Lachowska et al., 2017).

Research has proposed that technological advances have made the creation of rich media commonplace. Participants did not have any major issues adapting or using technology regardless of generational group (Mao, 2014). Research states that differences should be examined regarding general rich media receptiveness, and younger generations are fast, immediate-feedback oriented, and prefer and are accustomed to sharing and collaborating through rich media versus text (Desai & Lele, 2017; Reeves & Oh, 2008).

The study found that the delivery model of training has no significant effect on satisfaction, perceived learning, and behavioral intention of blue-collar workers, no matter whether they are digital native or digital immigrant workers. The generational media preferences (Bolin, 2016b; Prensky, 2009) that categorize digital natives and immigrants were not evident in this study and show no significant learning differences among generational groups (Chaudhry et al., 2020; Childs-Kean et al., 2020; Huang et al., 2018; Razzak et al., 2019; Sankey et al., 2011; White, 2020). Furthermore, the training format did not have a significant impact on the groups (Gupta et al., 2010).

Research states that the communication to learners in their preferred media leads to positive perceptions and general satisfaction of the material (Gee, 1990; Thanyaphongphat & Panjaburee, 2017); but blue-collar workers may see training and efforts put forth by organizations as more of a directive, rather than a negotiable element of their employment. The catering of content to reach demographic groups via media may be an overarching targeting method, but if the generational audience is delivered the

material, traditional or technology-based, and its consumption is interpreted as directive, the affect response is not changed (Aleksić & Stamenković, 2018). The study found that regardless of generational group, there was no significant difference in the satisfaction, perceived learning, and behavioral intention of blue-collar workers when receiving traditional or technology-based rich media training.

Organizations should not be discouraged by digital immigrants' perceived acuity in the use of technology for training purposes. The education levels of the individuals in this study also ranged significantly in both digital natives and digital immigrants, and the implications of education level and age are often used to make assumptions at the organizational level on the delivery media of training. The study was largely incident free in regard to technology usage. During the study the researcher could only provide very minimal guidance or feedback to the participants, even those that experienced trouble reading. The researcher only intervened to show the participants the volume control and the slide advancement button onscreen, and all participants easily navigated the materials.

Technology-based training is, evidently, at least equal or more cost effective than traditional training. Organizations can employ the Philips/Kirkpatrick model to determine if the cost effectiveness is obtainable in their field or industry. The designation of digital native and digital immigrant media consumption may not be as pronounced in regard to training as previously found, as individuals, especially blue-collar workers, may approach training differently than normal media consumption. These subjects are expanded upon in further research.

Training blue-collar workers with technology should adhere to instructional design best practices, and modern software solutions, such as Adobe Captivate or

Camtasia, provide a means to easily port existing materials into technology-based media for easy dissemination. Blue-collar workers were excited to use technology to learn new information and skills. Therefore, a facilitator that leads the process with knowledge management and clear navigation as the foundation of their training will realize the benefits that technology can provide to training.

Despite the possible cost savings an organization can reap, all of the benefits of instructional technology can be realized by an organization consisting of both digital native and immigrant blue-collar workers. Those benefits include the accessibility, delivery, and turnaround time between content presentation, formative assessment, and summative assessment. This will provide further organizational advantages, such as simple to administer assessments coupled with quick turnaround time for assessment results.

Recommendations for Future Research

The results of the study between digital natives and digital immigrants regarding traditional and technology-based training lends itself to further research using the Phillips and Phillips (2016a) five-level ROI model to further investigate business results and ROI. The cost of the tablets and initial setup is minimal, and the opportunities for businesses to add elements to their training according to Mayer's (2009) best practices allow for cost savings with no significant change in the satisfaction, perceived learning, and behavioral intention that are gained from a training program.

As android tablets were provided to the participants in the traditional group to complete the survey, further research could investigate the implications of users using their own devices to complete trainings, with consideration to those that may not have a

device that is capable of accessing html 5 content on most modern mobile browsers (Ley et al., 2014).

Another area of consideration for future researchers would be the quantification of time spent by employees and the subsequent results achieved. The amount of time spent by the research participants in technology-based training overall seemed to be less than those in traditional paper-based training. This could be coincidental, but measurement and quantification of this effort could bring further evidence to inform the Phillips and Phillips (2016a) five-level ROI model. The current study informs organizations that employ blue-collar workers to utilize either technology-based rich media or traditional training planned and constructed according to best practices (Mayer, 2009). The modality of those trainings will not have any significant effect on the training's satisfaction, perceived learning, and behavioral intention of the participants.

Limitations

A single instructional technologist will be responsible for the creation of rich media course materials. The sample is a convenience sample. The geographic area was the southern United States, in a single industry, with a limited number of physical branch locations. The results of this study may not be compatible with cases in other industries, or to different geographical locations. Motivation in the workforce may be different than motivation in educational settings, and previous training results may be skewed by motivation, content, or presentation. The divide between digital natives and digital immigrants is a controversial topic with differing opinions from academics; thus the division of populations proposed and the resultant analyses within this study determined if those differences exist.

Conclusions

This quantitative study of 68 blue-collar workers yielded the following results. The delivery model of training has no significant effect on satisfaction, perceived learning, and behavioral intention of blue-collar workers, no matter whether they are digital native or digital immigrant workers. Nevertheless, Phillips and Phillips (2016a) five-level ROI model should be employed in future research to further investigate specific business results and ROI.

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APPENDIX A

Letters Granting Permission

Figure 1**.** Permission to reuse table

eLearning Guild Service <service@elearningguild.com>

Fri 5/1/2020 5:29 PM

Hi Joe,

Thank you for your email. I was able to check on this for you, and yes, you definitely have permission to do this.

Thanks again,

Steve Firpo

Group Sales Manager

The eLearning Guild

707-566-8990 x306

sfirpo@elearningguild.com

Guidry, Joseph

Fri 5/1/2020 10:48 AM

To:service@elearningguild.com;

Dear Sir or Madam:

I would like to reprint the table on page 8 of

https://www.elearningguild.com/pdf/2/032607des.pdf

from

Beal, T. (2007). ADDIE Meets the Kirkpatrick Four: A 3-Act Play. *The E-learning Guild Research*, *1*(1), 1-12.

in my dissertation.

May I have your permission to do so?

Thanks,

Joe

Figure 2**.** Permission to reuse table

bob@hrdpress.com

Fri 6/7/2019 8:38 AM

As long as you properly cite the source that is fine.

Sincerely,

Robert Carkhuff

Publisher

Subject: Permission to reuse table

From: Guidry, Joseph

Date: Fri, June 07, 2019 8:56 am

To: "permissions@hrdpress.com" <permissions@hrdpress.com>

Dear Sir or Madam:

I would like to reprint Table. 12, Relationship between Goal Setting and Evaluation, from Foundations of Instructional and Performance Technology, p.67, in my dissertation.

May I have your permission to do so?

Thanks,

Yonnie Chyung <ychyung@boisestate.edu>

Monday, June 3, 2019 11:47 AM

To: Guidry, Joseph

Subject: Re: Permission to reuse table

Hi Joe,

I don't have any problem you citing Table 12 in your dissertation, but I think you would need to get copyright permission from (not me but from) the publisher, the HRD Press. I suggest that you contact the HRD Press - http://www.hrdpress.com/Contact-Us

Good luck with your dissertation!

Yonnie_

SEUNG YOUN (YONNIE) CHYUNG

Professor and Associate Chair | Organizational Performance and Workplace Learning |

Boise State University

Phone: (208) 426-3091

Email: ychyung@boisestate.edu

Mail: 1910 University Drive, Boise, ID 83725-2070

Location: RUCH #321, 1375 University Drive, Boise, ID 83706

Web: opwl.boisestate.edu/faculty-staff/faculty/yonnie-chyung |

opwl.boisestate.edu/chyung/

"Behavior is something that you take with you and an accomplishment is something that you leave behind." (Gilbert & Gilbert, 1992, p. 44)

Fri, May 31, 2019 at 6:12 AM

Guidry, Joseph

Hello Dr. Chyung,

I would like to reprint Table. 12, Relationship between Goal Setting and Evaluation, from Foundations of Instructional and Performance Technology, p.67, in my dissertation.

May I have your permission to do so?

Thanks,

Joe

Figure 3. Permission to reuse table

Wiley Global Permissions <permissions@wiley.com>

Wed 2/5/2020 8:33 AM

Dear Joseph,

Thank you for your email.

Permission is granted for you to use the material requested for your thesis/dissertation subject to the usual acknowledgements (author, title of material, title of book/journal,

ourselves as publisher) and on the understanding that you will reapply for permission if you wish to distribute or publish your thesis/dissertation commercially.

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Should you require any further information, please do not hesitate to contact me.

Kind regards,

Paisley Chesters

Permissions Co-Ordinator

Wiley

The Atrium

Southern Gate

Chichester

West Sussex

PO19 8SQ

www.wiley.com

Guidry, Joseph

Tue 2/4/2020 2:17 PM

Requesting permission to use Table 8.1 from Training evaluation within The Wiley Blackwell Handbook of the Psychology of Training, Development, and Performance Improvement in my dissertation.

APPENDIX B

Survey Questionnaire

Token? –

Demographic Information

How old are you? (Age) –

What is your highest level of education? (Education level) –

No schooling completed

8th grade completed

Some high school, no diploma

High school graduate

GED

Some college credit, no degree

Trade training

Associate degree

Bachelor's degree

Master's degree or higher

What is your gender? (Gender) –

Female

Male

Prefer not to say

Prefer to self-describe _____

With which racial and ethnic group(s) do you identify? (Ethnicity) –

American Indian or Alaska Native

Asian

Black or African American

Hispanic or Latino

Native Hawaiian or Other Pacific Islander

White

Another race or ethnicity not listed above _____

Satisfaction

Scale: ranging from 1 (not good at all) to 7 (extremely good)

Overall, I was satisfied with my training experience.

This training met my needs as a learner.

I was dissatisfied with my overall training experience (R).

I would recommend this training course to a friend who needed to learn the material.

Perceived learning

Scale: ranging from 1 (very much disagree) to 6 (very much agree)

I learned a lot from the training.

The training added to my knowledge.

I learned new things from the training.

The training will help me remember the things I learned.

Behavioral intention to use

Scale: rated on a seven-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree)

I intend to continue to use ergonomics in the future.

I expect that I would use ergonomics in the future.

I plan to use ergonomics in the future.

APPENDIX C

Recruitment and Consent Messages

Recruitment Message A

Dear Sir or Madam,

I am inviting you to participate in my research about training. The following is an anonymous survey, which should take approximately 15 minutes to an hour of your time. It details questions about your experience with your training. There are also some demographic questions.

To qualify for this study, you must be over the age of 18. This study is voluntary, and your participation will be anonymous – I won't even know who has taken the survey. If you would like to be part of my study, please sign the attached consent form from management.

Thank you,

Joe Guidry

APPENDIX D

Consent Form

Technology-based rich media training compared to traditional media training in blue collar employees

Informed Consent

INVITATION TO PARTICIPATE:

Dear Sir or Madam:

My name is Joe Guidry, and I am student of Instructional Systems Design Technology at Sam Houston State University. You are invited to participate in a research study of training composition. You were selected as a possible participant because you are a blue-collar employee. Please read this form carefully and ask any questions you may have before agreeing to be in the study. You must be 18 or older to participate in the study.

KEY INFORMATION ABOUT THIS RESEARCH STUDY:

The following is a short summary of this study to help you decide whether to be a part of this study. Information that is more detailed is listed later on in this form.

The purpose of this study is to determine the differences in response between normal trainings and technology trainings, as well as generational differences. You will be asked to complete a survey. We expect that you will be in this research study for 1 hour. The primary risk of participation is minimal. The main benefit is learning ergonomics.

STUDY PURPOSE:

The purpose of this study is to determine the differences in response between normal trainings and technology trainings, as well as generational differences.

NUMBER OF PARTICIPANTS:

If you agree to participate, you will be one of X who will be participating in this research.

PROCEDURES FOR THE STUDY:

If you agree to be in the study, you will do the following:

1. Participate in a training
2. Take a survey

RISKS AND INCONVENIENCES:

There are minimal risks and inconveniences to participating in this study. These include:

1. Time to participate

SAFEGUARDS:

To minimize these risks and inconveniences, the following measures will be taken:

1. The researcher will be as quick as possible
2. Your performance in the study will be confidential
3. Covid-19 procedures stated below will be followed.

CONFIDENTIALITY:

Your responses will be anonymous.

The results of this study may be used in reports, presentations, or publications, but your name or other personal information as applicable will not be used. The data will be stored and destroyed after the studies' completion.

VOLUNTARY PARTICIPATION:

Taking part in this study is voluntary. You may choose not to take part and may leave the study at any time. Leaving the study will not result in any penalty. Your decision whether or not to participate in this study will not affect your current or future relations with your employer.

BENEFITS OF TAKING PART IN THE STUDY:

The benefits of participating in this study are a better understanding of workplace ergonomics.

PAYMENT OR INCENTIVE:

You will not receive payment for taking part in this study.

COVID-19 PROCEDURES

I understand that by participating in a research project in person, I am at risk for possible exposure to SARS CoV-2, an agent that causes COVID-19. The risk for exposure to this

virus as part of this research project could result in a positive development of COVID-19. The consequences of COVID infection include extended quarantine/self-isolation, additional tests, hospitalization that may require intensive care treatment, and the risk of death.

Your Responsibility to Minimize Your Exposure

If you decide to participate, you agree to take certain precautions that will contain a risk for exposure.

• You will only participate if you are symptom-free.

• You will take your temperature before participating. If it is elevated (100 Fahrenheit or more) or if you have other symptoms described for COVID-19, you should stay home.

• You will wash your hands or use an alcohol-based hand sanitizer upon arrival. • You will wear a mask.

• You will keep a distance of 6 feet, and there will be no physical contact (e.g., no shaking hands).

• You will try not to touch your face or eyes with your hands. If you do, you will immediately wash or sanitize your hands.

CONTACT INFORMATION:

If you have questions about the study, please call me on 940-447-7703 or e-mail me at jlg113@shsu.edu. You will be given a copy of this form for your records. If you have any questions, suggestions or concerns about your rights as a volunteer in this research, contact the Office of Research and Sponsored Programs – Sharla Miles at 936-294-4875 or e-mail ORSP at sharla_miles@shsu.edu.

APPENDIX E

Traditional Presentation Training

Below is the link to the .pdf for the traditional media training:

Ergpnotes.pdf- https://myshsu-my.sharepoint.com/:b:/g/personal/jlg113_shsu_edu/EeRn4IsZ0ZVGkoOqEnAIMesBUoEJzzMX3HdlcV6saIDa-A?e=oVOACS

APPENDIX F

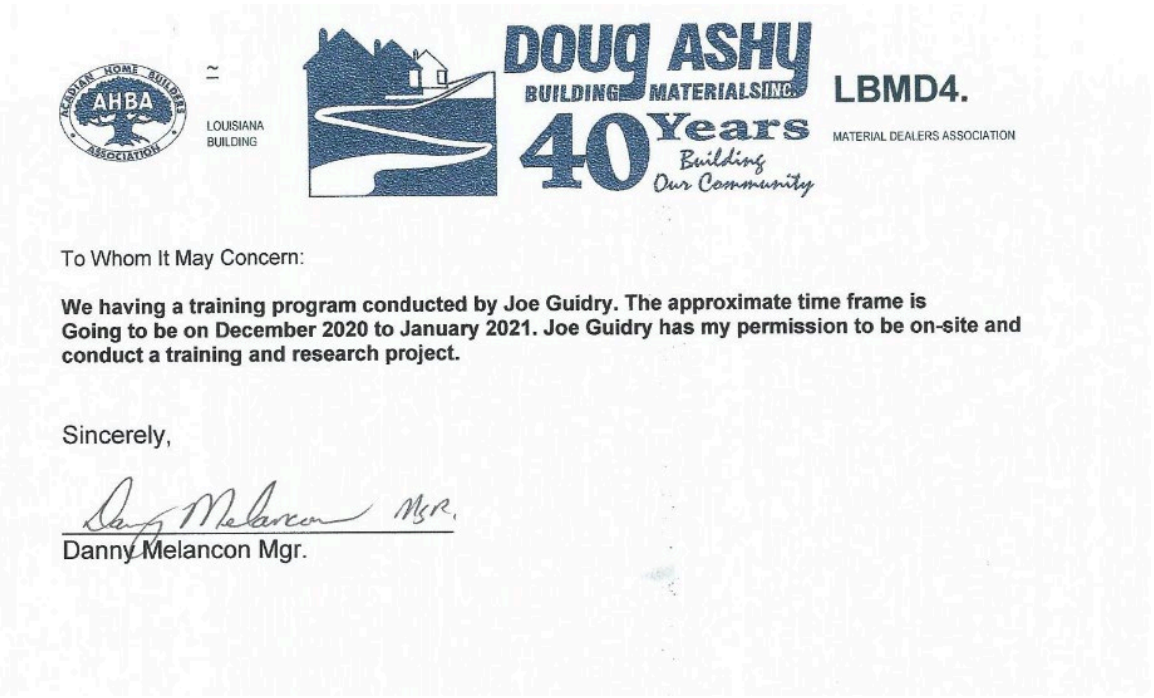
Technology-Based Rich Media Training

Below is the link to the. cptx for the technology-based media training:

Erpg.cptx- https://myshsu-my.sharepoint.com/:u:/g/personal/jlg113_shsu_edu/ET4iyFdcp6lJrET-EXLezhcBZfTb8eobrIdvn4U27kkHJA?e=1WqHtr

APPENDIX G

Letter of Support



AHBA Acadian Home Builders Association

LOUISIANA BUILDING

DOUG ASHY BUILDING MATERIALS INC.

40 Years Building Our Community

LBMD4. MATERIAL DEALERS ASSOCIATION

To Whom It May Concern:

We having a training program conducted by Joe Guidry. The approximate time frame is Going to be on December 2020 to January 2021. Joe Guidry has my permission to be on-site and conduct a training and research project.

Sincerely,

Danny Melancon Mgr.

Danny Melancon Mgr.

VITA

Joseph Guidry

Education

Sam Houston State, Huntsville, Texas

Doctorate of Instructional Systems Design and Technology

Doctoral Candidate, May 2021

Midwestern State University, Wichita Falls, Texas

Master of Educational Technology

Completed December 2012

Midwestern State University, Wichita Falls, Texas

Bachelor of Business Administration

Graduated December 2009

Honors and Awards

Google Certified Trainer

Microsoft Office Specialist

Relevant Experience

Burkburnett ISD, October 2019 – Present

Director of Technology

- Advancing district strategy for utilizing technological resources
- Providing a platform in which technologies are used for instructional purposes efficiently, effectively, and securely
- Assessing and employing new infrastructure and systems

- Training and developing all organizational stakeholders regarding the use of technology

Midwestern State University, August 2018 – Present

Adjunct Professor

- Engaging students in current literature and scholarly findings regarding technology integration
- Facilitating student achievement of industry certifications

Wichita Falls ISD, June 2016 – October 2019

Instructional Technologist

- Presented and modelled the school district's aspirations for technology usage to audiences locally, regionally, and globally
- Assisted teachers and students in the implementation and use of technology in the classroom
- Created training materials and administered district and regional training
- Consulted administration and curriculum on technology integration
- Created a flipped personal development system for online access to district-wide training
- Implemented district goals through joint staff compliance

Wichita Falls ISD, Wichita Falls High School, August 2014 – June 2016

Business and Technology Teacher

- Assisted technology students in achieving Microsoft certification

- Awarded a quarterly designation for top instructional staff
- Aided staff and peers with technology implementation and training

Burkburnett ISD, January 2012 – 2014

Educational Technologist* / *Technician

- Created and administered training programs and workshops on technical subjects for district employees
- Gave technical support for K-12 campuses and administration offices
- Mentored and gave direct support to district personnel on technical topics
- Facilitated course content delivery via distance learning