8-2018

The Effect of Familiarity on Learning with Video Clips Containing Seductive Details

Jonah Lee Ruddy
University of Tennessee, Knoxville, jruddy@vols.utk.edu

To the Graduate Council:

I am submitting herewith a dissertation written by Jonah Lee Ruddy entitled "The Effect of Familiarity on Learning with Video Clips Containing Seductive Details." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in School Psychology.

Christopher H. Skinner, Major Professor

We have read this dissertation and recommend its acceptance:

Marion E. Coleman-Lopatic, Ralph S. McCallum, Merilee McCurdy

Accepted for the Council:
Dixie L. Thompson

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

The Effect of Familiarity on Learning with Video Clips Containing Seductive Details

A Dissertation Presented for the

Doctor of Philosophy

Degree

University of Tennessee, Knoxville

Jonah Lee Ruddy

August 2018

Dedication

To my best friend and wife

Julie Ruddy

and my incredible son

Tristan Ruddy

Acknowledgements

I want to extend my deepest thanks and gratitude toward Dr. Chris H. Skinner, Dr. R. Steve McCallum, Dr. Merilee McCurdy, Dr. Brian Wilhoit, Dr. Robert Williams, Dr. Sherry Bain, and Dr. Dennis Ciancio and other faculty members in the Department of Educational Psychology and Counseling for their support and mentorship. I wish to extend my thanks to Dr. Mari Beth Coleman for serving as co-chair of my dissertation committee and to Mike O'Neil, M.S. for his help modeling and analyzing data collected in this study. A special thanks to Dr. David Cihak for his guidance as I earned my master's degree in special education and his continued mentorship and encouragement as I pursued a doctoral degree in school psychology. I would also like to thank Dr. Karee Dunn for serving as the supervising professor for my graduate teaching assistantship.

I want to recognize and thank Carrie Jaquett, Kyle Ryan, Shelby Wright, and Kala Taylor for their assistance in the development and execution of this study. I am also grateful for Dr. Tara Moore's and Jason Gordon's contributions to the conceptualization and development of the experimental design. Finally, I wish to thank the teachers, students, and school faculty who assisted in this research. Without willing and engaged volunteers, this work would not have been possible.

Abstract

Seductive information included in educational lessons can arouse students' emotional and situational interest. However, research on seductive details across instructional modalities shows both helpful and harmful effects on learning. The seductive details effect describes the negative influence of interesting, but irrelevant, information on achieving learning goals. Results from studies of videos with relevant and seductive details in multimedia lessons are inconclusive. Prior knowledge of target information has been shown to moderate the seductive details effect. In this study, the moderating effect of prior exposure to, or familiarity with, seductive, rather than target, information was explored using a multifactorial design. The experiment was conducted with high school psychology students who viewed narrated PowerPoint lessons with embedded videos containing relevant and irrelevant details that were either familiar or unfamiliar. Results from posttests including factual and applied items found no evidence of the seductive details effect impairing participant learning. Additionally, analysis using a generalized linear mixed effects model indicated prior exposure to seductive details had no significant moderating effect.

Table of Contents

List of Tables

List of Figures

CHAPTER I Introduction and Review of Literature

Introduction

Lesson design and delivery are critical elements of pedagogy that concern educators and researchers alike. Teachers are under pressure to deliver lessons aligned with increasingly rigorous and internationally competitive curriculum standards (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010) and ensure that all students make adequate progress measured by high stakes testing (Weingarten, 2014). It is rarely sufficient for instructors to present students with educational information and assume learners will retain and correctly use new knowledge or skills. Cognitive theorists suggest that, for academic learning to take place, information must be processed through a sequence of cognitive functions (e.g., Atkinson & Shiffrin, 1968; Baddeley, 1992; Mayer & Moreno, 2003; Moreno, 2006), that begins with perception and attention as gateways preventing the information processing system from being inundated by the large and constant quantities of environmental stimuli to which individuals are exposed. Only stimuli that are perceived and attended may enter the working and, potentially, long-term memory (Baddeley, 2001; Zhang & Luck, 2009). Attentional (Cowan, 2007) and working memory (Cowan, 2010; Miller, 1956) capacities are limited, and it is difficult for individuals to attend to more than one complex task (e.g., a lesson or instructional text) at the same time (Anderson, 2005; Lien, Ruthruff, & Johnston, 2006). Students who are not attentive or cognitively engaged in a lesson may not be able to process, retain, recall, or apply desired information accurately. Therefore, when providing instruction, teachers must carefully consider how to capture and sustain student attention (Evertson, Emmer, & Worsham, 2003).

Diverse populations require educators to employ a wide range of strategies for arousing student interest and engagement. While some students attend to a lesson, disinterested students may need further impetus to participate and learn. Pedagogical factors, including classroom arrangement or environment (Paris & Turner, 1994; Rueda & Moll, 1994; Turner & Patrick, 2008), lesson content and structure (Barron, 2006; Hidi & Baird, 1986; Hidi & Renninger, 2006; McDaniel, Waddill, Finstad, & Bourg, 2000) and educational goals (Elliot, Murayama, & Pekrun, 2011; Ford & Smith, 2007; Schutz, 1994) are often considered variables in capturing learner attention. Many class rooms also contain multimedia technology, in the form of videos, computers, and interactive whiteboards, that are intended to improve engagement and support learning. The use of these elements can influence how students process information and whether expected learning takes place at all. Researchers have shown that simply making learning material interesting does not guarantee proper learning (Garner, Gillingham, & White, 1989; Harp & Maslich, 2005; Harp & Mayer, 1998; Lehman, Schraw, McCrudden, & Hartley, 2007; Sanchez & Wiley, 2006). Therefore, it is equally important for educators to understand how to promote interest in their students and design lessons that arouse interest in a way that helps, not harms, the learning process.

Review of Literature

Role of Interest in Learning

Interest, described by Schraw and Lehman (2001) as "liking and willful engagement in a cognitive activity (p.23)", is an important factor in determining how mental resources are allocated (Hidi, 1990; Wade, Schraw, Buxton, & Hayes, 1993) and the effort expended on information processing (Schiefele, 1996, 1999; Schraw, 1998). The function of interest in education and learning has long been an area of concern for researchers stemming back to

Dewey's (1913) pioneering text, *Interest and Effort in Education,* in which he proposed that interest was an important element in deep and meaningful learning. Dewey suggested that interest comes from within the learner and that teachers should structure lessons to exploit individual student predilections. Interest is an important element in seizing a learner's attention, defined by Gagné as the first step in his foundational model of instructional design (Gagné, 1965; Gagné, Briggs, & Wager, 1988). Subsequent research has supported assertions about interest's effect on learning. For example, studies lead by Asher (Asher, 1980; Asher & Markell, 1974; Asher, Hymel, & Wigfield, 1978) of elementary-age children indicated students recalled more information when they found it interesting. Furthermore, Asher (1980) found that interest mediated attention and information processing in children when motivation was low.

Schank (1979) posited that interest plays an essential role in how individuals allocate limited cognitive resources. The concept of interest-based parsing was introduced by Schank to describe the selective focus on specific units of information found to be more interesting than others. Schank differentiated interest in text as resulting from either bottom-up or top-down processes. Bottom-up interest is generated by external elements (i.e., content and structure of the text) while top-down interest is based upon internal factors (i.e., prior knowledge and personal goals). Whether bottom-up or top-down, Schank cautioned that interest-based parsing alone may not focus a reader's attention on important textual elements. According to Shank's diverted-attention hypothesis, readers will attend to information that is engaging regardless of its importance.

Schiefele (1991) compared learning performances between participants reading low and high interest texts. Those who read high interest text had better recall and comprehension scores, and the author suggested that greater interest facilitates the allocation of resources for deeper

processing. Relatedly, Izard and Ackerman (2000) proposed that learner interest influences interactions with curricular materials in two ways. They describe interest as an emotional state that regulates active cognitive processing and as a motivational force that increases learner engagement in a lesson or activity. Learners who are interested in a topic pay more attention, use more cognitive resources to process important information, and spend more time on task (Izard & Ackerman, 2000; Kintsch, 1980). Ainley et al. (2002) supported the hypothesis that interest and enjoyment foster better learning. In a study of reader choice, the researchers described significant correlations between interest and choice order, interest and positive affect, positive affect and reading time, and reading time and learning outcomes.

Types of interest. To better understand the function of interest in information processing, theorists offer conceptualizations of interest differentiated by sources and mediational effects of interest. Kintsch (1980) theorized that key distinctions exist between the origins and effects of cognitive and emotional interests. Hidi and Baird (1986) proposed a four-stage model of interest development describing the process through which interest evolves and how forms of interest mediate learning. Based upon this model, total interest is subdivided into personal and situational interests (Hidi & Anderson, 1992; Hidi, Renniger, & Krapp, 1992; Krapp, Hidi, & Renninger, 1992; Lehman & Schraw, 2001).

Cognitive and emotional interest. From studies examining the role of interest in processing written text, Kintsch (1980) proposed a division between cognitive and emotional interests. Emotional interest results from informational stimulus that elicits a strong affective response (e.g., love, conflict, or tragedy), whereas cognitive interest arises when the reader develops a structural or conceptual understanding of the information. While certain academic courses, such as literature, may benefit from inherent subject matter that evokes emotional

interest, other topics, such as science or math, typically lack affective elements and generate less interest. When learners are presented a text without a strong emotional valence, researchers suggest that engagement may be raised by making the text more cognitively interesting through methods such as relating target information to broader themes (Schraw & Dennison, 1994) or structuring the text in a unique or unexpected way (Wade, 1992).

Kintsch (1980) suggested that generating a balanced level of cognitive interest was important to comprehending text. Low levels of interest cause readers to become bored and not devote cognitive resources to processing textual information. In contrast, excessive interest hinders the development of a coherent understanding of the text. While offering a foundational explanation of interest, Kintsch's characterizations of cognitive and emotional interest lack strong empirical support (Schraw & Lehman, 2001). However, Kintsch's models of cognitive and emotional interests served as a conceptual precursor for later interest research.

Personal and situational interest. Theories of personal and situational interest (Hidi & Anderson, 1992; Hidi, Renniger, & Krapp, 1992; Krapp, Hidi, & Renninger, 1992; Lehman & Schraw, 2001) classify interest as either trait-based or state-based (Hidi, 2001). Personal interest is viewed as a stable personality predisposition while situational interest is generated in reaction to the environment (Hidi, 2001). Both forms of interest act as moderators on learning and should be considered equally by educators (Schraw & Lehman, 2001). Hidi and Baird (1986) proposed a four-stage model of interest development describing how situational interest develops into personal interest. Situational interest is triggered by capturing a learner's attention and eliciting an emotional response. Next, situational interest is maintained through emotional arousal and meaningfulness to the learner. Situational interest maintained over time leads to the emergence of individual interest which, finally, evolves into a well-developed and relatively stable

individual interest. While individual interest plays a role in learning, teachers designing a lesson should consider how to trigger and sustain situational interest in learners who are not already attracted in the subject matter.

Personal interest. Personal interest describes attraction and attentiveness toward information that is limited to certain topics, is long-lasting, and appears intrinsically motivated (Hidi et al., 1992; Krapp et al., 1992). An individual's personal interests are derived from experiences, prior knowledge, and emotional responses (Deci, 1992; Renninger, 1992, Schiefele, 1991; Tobias, 1994). Personal interests are relatively consistent and stable across locations and activities (Schraw & Lehman, 2001). For example, a student with a passion for art typically demonstrates a personal interest in this area whether he/she is at school, at home, or visiting a neighboring city.

Schiefele (1992) illustrated the role of personal interest in information processing using a three-step model. First, a learner interacts with a new text. Next, the level of personal interest elicited by the text influences both the reader's motivation to engage and the types of cognitive resources used to process the textual information. The level of engagement and deployed processes regulate how incoming information is integrated into a mental representation by the reader. Studies of adult (Kintsch, 1998; Schiefele, 1999), college (Benton, Corkill, Sharp, Downey, & Khramtsova, 1995; Tobias, 1996), and high school (Benton et. al., 1995) participants support the hypothesis that personal interest mediates how information processing resources are used. Kintsch (1998) found that high personal interest was related to improved propositional recall while low personal interest resulted in higher verbatim memory. These results suggest that high levels of personal interest trigger the allocation of cognitive resources used to construct propositional networks instead of resources used for simple recall. The consequences of personal

interest in information processing were also found by Benton et al. (1995) in a study showing levels of personal interest effect the nature and quality of narrative writing.

Situational interest. In juxtaposition to personal interest, situational interest is less stable, dependent on context, and is transitory (Hidi et al., 1992; Schraw & Lehman, 2001). Situational interest is environmentally activated and can be evoked spontaneously by information that is unusual, vivid, emotional, or indicates a change of goals (Hidi & Andersson, 1992; Krapp et al., 1992; Schraw, 1997). Unlike personal interest, situational interest does not endure over time and dwindles when the context changes. Despite its transient nature, situational interest is important to educators and researchers because it is more susceptible to change than personal interest (Schraw & Lehman, 2001). Personal interest, while playing a valuable role in learning, develops slowly over time and is not a factor that teachers can easily influence during a single lesson. Furthermore, Hidi and Harackiewicz (2000) recommend educators accentuate situational interest because it is difficult to implement practical strategies that engage the diverse personal interests of students. Returning to the example above, a student without a personal interest in art may be inattentive during a museum field trip until a photo containing a lurid and emotionally charged image elicits situational interest. The teacher may then capitalize on the student's situational arousal and direct the student's attention toward target learning materials.

Situational interest is delineated into three subdivisions: knowledge-based, task-based, and text-based (Schraw & Lehman, 2001). Knowledge-based interest describes the moderating influence of prior knowledge. While prior knowledge is most often associated with personal interest (Alexander & Jetton, 1996), studies show that prior knowledge can moderate situational interest as well (Alexander & Murphy, 1998; Garner, Alexander, Gillingham, Kulikowich, & Brown, 1991; Schiefele, 1992; Schraw, Bruning, & Svoboda, 1995; Tobias, 1994, 1996; Wade &

Adams, 1990). Being provided background information before being asked to read expository texts increased situational interest among college students who described lacking prior knowledge as a factor that makes text hard to read and uninteresting (Wade, Buxton, & Kelly, 1999). Similarly, Schraw et al. (1995) and Schraw (1997) discovered a strong positive correlation between informational completeness and situational interest.

Task-based interest is dependent on how encoding instructions are conveyed through learner goals (Schraw & Dennison, 1994) and the presentation of information (Hidi & Baird, 1986; Schraw & Lehman, 2001). Sansone, Wiebe, and Morgan (1999) demonstrated the effect of learner goals in a study using college undergraduates engaged in tasks typically described as "boring." Stating the explicit benefits of the otherwise boring task to the participants fostered a desire to complete the task and resulted in greater levels of reported interest. Similarly, Mitchell (1993) found that providing high school math students with a clear purpose promoted active engagement and increased interest.

Experiments of task-based interest related to the presentation of information provide evidence that altering the structure of delivery can influence engagement and learning (Schraw & Lehman, 2001). In a study using change-of-text manipulations, Hidi and Baird (1986) reported that interest was a contributing factor in the ability of children to recall information from expository and narrative texts. Research by Graves et al. (1988) showed a basic history text edited by professional editors, college composition instructors, and linguists to be more interesting led to improved recall by college students. However, in an experiment demonstrating that structure alone does not account for situational interest, Wade et al. (1999), observed that college students reading either expository or narrative versions of the same text recalled an equivalent amount of information and rated the passages as equally interesting.

The structural properties of the information are also important to the generation of situational interest (Lehman & Schraw, 2001). Because many studies of situational interest have involved written passages, this subtype of interest is also called text-based interest (Hidi, 1990). Text-based interest has been attributed to many factors including imagery (Goetz & Sadoski, 1995), vividness (Garner, 1992), information complexity (van Dijk & Kintsch, 1983), suspense (Jose & Brewer, 1984), and ease of comprehension (Schraw, 1997). Among these factors, three areas have been the focus of significant research: vividness, coherence, and seductiveness (Schraw & Lehman, 2001).

Vividness promotes situational interest through suspense (Schraw & Lehman, 2001), imagery (Goetz & Sadoski, 1995), surprise (Hidi, 1990), and humor (Dienstbier, 1995). Wade et al. (1993, 1999) found that vivid textual elements were rated by college student as more interesting and resulted in greater levels of recall. In support of these findings, Schraw (1997) reported positive correlations between vividness, text interest, and recall. Overall, vividness of information has been shown to improve both situational interest and learning without detriment (Schraw & Lehman, 2001) and is an element that educators can manipulate to promote learning.

Information that is coherent elevates interest due to the ease with which learners can encode, integrate, and retrieve coherent information (Kintsch, 1998). Texts that are organized have been rated as more interesting (Hidi, 1990) in both expository (Schraw et al., 1995) and narrative (Schraw, 1997) formats. In a study of text-based interest using college students, Wade et al. (1999) reported that poor text coherence was related to decreased interest. Like vividness, efforts to improve coherence effect interest and learning in a positive fashion (Schraw & Lehman, 2001), and teachers are encouraged to structure lessons and target information to be well organized and comprehensible.

The third element of situational interest, seductiveness, is described in terms of seductive details, or units of information that are interesting and sometimes tangential, but are irrelevant to achieving learning goals (Garner, Gillingham, & White, 1989; Harp & Maslich, 2005; Mayer, 2005; Schraw & Lehman, 2001). Seductive details interest learners because they are often novel, controversial, or describe emotionally charged topics, such as violence, romance, or betrayal (Kintsch, 1998; Wade, 1992). Some researchers suggest that seductive details can increase overall learning by making students pay greater attention to all materials presented in a lesson and encode a greater amount of information (Izard & Ackerman, 2000; Kintsch, 1980). Examples of how educators may add seductive details to stimulate situational interest include funny or interesting stories about the topic, appealing pictures or graphics, or showing videos during their lessons.

The Seductive Details Effect

Investigations of seductiveness' role in information processing and learning have provided mixed results (Rey 2012; Schraw & Lehman, 2001; Thalheimer, 2004). With the potential of seductive details to both facilitate and hinder learning, teachers wishing to increase the instructional effectiveness of their lessons must consider how the addition or subtraction of seductive information may impact learning (Harp & Meyer, 1997). The seductive details effect occurs when highly interesting, but instructionally irrelevant, information interferes with desired learning objectives (Harp & Mayer, 1997; Mayer, Griffith, Jurkowitz, & Rothman, 2008). The cognitive consequences of the seductive details effect include recall of seductive details at the expense of more important information (Alexander & Kulikowich, 1994; Garner, Brown, Sanders, & Menke, 1992; Wade & Adams, 1990) and decreased problem-solving proficiency on tasks related to lesson goals (Harp & Mayer, 1998). While early studies of the seductive details

effect focused on educational text (e.g., Garner et al., 1989; Wade & Adams, 1990), subsequent investigations have examined seductive elements included in other forms of instruction, such as recorded lectures (Harp & Maslich, 2005), illustrations (e.g., Harp & Mayer, 1998), sounds and music (Moreno & Mayer, 2000), and video clips (e.g., Mayer, Heiser, & Lonn, 2001; Rowland-Bryant, Skinner, Dixon, Skinner, & Saudargas, 2011). Despite a call to limit the term "seductive details" to interesting, but irrelevant, elements in text (Thalheimer, 2004), current literature applies this term to all modalities (Mayer, 2005; Rey, 2012).

Review of seductive details research. Despite numerous researchers considering the adverse effects of seductive details, empirical evidence for the seductive details effect and how seductive details moderate learning has been inconsistent (Rey, 2012; Schraw & Lehman, 2001; Thalheimer, 2004). A comparison of 24 studies of the seductive details effect (Thalheimer, 2004) showed 16 with adverse learning outcomes, seven finding neither positive or negative effects, and one demonstrating improved learning related to addition of seductive details. Overall, this meta-analysis determined that scores on measures of recall were 19.4% lower in the presence of seductive information.

In a later meta-analysis of seductive detail research, Rey (2012) found that eleven of the 39 studies included in his analysis supported the seductive details effect, thirteen reported mixed results, and 15 did not corroborate the hypothesis. Furthermore, six of these studies contradicted the seductive details effect with descriptions of improved learning outcomes. The author also found no correlation between the type of seductive details included in experimental materials and incidences of the seductive details effect. In a meta-analysis of seductive details effect size, Rey calculated a highly significant small to medium effect size for retention [i.e., $d = 0.30$ (99% confidence interval 0.20-0.39)] and a highly significant medium effect size for transfer [i.e., $d =$

0.48 (99% confidence interval 0.34-0.61)]. These results support the seductive details effect but do not explain the discrepancies found in research. Based upon tests of homogeneity indicating one or more moderators, the author suggested that moderating factors may be responsible for these inconsistent results. A review of preceding studies describing the methods, materials, and outcomes reported by researchers further illustrates the ambiguity of seductive details effect.

Seductive details in text. An early example of inconsistencies found in seductive details research is found in studies by Hidi and Baird (1988) and Garner and associates (Garner et al., 1989; Garner, Alexander, Gillingham, & Brown, 1991). Both groups of researchers conducted comparable experiments investigating the effect of seductive details on how readers process target information in expository text. Hidi and Baird (1988) asked fourth- and sixth-grade students to read expository passages about inventors and inventions including only target information or including additional irrelevant details after the target information in the text. No seductive details effects were found on measures of free recall taken immediately after reading the passage and one week later. Based on these findings, the authors posited that the addition of interesting, but unnecessary, information neither aided nor hurt learning.

Conversely, in Garner et al.'s (1989) research of college and seventh-grade students reading versions of a scientific text with or without seductive details, readers from both groups receiving passages with seductive details recalled fewer main ideas than those who read text without seductive details. The authors of this study concluded that seductive details interfered with participant ability to recall important information. However, a subsequent experiment (Garner & Gillingham, 1991) involving college students reading no-seductive detail or seductive detail versions of biographical passages found no differences between the groups ability to recall target information or correctly answer short-answer questions. These contradictory findings

raised additional questions about possible mediators and moderators of the seductive details effect including participant factors, subject of text, length of text, and placement of seductive details within the text (Lehman et al., 2007).

Wade and Adams (1990) used participant ratings to determine which textual elements contained main ideas, factual details, seductive details, or boring trivia. On tests of recall involving another group of participants, seductive details were recalled more accurately than other elements. Main ideas from the passages were remembered better than facts or boring trivia, and the researchers proposed that both interest and importance are factors in memory of text. These results also led researchers to question whether different cognitive processes are employed when reading dissimilar types of information. In an investigation of this hypothesis (Wade et al., 1993) college students were asked to read the same text used in the previous study (Wade & Adams, 1990) while their reading times were recorded via computer. The participants took significantly longer to read seductive detail segments than main idea segments. Once again, seductive details were recalled more accurately than other types of information. Wade et al. postulated that seductive details inhibited the processing of other textual elements because readers unintentionally spent too much time reading them. A follow-up study by Schraw (1998) using the same passages (Wade & Adams, 1990; Wade et al., 1993) and computer measured reading times supported the conclusion that learners spend more time reading seductive details and use different cognitive strategies to process text based upon levels of interest and importance. However, Schraw's experiments did not show the seductive details effect on main idea recall.

A study of the placement and contextual relevance of seductive details in an expository text was conducted by Rowland et al. (2008) using undergraduate psychology students. The

participants read a short, biographical passage about Sigmund Freud and were assigned to one of five conditions: context-dependent details before target information, context-independent details before target information, context-dependent details after target information, context-independent details after target information, or control (i.e., only target information). The researchers determined that contextual relevance of interesting details did not influence learning outcomes and reported mixed results regarding placement of seductive details. Seductive details placed before target passages led to lower performance on a follow-up quiz while no significant differences were found between groups receiving either no seductive details or seductive details following the main ideas. Learning differences resulting from the placement of seductive information support previous findings (Wiley, 2003; Wright, Milroy, & Lickorish, 1999) that the location of seductive information within the text structure mediates the processing and integration of target information.

Learning outcomes associated with the location of seductive details were also reported in a study (Wang & Adesope, 2014) of Chinese middle schoolers reading expository and narrative texts written in Chinese characters. The authors, concerned that seductive details may function differently when learning different types of information, intentionally selected a social science subject (i.e., economics in a US state) as the topic of base passages, noting that previous seductive detail research used predominantly scientific subjects. Seductive details were placed either before or after the base passage, and participants were assigned to one of three conditions. Students reading text containing no seductive details scored higher on a main idea recall task than those in both the seductive details before or seductive details after groups. While no significant differences were found on recall performance between the seductive details groups, students reading seductive details before the base passage recalled significantly more seductive

details than those in the seductive details after condition. These results led the authors to conclude that the seductive details in text hinder learning regardless of their placement in relation to main ideas. Additionally, the data supported their hypothesis that the seductive details effect is not limited to specific subject areas (e.g., natural sciences) and may hinder students across topics.

Using a passage written in Chinese characters about the formation of the earth, Wang and Adesope (2016) continued to investigate the seductive details effect within the framework of the four-phase model of interest (Hidi & Renninger, 2006). Ninth-grade participants from two Chinese high schools were assigned to either base passage only or passage with seductive details conditions. Consistent with other outcomes (Garner et al., 1989; Wade & Adams, 1990; Wade et al., 1993), reading passages with seductive details resulted in poorer performance on tests of recall. On a measure of transfer, no significant differences were found between groups. In an analysis of participant interest, students in the seductive details group reported high levels of triggered situational interest, and the researchers reported that triggered situation moderated the seductive details effect.

Seductive illustrations. The addition of illustrations to text creates a multimedia learning environment that is fundamentally different than reading text alone because learners must use both language and images to develop cognitive representations of knowledge (Mayer, 2005). Harp and Mayer (1997, 1998) expanded research on the seductive details effect to include what they deemed "seductive illustrations." Seductive illustrations are pictures or graphics accompanying a text that, as seductive details, are highly interesting, but tangential or irrelevant to the important ideas of the passage. In a pair of experiments, the researchers found that participants reading passages with seductive illustrations, seductive text, or both recalled fewer important ideas and performed related problem-solving tasks less adeptly than those reading

passages without seductive details. Harp and Mayer also asked participants to rate the cognitive and emotional interestingness of the material in accordance with Kintsch's (1980) interest classifications. Seductive illustrations and text were designated as more emotionally interesting while text without these elements were rated as cognitively interesting. The researchers proposed that emotionally interesting details were harmful to learning, whereas cognitively interesting details promoted learning.

Later studies by Park, Kim, Lee, Son, and Lee (2005) and Sanchez and Wiley (2006) added to research of seductive illustrations (Harp & Mayer, 1997,1998) by including seductive illustrations in lessons presented to participants using other forms of multimedia technology. Graduate student participants taking part in Park et al.'s (2005) experiment were assigned to treatment groups viewing lessons on hurricanes with text only, text with cognitive-interest illustrations, or text with emotional-interest illustrations on Personal Digital Assistants (PDAs). At the time of the study, PDAs were as described as electronic data management devices such as Palm Pilots, Palmtop computers, and Pocket PCs. Replicating Harp and Mayer's (1998) findings, this study also yield mixed results. Participants receiving the lesson with additional cognitively interesting illustrations outperformed those viewing text with emotionally interesting illustrations or text without illustrations on the PDAs. However, a subsequent study by Park and Lim (2007) using the previous lesson on hurricanes with the same experimental conditions did not find evidence of better learning associated with emotionally interesting illustrations. Instead, the authors describe no differences on tests of free recall and comprehension between the groups and no evidence of the seductive details effect.

Sanchez and Wiley (2006) asked undergraduate participants to read an expository lesson about the ice age delivered in Web page format. The participants were assessed for working

memory capacity, and, in alignment with previous studies, the participants were assigned to non-illustrated, illustrated with conceptual images, or illustrated with seductive images formats. No seductive details effect was observed on an argumentative essay task or a computerized inference verification task for participants with high working memory. For participants with low working memory capacities, the only evidence of the seductive details effect was lower mean scores on the inference verification task. These findings led the authors to propose that working memory is a personal factor that may determine which students will be hindered when exposed to seductive details.

The immediate and delayed effect of seductive illustrations on learning was examined by Magner et al. (2014) using a self-directed, computer based tutoring program to deliver a geometry lesson to eighth-grade students. Seductive illustrations decreased immediate performance on near transfer (i.e., presented in content or context of lesson) tasks for learners with low prior knowledge while students with greater prior knowledge benefited from their addition. No significant differences were found between groups on far transfer (tasks presented in new content or context) items nor on a posttest conducted two weeks after the lesson. The authors concluded that prior knowledge may be an important moderator of the seductive details effect and that seductive illustrations may not influence long-term learning.

Auditory seductive details. With an interest in whether hearing interesting, but unnecessary, stimuli hinders learning in the same way as seductive details in text, Moreno and Mayer (2000) conducted two experiments appraising whether exposing learners to background music and/or simulated environmental sounds (e.g., wind blowing or static) resulted in the seductive details effect. The college student participants viewed a narrated animation about the formation of lightening or hydraulic brakes with either no sound, environmental sounds

associated with the animation, or environmental sounds plus background music. Analysis of participant learning showed mixed results with participants hearing background music performing worse on measures of retention and transfer than those working in silence or with environmental sounds alone. No differences were reported between groups on matching tests. Later research by the same authors (Moreno & Mayer, 2002) featured the addition of seductive details in the form of environmental sounds unrelated to the animation. The pair found that the addition of these noises to a multimedia lesson produced no differences between participant outcomes on retention, transfer, or matching tasks.

Studies assessing the seductive details effect in voice recordings (Harp & Maslich, 2005; Mayer, Heiser, & Lonn, 2001; Towler, 2009) also yielded deviating results. Mayer et al. (2001) obtained evidence for the seductive details effect in an experiment using the same narrated animation about lightening formation employed in the previous experiments (Moreno & Mayer, 2000, 2002). When six additional narrated segments were added to the presentation, participants recalled fewer main ideas and generated fewer solutions on a transfer test than those not received additional segments. Those viewing seductive details lessons containing on-screen text and narration scored lower than those viewing lessons without the text. In a corroborating study using an audio-only lecture on lightening formation, Harp and Maslich's (2005) undergraduate participants who listened to a lecture with seductive details also scored significantly lower on tests of recall and transfer. However, Towler's (2009) findings for students listening to taped lectures about sexual harassment case law indicated no significant differences on measures of recall between groups listening to lectures with or without seductive details. Furthermore, participants in the seductive details group scored higher on a problem-solving test than those in the no seductive details condition.

Muller, Lee, and Sharma (2008) and Towler et al. (2008) also discerned no evidence of the seductive details effect using learner controlled, computer-based, multimedia lessons containing lectures or interviews. Muller et al. divided participating high school and first year university students into groups viewing either a concise online multimedia presentation on astronomy without extraneous details or an online presentation including interesting, but tangential, interview segments. Scores on a recall and transfer posttest reflected no significant differences between the groups. In two experiments requiring participants to view narrated training programs about Microsoft Excel or Microsoft Mail Merge, undergraduate student participants exposed to lessons containing narrated seductive details performed equally with participants in the no seductive details condition and scored higher on a test measuring transfer performance (Towler et al., 2008).

Multimodal seductive details. Multimedia technology allows for seductive details to be added to a single lesson using several modalities. The effect of deploying seductive details in a commonly used multimedia format, PowerPoint, was examined by Bartsch and Cobern (2003). Seductive details in the form of pictures, sound effects when text appeared, and the appearance of text were included in PowerPoint presentations used over the course of 11 lessons with college students. Lower quiz grades were associated with presentations including seductive details. In a second experiment, Bartsch and Cobern (2003) documented the learning outcomes of participants viewing PowerPoint slides containing facts accompanied by related or unrelated pictures. Outcomes from this study also supported the seductive details effect with lower rates of recall and recognition of facts accompanied by irrelevant images. The authors concluded that PowerPoint presentations should not contain details immaterial to learning goals. Nevertheless, this supposition is challenged by data collected by Rey (2011) from college students viewing

PowerPoint presentations on star formation with or without seductive images. No differences were found between group performances on retention and transfer tests in this study.

A study by Grice and Hughes (2009) also examined learning outcomes resulting from that addition of both seductive images and sounds to a lesson on learning styles and study methods in an online learning environment. Seductive images were included in the form of animations that altered on screen elements (e.g., changing word colors), and seductive sounds were introduced as musical elements intended to induce positive emotions. No significant differences were found on tests of knowledge or understanding between seductive details and no-seductive details conditions. Additionally, the authors reported that participants who took part in lessons containing seductive animations demonstrated improved posttest scores.

Doolittle and Altstaeder (2009) continued the investigation of the moderating effect of working memory capacity on the seductive details effect (Sanchez & Wiley, 2006) as well as extended research on seductive details in narrated animations (Moreno & Mayer, 2000, 2002; Moreno et al., 2001). The working memory capacity of undergraduate participants was measured, and students were assigned to watch a narrated animation on lightening formation with no additional details or with extraneous environmental sounds (e.g., thunder) and images (e.g., lightning flashes). Across conditions, students with high working memory capacities scored higher on recall and transfer tests than students with low working memory. However, in contrast to previous findings (Sanchez & Wiley, 2006), no seductive details effect was detected, even in the low working memory group.

A comparison of text and narrated seductive details in a self-paced multimedia learning environment also provided results contradicting the seductive detail effects (Park, Moreno, Seufert, & Brünken, 2011). High school student participants were assigned a lesson on cellular

biology in one of four conditions: text with seductive details, text with no seductive details, narration with seductive details, and narration with no seductive details. The text and narration provided identical information, and seductive animations were included in both seductive details conditions. In addition to finding no main effect for seductive details across learning measures, the researchers also found increased learning performance in the narration with seductive details group. The authors concluded that modality, as well as individual differences, may moderate the effect of seductive details on learning.

Using the same structure described in this prior study (Park et al., 2011), Park, Flowerday, and Brünken (2015) continued to examine the interplay of individual differences and modality on the seductive details effect. As before, the researchers assigned university undergraduate student participants to text-only, narration-only, or text-and-narration lessons with or without seductive details. Along with learning outcomes, the authors measured prior knowledge, spatial ability, time-on-task, and situational interest. Mixed results were found on tests measuring retention and problem solving with participants viewing narration-only lessons with and without seductive details achieving the highest scores and the text-and-narration with seductive details participants earning the lowest. The authors also reported that the narration-only with seductive details condition elicited the highest levels of reported situational interest while no differences were found between prior knowledge, spatial ability, and time-on task.

A concurrent study by Park, Korbach, and Brünken (2015) using eye-tracking software likewise delivered mixed support for the seductive details effect and provided data showing a moderating influence by spatial ability and prior knowledge. Seductive details were added to the self-paced multimedia lesson in the form of seductive text accompanied by seductive illustrations. Participants were measured for working memory capacity, prior knowledge,

cognitive load, and post-lesson learning performance. The participants eye-movements were also tracked to determine gaze-fixation and time fixated. No seductive details effect was reported for tests of recall, but participants in the seductive details group had significantly lower comprehension scores. Furthermore, participants with lower spatial ability and prior knowledge scores were hindered more by the presence of seductive details than others.

Seductive details in video. Video, a multimedia format regularly used for formal and informal learning, can rapidly expose viewers to an abundance of visual and auditory stimuli beyond what is typically presented in either text or audio. As a learning tool, videos also afford educators the opportunity to stimulate learner interest by simultaneously presenting seductive details in multiple modalities. Mayer et al. (2001) examined seductive details in video in two experiments using lessons with narrated animations and six additional short (i.e., 10 s) narrated video clips. The video clips contained interesting information that was topically, but not conceptually, relevant to the main ideas. No significant differences between groups in recall of important ideas were reported, but participants viewing video clips had reduced scores on a measure of transfer ability. These mixed findings were consistent regardless of whether the videos were presented before, after, or interspersed throughout the presentation. The authors suggested that the seductive information in the video clips interfered with the development of accurate schema.

In a study of using a longer video clip, Shen and partners (2006) showed five- or six-minute video lectures on net game (e.g., tennis) strategies to sixth-, seventh-, and eighth-grade physical education students. In the seductive details video, the teacher included a story of a sneaky fox and uses a fox tail prop to arouse learner interest. Participants watching the lesson including seductive details scored lower on assessments of retention and problem solving-

transfer than those watching the basic video. The authors also reported that students in the sixth grade scored lower than eighth-grade students and concluded that younger learners may be more susceptible to the seductive details effect due to developmental limitations.

Video clips containing seductive details were used within a PowerPoint lesson in a study by Rowland-Bryant et al. (2011). The video clips were selected from popular media and intended to be relevant to the target lesson on personality traits. Despite their general relevance, the video clips all contained visual and auditory seductive details. In a replication of previous research (Mayer et al., 2001), the researchers also investigated the placement of the video clips before or after target information. Undergraduate participants were assigned to video clips before target material, video clips after target material, no video clip, or post-test only conditions. Students in both video clip conditions scored higher on measures of recall and application. Furthermore, in contrast to studies suggesting placement of seductive details before target information hinders learning (Garner et al., 1989; Harp & Mayer, 1998; Rowland, et al., 2008), no significant differences were found due to video clip placement.

Yoo and Catrambone (2016) used three variations of a video lesson on human digestion to compare learning outcomes and interestingness. The base video used screen capture animations and narrations to deliver target information. For the seductive details condition, the researchers added content in the form of anecdotes and facts unrelated to the video's main idea. The studies third condition inserted emotionally interesting, but relevant, details to the basic video. Participants in all three conditions were measured for recall, transfer, local, and general learning as well as differences between pre- and posttest scores. The authors reported no significant differences across conditions in all five measures and questioned whether the details added to the video were sufficiently interesting to moderate learning.

Seductive details effect theories. Researchers have offered several theories to explain the seductive details effect in relation to interest and learning (e.g., Harp & Mayer, 1998; Lehman et al., 2007; Mayer, 2005; Park, Flowerday, & Brünken, 2015). While meaningful differences can be found between theories, researchers conclude that seductive details interfere in how a learner deploys cognitive resources and processes important information. Explanations proposed for this interference range from distracted attention and interference with schema development to overloaded cognitive resources.

Distraction, disruption, and diversion hypotheses. Harp and Mayer (1998) proposed the distraction, disruption, and diversion hypotheses to explain the detrimental effect seductive details have on learning from text. Each hypothesis suggests the seductive details effect harms learning by altering how learners interact with main ideas in text. However, each hypothesis describes this alteration occurring in a difference stage of information processing. Despite Harp and Mayer's (1998) conclusion supporting the diversion hypothesis, conflicting results have been reported by other researchers from experiments using text and other modalities (see Lehman et al., 2007; Rey, 2012; Thalheimer, 2004). Lehman et al. (2007), extending on Harp and Mayer's (1998) proposals, used both learning outcomes and reading times as criteria to develop modified versions of these explanations: a) the reduced attention hypothesis, b) the coherence break hypothesis, and c) the inappropriate schema hypothesis.

Distraction and reduced attention hypotheses. Like Schank's (1980) diverted attention hypothesis, Harp and Mayer's (1998) distraction hypothesis for the seductive details effect proposes that seductive details capture and divert a learner's attention away from important ideas. Per this theory, seductive details are highly interesting, easily attended, and readily comprehended. Distracted individuals are thought to spend more time attending to seductive

details and less time focusing on relevant material (Lehman et al., 2007). The distraction hypothesis predicts poor learning outcomes occur because information processing is turned on to seductive details and turned off from target information (Garner, 1992; Garner et al., 1992; Anderson, Mason, & Shirley, 1984).

Harp and Mayer (1998) found no supporting evidence for the distraction hypothesis in two experiments providing key information in a bold, italicized font and providing objectives emphasizing learning goals. These techniques, designed to guide learner attention, did not moderate the seductive details effect on measures of recall or transfer, suggesting that misplaced attention was not impairing learning. However, in a similar study supporting the distraction hypothesis (Peshkam, Mensink, Putman, & Rapp, 2011), pre-reading instructions to focus attention on specific, relevant topics or ignore specific, irrelevant topics resulted in no significant differences on recall measures between seductive detail and no seductive detail groups. Only a group given less specific pre-reading instructions demonstrated reduced recall scores. The authors concluded that directing the readers' attention diminished the distracting influence of seductive details.

Studies measuring time spent processing seductive details compared to target information (Lehman et al., 2007) and tracking participant eye movement (Park et al., 2015; Sanchez & Wiley, 2006) also provide support for the distraction hypothesis. Lehman et al. (2007), investigating their variant premise, the reduced attention hypothesis, determined that time spent attending target information was reduced when seductive details were included in a passage, and participants reading seductive text passages scored lower on tests of retention. Sanchez and Wiley (2006) indicated that participants with lower working memory capacities had less attentional control and more difficulty ignoring seductive illustrations. Eye-tracking data showed

participants with low attentional control spent significantly more time attending seductive illustrations than those with better control. Park et al. (2015) reported longer gaze fixations on seductive illustrations than relevant illustrations. The researchers also described participants in the seductive details group engaging in fewer total fixations on relevant illustrations, delayed fixation on relevant illustrations, and fewer transitions between relevant text and relevant illustrations.

The authors of a study of the effect of seductive details in a social science text (Wang & Adesope, 2014) also make an argument in support of the distraction hypothesis. While the seductive details effect was observed when seductive details were placed before or after the main passage, the authors ruled out the disruption hypothesis due to a lack of causal links subject to disruption within the passage. Additionally, the pair cited a lack of disruptive seductive details interspersed within the passage itself as further evidence against the hypothesis. Instead, in agreement with the distraction hypothesis, the researchers concluded that the addition of interesting, but irrelevant details distracted the readers' attention away from the main text.

Disruption and coherence break hypotheses. The disruption hypothesis (Harp & Mayer, 1998) suggests that negative learning outcomes occur because seductive information impedes the transition from one relevant detail to the next (Mayer et al., 2008). This disruptive injection of seductive details disorders the formation of a coherent mental model and results in poor comprehension. Lehman et al.'s (2007) related coherence break hypothesis supports that adding interesting, but tangential, information impairs learning due reduced text coherence. The authors also contend that learning is hampered because individuals are required to spend additional time attempting to integrate seductive details into a causal sequence with the main ideas of the passage.

In their initial study of the coherence hypothesis, Harp and Mayer (1998) failed to find evidence to support this explanation. The researchers attempted to reduce the seductive detail effect by providing guided support (e.g., signaling and preview sentences) for organizing target ideas to participants reading an illustrated passage. However, other investigators questioned whether these strategies were effective in improving text coherence (Rey, 2012). In a set of three experiments scrutinizing the coherence hypothesis, Mayer and Jackson (2005) found that learners given concise, illustrated passages or narrated animations performed better on problem-solving tasks than those receiving passages or narrated animations interspersed with added relevant elements. These studies demonstrated the effect of informational coherence on learning even in the absence of seductive details.

Lehman et al. (2007) established two criteria to test their coherence break hypothesis. First, seductive details must decrease deep understanding of main ideas, and, second, reading times must increase when learners transition between seductive detail and main idea sentences. The researchers posited that reading rates would slow because readers need extra processing time to connect unrelated information (Keenan, Baillet, & Brown, 1984). Evidence for the coherence break hypothesis was discovered when participants reading seductive details passages earned lower scores on measures of recall and understanding and, in keeping with the second criteria, spent significantly more time reading main idea sentences that followed seductive details. However, a study replicating and extending this research using the same text (McCrudden & Corkill, 2010) failed to support the coherence break explanation. While these authors also found increased reading times for base sentences following seductive details, no significant differences in retention scores were found between groups.

A pair of multimedia studies by Park, Flowerday, and Brünken (2015) and Park, Korbach, and Brünken (2015) also corroborate the disruption hypothesis. In an experiment comparing the delivery of information through auditory and visual modalities (Park, Flowerday, & Brünken, 2015), participants hearing narrated seductive details while looking at relevant text and images in a computer based lesson exhibited the lowest learning outcomes. The authors described seductive details as disrupting the processing of visual information due to the recency effect of auditory information. Auditory seductive details that were integrated into relevant narration did not disrupt learning. Eye-tracking data obtained by Park, Korbach, and Brünken (2015) indicated that seductive details disrupted how learners transitioned between informational stimuli and how much time was spent processing relevant information.

The effect of additional situational differences is seen in studies by Mayer et al. (2008) and Towler et al. (2008) that produced data inconsistent with the disruption hypothesis. In two experiments comparing low-interest and high-interest seductive details in illustrated booklets, narrated animations, or PowerPoint presentations (Mayer et al., 2008), recall performance was similar across groups and transfer performance was only lower in a group exposed to high-interest seductive details. The authors concluded that these results were inconsistent with the disruption hypothesis because irrelevant information should reduce coherence regardless of interestingness. Towler et al. (2008) postulated that disruptive seductive details would impair recall but improve transfer and problem solving because superficial information would not be integrated into a mental model. The researchers reported no differences in recall between groups and higher transfer outcomes for participants in the seductive details condition. Towler (2009) suggested these findings indicate that high-knowledge learners benefit from disruptive text because they must use compensatory processing to find unstated relationships in the passage. In

total, mixed evidence for the disruption hypothesis suggests that incoherence caused by seductive information may be due to other mediating and moderating factors.

Diversion and inappropriate schema hypothesis. The third hypothesis for the seductive details effect proposed by Harp and Mayer (1998), the diversion hypothesis, asserts that the inclusion of interesting, but unrelated, details leads to the priming of inapplicable schemas based upon seductive details rather than target ideas. Organizing incoming instructional information around an irrelevant schema leads to weak and distorted learning. Researchers (Harp & Mayer, 1998; Mayer et al., 2001; Rowland et al., 2008) claim that the order in which unnecessary elements are incorporated in a lesson affects the intensity of the seductive details effect. Seductive details introduced early in a lesson are more detrimental because they divert the learner to incorrect schema. Equally, seductive details presented later should cause less harm to learning outcomes because an appropriate schema will be in place.

In a study designed to evaluate the effect of seductive detail placement, Harp and Mayer (1998) assigned participants to reading passages with no seductive details or with seductive text and illustrations at the beginning, end, or interspersed throughout. When seductive details were placed at the end of the passage, no significant differences were found on recall or transfer scores compared to the no seductive details group. Participants receiving seductive details prior to and interspersed within the passage performed significantly lower, but no significant differences were found between these conditions. While these findings supported the diversion hypothesis, they did not rule out distraction or disruption.

Research on the placement of seductive details by Mayer et al. (2001) and Rowland et al. (2008) also supported the diversion hypothesis. Individuals viewing video clips after an animated lesson performed better on transfer measures than those who viewed the video before the

animation (Mayer et al., 2001). Although these results provide evidence for the diversion explanation for impaired transfer learning, no differences were found on retention tasks. Nevertheless, Rowland et al. (2008) did find further evidence for the priming of inappropriate schema interfering with retention when seductive details were placed before rather than after the main passage. The findings may, however, be limited to textual details and not clarify learning results obtained with seductive video.

Studies by other researchers challenge the diversion hypothesis. Garner et al. (1991) found no significant impact on participant recall ability after reading an expository passage with seductive details added before the main text. In an experiment placing seductive illustrations before or within a writing about earthquakes (Wiley, 2003), the seductive details effect was only observed on learning outcomes for those who read the text with interspersed seductive images. Individuals who viewed seductive pictures before reading were not impaired.

Lehman et al. (2007) evaluated their related inappropriate schema hypothesis by asking participants to read a base text with or without interspersed and integrated seductive detail sentences. The inappropriate schema hypothesis is like Harp & Mayer's (1998) diversion theory in that seductive details are thought to hamper learning by organizing new information around an irrelevant schema. The researchers posited that the inappropriate schema explanation would be valid if learners recall seductive text details more than main ideas and if learning from the text is diminished. The results from their experiment only demonstrated reduced understanding for participants exposed to seductive details. No differences were found between groups pertaining to the recall of seductive details and main ideas. While these results indicated that seductive details inhibit learning, unambiguous evidence for the inappropriate schema hypothesis was not found.

A study of the placement of seductive video clips within a PowerPoint lesson (Rowland-Bryant et al., 2011) also contradicted the diversion hypothesis. Participants viewed lessons with video clips presented before and after target information. The authors observed no significant differences on recall or applied question scores between groups viewing seductive videos before or after the main content. In addition to reporting results incompatible with the diversion hypothesis, the researchers found no evidence of the seductive details effect for participants receiving lessons with video clips. Instead, both seductive details groups performed better on learning measures than two groups not viewing the clips.

Cognitive load theories. Researchers have also explained the seductive details effect as a function of the limited cognitive resources and capacity of working memory. According to Cognitive Load Theory (CLT; Garner et al., 1992; Plass, Moreno, & Brünken, 2010; Sweller, Ayers, & Kalyuga, 2011), and the related Cognitive Theory of Multimedia Learning (CTML; Mayer, 2005) and Cognitive-Affective Theory of Learning with Media (CATLM; Moreno, 2005, 2006; Park, Plass, & Brünken, 2014), individuals have finite cognitive resources to use in attending and processing information in each moment. Every task using working memory employs a certain quantity of these resources and imposes cognitive load on the system. Cognitive processing capacities vary between individuals, and other individual differences (e.g., novices versus experts) influence the amount of cognitive load experienced by those engaged in the same task (Murphy & Wright, 1984; Voorhies & Scandura, 1977). Elevated levels of cognitive load can interfere with functioning and lead to increased errors (Chandler & Sweller, 1992; Moreno & Mayer, 1999; Kalyuga, Ayers, Chandler, & Sweller, 2003). For example, when a student attempts a task requiring cognitive resources beyond his/her means, performance and learning may both be reduced (Sweller & Chandler, 1991). Multiple factors, including task

complexity, format, and relevance, all contribute to the total load imposed by an activity on working memory (Park, Korbach, & Brünken, 2015). CLT categorizes these factors as different forms of cognitive load per the function of incoming information.

Intrinsic cognitive load. Intrinsic cognitive load results from the inherent complexity of the information learned or used in a task (Sweller, 1994; Sweller et al., 2011). This load occurs when individuals use working memory to think about the information being presented. The amount of intrinsic load generated by a task is influenced primarily by element interactivity, or the number of related informational elements processed simultaneously by the working memory. Processing many elements and/or highly interactive elements results in increased levels of intrinsic cognitive load (Park, Flowerday, & Brünken, 2014).

In education, the intrinsic load of a lesson can be estimated by evaluating the number of informational elements and the complexity of the relationships presented to the learner (Park, Korbach, & Brünken, 2015; Pass, Renkl, & Sweller, 2003). For example, a college-level history lesson on the causes of World War I that produces high intrinsic load may require students to learn and understand how the effects of multiple past wars, convoluted alliances, ethnic and nationalistic tensions, and technology interacted to trigger the conflict. Conversely, a low intrinsic cognitive load lesson with few elements and minimal interactivity may only ask students to learn how to separately identify the leaders and countries involved in the war. Each element can be learned in isolation and does not interact with another.

Element interactivity is moderated by the development of schemas (Sweller et al., 2011). Novel informational units that are not yet incorporated into a schema are processed in the working memory as singular elements. When learning a new subject, the act of managing multiple units of new information simultaneously results in elevated interactivity and intrinsic

load. However, as the learner develops expertise and the information is incorporated into a schema, the schema then functions as a single element in the working memory (Pass et al., 2003). Using schemas in working memory reduces the intrinsic cognitive load compared the load generated from processing unrelated, individual elements (Pass et al., 2003; Sweller, 1994). Returning to the example above, teaching lessons with fewer units and low elemental interactivity prior to introducing more intricate, high interactivity material affords the learner the opportunity to develop appropriate schemas and reduces intrinsic load.

Germane cognitive load. Related to intrinsic load and schema acquisition, theorists describe the use of cognitive resources to engage in cognitive behaviors promoting schema development as germane cognitive load (Plass, Moreno, & Brünken, 2010; Sweller et al., 2011). Germane cognitive load does not stem from the target information or the structure of the task, but, rather, it is generated from the use of mental resources to assimilate or accommodate new information into schemas and automate the schemas in long-term memory (Sweller, 1998; Debue & Leemput, 2014). Higher levels of learner engagement and schema acquisition result in greater germane load (Park, Korbach, & Brünken, 2015). While germane load places additional demands on cognitive resources, these functions are expected and essential to learning.

Extraneous cognitive load. Cognitive load is also generated by processing informational units irrelevant to the task at hand. Individuals must attend to and process additional details that are extrinsic to the target information when engaged in most lessons or activities (Sweller et al., 2011). The demands placed upon the working memory when cognitive assets are devoted to information irrelevant to the development of schemas or completing the desired task is termed extraneous cognitive load. Extraneous demands are typically generated by instructional design and the format in which information is presented (Park, Korbach, & Brünken, 2015). For

example, a student may experience extraneous cognitive load when attempting a computer-based learning game with complicated controls. Working memory resources are expended to understand and control the program rather than being devoted to relevant schema development. When intrinsic cognitive load is low, extraneous cognitive load from instructional elements may not impair learning (Paas et al., 2003); however, when a student is experiencing high intrinsic load, instructional conditions generating extraneous load can interfere with efficient learning (Sweller, 1993, 1994).

A key assumption of Cognitive Load Theory (CLT), Cognitive Theory of Multimedia Learning (CTML), and Cognitive-Affective Theory of Learning with Media (CATLM), is the additivity hypothesis, or the idea that overall cognitive load experienced during learning is an aggregate of all three load variations (Moreno & Park, 2010; Park, 2010; Sweller, 1993). The triarchic model of CLT proposed by Moreno and Park (2010) compares an individual's total working memory capacity to total cognitive load. If the total load exceeds working memory capacity, learning and problem solving will be impaired (Chandler & Sweller, 1992; Park, Flowerday, & Brünken, 2015; Moreno & Park, 2010; Moreno & Mayer, 1999; Kalyuga et al., 2003). To support learning, educators must take care that a student's cognitive capacities are not overloaded (Moreno & Park, 2010; Sweller, 1993).

While intrinsic cognitive load can be manipulated in select circumstances (see Lee, Plass, & Homer, 2006), in most learning conditions, intrinsic load is a fixed property of instructional materials (Sweller, 1994). Intrinsic load is inherent to all learning and may only be reduced by developing and automating relevant schemas (Pass et al., 2006). Germane load, being essential for forming and automating schemas (Sweller, 1998; Debue & Leemput, 2014), is desired and often intentionally increased through instructional design (Homer, Plass, & Blake,

2008; Moreno & Park, 2010; Park, Korbach, & Brünken, 2015). Therefore, teachers wishing to maximize the delegation of student cognitive resources to information processing and schema development should design lessons which eliminate factors contributing to extraneous load (Chandler & Sweller, 1991; Moreno & Park, 2010; Pass et al., 2006). Two well-known instructional design features which create extraneous load are modality and seductive details (Magner et al., 2014; Park et al., 2011; Park, Flowerday, & Brünken, 2015).

Modality describes the sensory pathways through which individuals perceive and process incoming stimuli (Moreno, 2006). Based upon evidence that working memory manages information using two independent channels (Baddeley, 1992; Baddeley & Logie, 1999; Mayer & Moreno, 1998; Moreno & Mayer, 1999; Paivio, 1986), Mayer & Moreno (1998) proposed the dual-processing model of working memory that describes the processing of visual information by the visuospatial sketchpad and auditory information by the phonological loop. Like other cognitive functions, both modality processing systems have limited capacities and can be overloaded if too much information is introduced (Baddeley, 1986; Sweller, 2003). Mayer (2001) expanded upon this model to develop CTML, which suggests information processing of multimedia stimuli occurs on three levels. First, visual and auditory information are selected. Next, the information is organized into coherent visual and auditory models, and, third, these models are integrated into each other and pre-existing schemas.

Instruction delivered using a single modality can impose extraneous cognitive load on a student (Paas et al., 2003). This idea is illustrated in the harm caused by lesson designs requiring student to both read text and consider visual images (e.g., animations, photos, graphs). The efforts exerted by students to split their attentional resources and process the material using limited visual working memory (Baddeley, 1992; Sweller, 1993) yield detrimental levels of

extraneous cognitive load (Sweller, 2005; Sweller, van Merriënboer, & Paas, 1998). Yet, when text is replaced with narration, learning outcomes often improve (Ginns, 2005; Moreno & Mayer, 1999; Rummer, Schweppe, Fürstenberg, Seufert, & Brünken, 2010; Schnotz, 2011). The cognitive load is divided between the two channels, allowing for additional resources to be expended on schema integration and development (Moreno, 2006; Pavio, 1986). By parlaying the advantage of audiovisual over purely visual presentations (i.e., the modality effect) instructors can design multimedia lessons that facilitate a low cognitive load condition (Mayer, 2001; Mayer & Moreno, 1998; Moreno & Mayer, 1999).

Seductive information is considered a source of extraneous cognitive load because, despite being highly interesting, it does not supply information that is relevant to learning objectives or facilitate the development and automation of schemas (Mayer, 2005; Mayer et al., 2008; Park et al., 2011). Interesting, but unrelated, details can distract, disrupt, or divert a learner's information processing systems and engage cognitive resources intended for relevant, but less interesting, information. Consequently, insufficient resources are left to process ideas essential for learning (Mayer et al., 2008; Park, Flowerday, & Brünken, 2015). Despite meeting the criteria of extraneous load, cognitive research on the seductive details effect has not provided consistent results or answers about how these details mediate information processing (Park, Korbach, & Brünken, 2015; Rey, 2012).

Moderating factors. Cognitive load theories suggest the effect of extraneous load produced by seductive details can be moderated by several factors. CLT indicates that combined cognitive load, per the additivity hypothesis (Sweller, 1993) or triarchic model of CLT (Moreno & Park, 2010), determines if extraneous load from seductive details interferes with learning (Park et al., 2011; Towler et al., 2008). Park et al. (2011) used multimedia presentations with

seductive text and animations including either on-screen text or narrations. The researchers postulated, based upon the modality effect, that lessons with on-screen text would result in higher cognitive load than lessons with narration. Participants in the low-load, narration conditions receiving seductive details had better learning outcomes than those not receiving seductive details. The authors suggested that cognitive processes may not be impeded by seductive details if learners have sufficient resources, or working memory capacity, to process both relevant and irrelevant information. The authors also reported an unpredicted finding in the performance of participants in the high-load, text with seductive details group. No significant differences were found in scores between these participants and those in either group without seductive details. Park et al. acknowledged that participants in this experiment had higher levels of prior knowledge than those in their preliminary trial and suggested that the unanticipated learning outcomes may be a consequence of differences in learner prior knowledge.

Sanchez and Wiley (2006) used the Operation Span (Turner & Engle, 1989) and Reading Span (Daneman & Carpenter, 1980) working memory assessments and eye-tracking technology to evaluate the moderating effect of working memory capacity on seductive details. Participants, divided into low and high working memory capacity groups, read expository text with or without seductive or relevant illustrations. The low working memory group with seductive details scored significantly lower on essay and inference verification tasks, but no significant differences were found between high or low working memory participants between other groups. Eye-tracking data demonstrated that participants in the low working memory group also attended to seductive images longer than those with higher working memory. Based upon findings that working memory capacity did not account for disparate outcomes between participants in the no seductive details condition, the authors posited that the moderating influence of working memory on the

seductive detail effect is better explained by working memory's control of attention rather than memory capacity.

Data from Doolittle and Altstaeder (2009) support the conclusion that working memory capacity may not moderate seductive details. Using student participants whose working memory was measured using the Operation Span (Turner & Engle, 1989) task, the authors found that high working memory participants performed better on recall and transfer tests than those with lower working memory. However, no significant effects were reported for the interaction between working memory and seductive details. Conversely, a study of learners exposed to seductive audio in the form of background music (Park et al., 2009) showed that students with high working memory capacities were less effected by the seductive sounds than those with medium working memory levels. The students with medium working memory capacities did better in a music-free condition.

The moderating effect of prior knowledge on the seductive details effect also remains unclear. Leaners with low prior knowledge lack developed and automated schemas and experience greater element interactivity, and, thus, greater cognitive load when processing incoming information (Kalyuga, 2007; Sweller, 2005; Sweller et al., 1998). Students with high prior knowledge, on the other hand, may use existing, automated schemas to decrease intrinsic load and can devote more resources to germane or extraneous processes (Magner et al., 2014; Sweller, 2005). Researchers suggest that the effectiveness of instructional design depends on learner working memory and prior knowledge (Kalyuga, 2006, 2007; Mayer & Sims, 1994; Plass et al., 2003).

Many seductive details researchers did not assess participant prior knowledge (e.g., Garner & Gillingham, 1989; Hidi & Baird, 1988; Lehman et al., 2007; Rowland-Bryant et al.,

2011) while other researchers only used self-assessment scores to limit study participation to novice learners (e.g., Harp & Mayer, 1997, 1998; Mayer et al., 2008; Moreno & Mayer, 2000, 2002; Sanchez & Wiley, 2006). Park et al. (2005) reported that when prior knowledge was controlled for, participants receiving cognitively interesting, relevant illustrations outperformed those receiving emotionally interesting, irrelevant illustrations or only text. As noted above, prior knowledge was also suggested as a moderator for participants in seductive text and narration conditions (Park et al., 2011).

Magner et al. (2014) established a relationship between prior knowledge and the seductive details effect by using a domain specific pretest to assess participants before they engaged in computer-based learning with or without seductive information. The authors reported significant differences between participants with dissimilar degrees of prior knowledge. Participants with low prior knowledge learned better using lessons without seductive details. Leaners with high prior knowledge were not impaired by the seductive details effect, and learning outcomes for those with very high prior knowledge were improved by the inclusion of seductive illustrations. The researchers suggested that high prior knowledge prevented working memory from being overburdened while seductive details facilitated information processing by elevating situational interest. Another multimedia seductive details study by Park, Korbach, and Brünken (2015) provided support for this conclusion. Participants with high prior knowledge exposed to high cognitive load lessons experienced decreased learning outcomes, but no differences were found between high prior knowledge learners in seductive and no seductive details conditions. High levels of prior knowledge appear to help learners compensate for seductive details in comparison to low prior knowledge learners who are impaired in the same condition.

Theorists have also postulated, per Moreno's (2006) CATLM, that affect and situational interest act as moderators of the seductive details effect (Park, Flowerday, & Brünken, 2015; Magner et al., 2014; Schnotz, Fries, & Horz, 2009). Per the affective mediation assumption of CATLM, motivation influences levels of cognitive engagement (Moreno, Mayer, Spires, & Lester, 2001; Moreno, 2005, 2006). Positive emotions and associated situation interest have been shown to facilitate recall (Isen, Daubman, & Nowicki, 1987), learning with multimedia (Um, Plass, Hayward, & Homer, 2012), and reading engagement (Flowerday, Schraw, & Stevens, 2004). Schnotz et al. (2009) proposed that positive affect is important for activation and persistence in cognitive processing. However, other researchers suggest (Um et al., 2012) that affective processing benefits do not outweigh the extra cognitive load imposed by processing emotional details (i.e., seductive details).

In conjunction with their study of prior knowledge and seductive details, Magner et al. (2014) reported an indirect positive effect from situational interest generated by seductive details on transfer learning and an increased willingness to work when seductive illustrations are included in computer-based learning. Park, Flowerday, & Brünken (2015) distinguished between the influence of situational interest and positive emotions in a multimedia study using textual and visual seductive details. The authors found evidence confirming the affective mediation assumption (Moreno et al., 2001; Moreno, 2005, 2006) for situational interest but none for elements triggering positive emotions. Furthermore, situational interest only appeared in low cognitive load conditions (e.g., narration). The researchers concluded that situational interest generated by seductive details can facilitate learning in low cognitive load conditions by focusing attention and affective reactions on both present and future learning.

Summary

Capturing and sustaining student interest and attention is important for achieving desired learning goals (Ainley et al., 2002; Evertson et al., 2003; Izard & Ackerman, 2000; Kintsch, 1980; Schiefele, 1991). Teachers often use seductive details to stimulate situational interest (Garner et al., 1989; Harp & Maslich, 2005; Mayer, 2005; Schraw & Lehman, 2001). However, empirical evidence from over 30 years of research supports the seductive detail effect, or the impairment of learning caused by the addition of seductive details (Rey, 2012; Thalheimer, 2004). The seductive details effect has been shown to decrease learner recall and transfer performances, and it has been demonstrated in experiments using diverse modalities including seductive text, seductive images, seductive audio, and combinations of the three (Rey, 2012). To explain the seductive details effect, researchers have focused on four primary hypotheses. Harp and Mayer (1998) and Lehman et al. (2007) hypothesized that seductive details harm learning by distracting learner attention, disrupting coherence of schema development, or diverting information to inappropriate schemas for integration. Researchers using cognitive load theories (e.g., Magner et al., 2014; Park et al., 2011; Park, Flowerday, & Brünken, 2015; Park, Korbach, & Brünken, 2015) propose that seductive details generate extraneous cognitive load and may overload a learner's working memory capacity. Empirical evidence both substantiating and undermining all four hypotheses suggests that more than one of these premises may explain the seductive details effect (Rey, 2012).

Inconsistent findings, as well as results demonstrating positive learning outcomes related to seductive details (e.g., Garner et al., 1991; Magner et al., 2014; Park et al., 2011; Rowland-Bryant et al., 2011), imply that several factors may moderate how seductive details influence knowledge acquisition. Studies indicate that format (Harp & Mayer, 1997; Rey, 2011), lesson

modality (e.g., Magner et al., 2014; Mayer, 2001; Mayer & Moreno, 1998; Moreno, 2006; Moreno & Mayer, 1999), interestingness (Park, Flowerday, & Brünken, 2015), placement (e.g., Mayer et al., 2001; Rowland-Bryant et al., 2011), time (Rey, 2012), and prior knowledge (e.g., Magner et al., 2014; Park et al., 2005; Park et al., 2011; Park, Korbach, and Brünken, 2015) may all moderate the seductive details effect in some fashion. Continued research is needed to clarify which specific moderators cause seductive details to either hamper or facilitate learning in natural classroom settings. The study described below is intended to provide additional information to the current body of seductive details literature.

CHAPTER II Purpose and Research Questions

Purpose

Interest plays an important role in academic learning (Dewey,1913; Hidi & Baird, 1986; Schank, 1979; Schifele, 1996, 1999; Schraw & Lehman, 2001; Wade et al., 1993) by capturing and holding a learner's attention (Izard & Ackerman, 2000; Ainley et al., 2002) and influencing how limited cognitive resources are allocated (Hidi, 1990; Schraw & Lehman, 2001; Schiefele, 1999). Interest has been conceptually subdivided and classified into several categories based upon source and behavioral characteristics (Schraw & Lehman, 2001). Due to consequences associated with different types of interest, educators must consider environmental and personal factors when designing lessons meant to arouse interest and attention (Evertson et al., 2003).

One method used by teachers to stimulate student interest is to include emotionally (Kintsch, 1980) or situationally interesting (Hidi et al., 1992) details in instruction. Situational interest may be increased through prior knowledge, task goals, or the properties of the instructional information itself (Schraw & Lehman, 2001). Learners may find information interesting because it is vivid (Goetz & Sadoski, 1995; Hidi, 1990; Wade et al., 1993, 1999), coherent (Hidi, 1990; Kintsch, 1998; Wade et al., 1999), or seductive (Garner et al., 1989; Maslich, 2005; Mayer, 2005; Schraw & Lehman, 2001). While efforts to improve vividness and coherence affect interest and learning in a beneficial manner (Schraw & Lehman, 2001), increasing the seductiveness in a lesson can harm learning (Rey, 2012; Schraw & Lehman, 2001; Thalheimer, 2004).

The seductive details effect occurs when interesting, but unrelated, information interferes with meeting target learning goals (Harp & Mayer, 1997; Mayer et al., 2008). Overall, previous research supports the seductive details effect (Rey, 2012; Thalheimer, 2004) with a small to

medium effect size for recall and a medium effect size for transfer tasks (Rey, 2012). However, results from other studies indicate inconsistent or positive effects from seductive details (Rey, 2012; Thalheimer, 2004). To explain the function of seductive details and determine what individual and environmental factors contribute to these disparate findings, researchers have examined seductive details in different formats and across several media modalities.

The purpose of this study was to replicate and extend seductive details research in multimedia learning environments. While seductive details research has examined the effect of interesting, but irrelevant, information in text, images, audio, and multimedia formats (Rey, 2012), research of seductive details in video is limited (Mayer et al., 2001; Shen et al., 2006; Rowland-Bryant et al., 2011; Yoo & Catrambone, 2016). Video clips are used regularly in education because they contain relevant information as well as interest arousing seductive details (Harp & Mayer, 1997). Video clips may, per the modality effect (Mayer, 2001; Mayer et al., 2008; Moreno & Mayer, 1999), benefit learning because they deliver both visual and auditory information. This study replicated the design used in a pilot study by Rowland-Bryant et al. (2011) that measured recall and applied learning following a narrated PowerPoint lesson interspersed with video clips containing relevant and seductive information.

The study also considered prior knowledge as a possible moderator of the seductive details effect. Previous studies have shown high levels of prior knowledge can decrease or eliminate the negative effect of seductive details (Magner et al., 2014; Park et al., 2011; Park, Korbach, & Brünken, 2015). These studies, however, only considered domain-specific prior knowledge directly related to lesson goals. This study was designed to add to the current body of research by investigating learner familiarity with seductive elements, rather than main ideas, as a possible moderator of the seductive details effect. Within the lesson, participants were exposed

to subunits containing no seductive details, seductive video clips that are likely familiar, or seductive video clips that are likely unfamiliar to the learner. Each participant was randomly exposed to each study condition two times during the lesson. This design allowed for the collection of both within-subject and between-subject data. The study also benefited from the use of a naturalistic setting (i.e., participants' actual classroom) and the collection of next day and long-term learning data collected two weeks after the instructional session.

Research Questions and Hypotheses

Research question 1. Will the inclusion of video clips containing relevant and seductive details in a multimedia lesson decrease or increase participant learning? Studies on the use of video clips within multimedia lessons (Mayer et al., 2001; Shen et al., 2006; Rowland-Bryant et al., 2011; Yoo & Catrambone, 2016) have provided mixed results. This study evaluated the effect of videos with relevant and seductive details through posttests containing recall and applied items. Based upon results from a pilot study conducted by Rowland-Bryant et al. (2011) and research by Yoo & Catrambone (2016), it was hypothesized that the inclusion of video clips with relevant and seductive details within the narrated PowerPoint lesson would not decrease participant learning as measured by posttests delivered the day after the lesson. Due to the positive influence of situational interest on learning (Schraw & Lehman, 2001), it was also hypothesized that participants would have higher scores on posttest items linked to subunits with video clips than on items linked to subunits without seductive details.

Research question 2. Does participant familiarity with seductive details moderate the seductive details effect on learning? Empirical evidence (Magner et al., 2014; Park et al., 2005; Park et al., 2011; Park, Korbach, and Brünken, 2015) suggests that prior knowledge moderates the seductive details effect. The processing of seductive details generates extraneous cognitive

load that may overwhelm a leaner's cognitive capacity and hamper learning (Mayer et al., 2008; Park, Flowerday, & Brünken, 2015). Per cognitive load theories, prior knowledge facilitates the organization and integration of incoming stimuli by utilizing existing, automated schemas to decrease intrinsic load and devote more resources to germane or extraneous processes (Magner et al., 2014; Sweller, 2005).

It was hypothesized that prior knowledge of information included in video clips with seductive details would moderate the negative impact of the irrelevant details on associated posttest recall and application scores. Greater familiarity with video clip contents can allow seductive informational units to function as a single element in the working memory (Pass et al., 2003). This reduces the extraneous load generated by the seductive details and allows more resources to be deployed for intrinsic and germane processing. It was likewise hypothesized that unfamiliar video clips would generate greater extraneous load and result in lower posttest outcomes on linked recall and applied items.

Research question 3. Will the inclusion of video clips containing relevant and seductive details in a multimedia lesson decrease or increase long-term participant learning? Learning outcomes for most seductive details research (Rey, 2012) are only measured immediately following exposure to educational materials. Magner et al. (2014) found no differences between groups on a posttest taken two weeks after lesson delivery, but participants were provided with instructional booklets to study in the intervening time. For this study, it was hypothesized that the inclusion of video clips within the narrated PowerPoint lesson would not decrease participant scores on the two-week posttest containing the same recall and applied items as the initial posttest. Furthermore, based upon the facilitating role of situational interest in learning (Schraw & Lehman, 2001), it was hypothesized that participants would have higher scores on two-week

posttest items connected to subunits with video clips than items connected to subunits without video clips.

Research question 4. Does participant familiarity with seductive details moderate the seductive details effect on long-term learning? In their analysis of delayed posttest learning, Magner et al. (2014) found a significant effect for prior knowledge on learning outcomes. Higher prior knowledge of irrelevant information may allow for more cognitive resources to be devoted to organizing and integrating pertinent information with long-term memory schemas. Based upon these findings, it was hypothesized that greater familiarity with the content of video clips with seductive details would moderate the negative impact of the irrelevant details on two-week posttest recall and application scores. Conversely, it was hypothesized that unfamiliarity with video clips contents would result in lower two-week post-test performance on associated items by participants.

CHAPTER III Methods and Materials

Methods

Participants and Setting

This study took place in a public high school in the South-Eastern region of the United States. The participants were drawn from students enrolled in one of four psychology classes taught by two cooperating teachers. As psychology is an elective course, invited students were in the 10th, 11th, or 12th grades. Out of 63 students enrolled in the classes, 44 (28 female and 16 male) students assented to take part in the experiment. For students under the age of 18, parent/legal guardian consent was also obtained. Treatment and data collection took place over three days during regular class hours in the spring of 2016 and was limited to normally scheduled, 50-minute psychology class periods. The treatment phase, using a narrated PowerPoint lesson with interspersed video clips, took place on the first day and was delivered as part of regular class room instruction and activities. On the following day, a recall and application posttest was administered, and participants were asked to complete a video familiarity survey. Two weeks following instruction, researchers administered a second recall and application posttest. All phases of the experiment were conducted in the students' regular psychology classroom, and participants were seated at their regular desks.

Inclusionary criteria. The experiment was conducted as part of regular classroom instruction and activities. Therefore, all students enrolled and present in each psychology class viewed a narrated PowerPoint lesson with interspersed video clips and completed posttests and a survey. However, data were kept and recorded only for students who personally assented and had the consent of their legal guardian to participate. Posttests and surveys completed by all other

students were destroyed. It was also necessary for participants to be present on first day of the experiment. Data from students who were absent on the first day were excluded from analysis.

Materials

Consent and assent forms. Consent and assent for participation in the study were collected using teacher consent (Appendix A), parent or legal guardian (Appendix B), student assent (Appendix C), and student consent (Appendix D) forms approved by the University of Tennessee, Knoxville Institutional Review Board. Teacher consent was obtained before beginning research procedures in their respective classrooms. Parent/legal guardian consent forms was sent home with all students enrolled in the four participating classes and collected by teachers and researchers. Before conducting treatment on the first day of the study, researchers informed students of the research, presented the student assent form, and asked those who wish to participate to sign and return the document. Students who did not wish to participate were instructed to return the unsigned form to the researchers.

Treatment materials. A laptop, supplied by the University of Tennessee, Knoxville College of Education, Health, & Human Sciences Instructional Services Center, and a pair of headphones was placed at each student's desk. One of three narrated PowerPoint lesson versions containing 27 slides and four embedded video clips was loaded on each laptop (Appendix E). The lesson was delivered as part of regular classroom instruction and was designed in conjunction with the Psychology course instructors. The lesson aligned with both State of Tennessee and local Psychology curriculum standards. The topic of the lesson was personality traits and attribution theory. Target learning objectives included dispositional attribution and the Five-Factor Model of Personality, or O.C.E.A.N. (McCrae & Costa, 1990).

Information in the PowerPoint lesson was presented in both textual and narrated format. The narration matched the informational text on each slide. Lesson slides advanced automatically upon completion of the narration, and time limits on matching slides were constant across all lesson versions. Each slide contained the same basic learning materials. Six lesson subunits were selected for manipulation including: dispositional attribution, openness to experience, conscientiousness, extroversion, agreeableness, and neuroticism.

Each lesson subunit was assigned the no video (NV), familiar video (FV), or unfamiliar video (UV) treatment condition, and, if applicable, the corresponding video clip was shown before target lesson information.

Video clip sources believed to be familiar to students included media that had current and/or long-lasting pop-culture presence or were produced within the last twenty years. Video clips believed to be unfamiliar to the students were drawn from sources that lacked current pop-culture presence or were produced more than twenty years ago. All video clips were rated as acceptable for viewing by general audiences by the Motion Picture Association of America or TV Parental Guidelines. Video clip contents included a relevant behavioral example for each subunit as well as seductive audio and visual details. Each clip was edited to be approximately 2 minutes in duration. Table 1 illustrates the video clips selected for each lesson subunit.

Each PowerPoint lesson included two low-familiarity video clips, two high-familiarity video clips, and two no video clip conditions. Three PowerPoint lessons varied which video clip condition was paired with target learning subunits. Conditions within the PowerPoint lesson were counterbalanced using a Latin square design (Williams, 1949) which controls for both order and carryover effects. Table 2 shows the distribution of conditions across lesson subunits.

Table 1

Familiar and Unfamiliar Video Clips Sources Used with Lesson Subunits

Lesson Subunit	Familiar Video Clip	Unfamiliar Video Clip
Dispositional Attribution	*Wizard of Oz* (1939)	*Bravestarr* (1987)
Openness to Experience	*Alice in Wonderland* (1951)	*Animaniacs* (1993)
Conscientiousness	*The Many Adventures of Winnie the Pooh* (1977)	*The Littles* (1985)
Extraversion	*Aladdin* (1992)	*Top Cat* (1961)
Agreeableness	*The Incredibles* (2005)	*Rainbow Brite* (1984)
Neuroticism	*Finding Nemo* (2003)	*Count Duckula* (1989)

Table 2

Treatment Conditions Counterbalanced Across Lesson Subunits in a Latin Square Design

	Lesson Subunits					
Lesson Version	Attribution	Openness	Conscientious	Extraversion	Agreeableness	Neuroticism
1	NV	FV	UV	UV	NV	FV
2	FV	UV	NV	FV	UV	NV
3	UV	NV	FV	NV	FV	UV

Note. NV=No Video, FV= Familiar Video, UV=Unfamiliar Video.

Data collection materials. Participant learning was assessed using a 28-item multiple choice posttest administered the day following instruction and again two weeks post-instruction. Each posttest item had four response options. Four items were written for each of the target lesson subunits, and four additional items were written for historical and contextual information not included in these subunits. The seven sets of four questions were counterbalanced in both next day and two-week post-tests using a Latin square design (Williams, 1949). See Appendix F for posttest questions and answers divided by subunit prior to counterbalancing. Students used pencils or pens to complete paper copies of the post-tests.

Two questions in each set assessed recall by requiring participants to remember facts from the lesson. An example of a recall item is:

> Demonstrating a willingness to try something new and appreciating cultural differences is associated with which of the following traits?
>
> a. Extraversion
>
> b. Agreeableness
>
> c. Conscientiousness
>
> d. Openness to Experience
>
> (The correct answer is d. Openness to Experience.)

Two questions in each set assessed applied learning by requiring students to select an answer after reading a fictional case study. For example, one applied item is:

> Aaron watched Naomi move through the party with a big smile on her face. She stopped to talk to everyone and seemed to light up the room as she walked around. When she made it to Aaron's side of the room, she ran over to him and gave him a big hug. She

grabbed his hand and told him, “Come on! We need to dance. Standing around is so boring!”

Based on this vignette, Naomi’s personality can be described as high trait in:

a. Openness to Experience

b. Agreeableness

c. Neuroticism

d. Extraversion

(The correct answer is d. Extraversion.)

The students also completed a Video Familiarity Survey on the day following treatment. On the form, the participants indicated how many times they had viewed the movie or episode from which the actual video clip was obtained and the number of times they had seen materials related to the video clip. For example, a student may not have seen the actual episode of *The Many Adventures of Winnie the Pooh* (Lounsbery & Reitherman, 1977) from which the video clip was selected, but he/she may have read books, watched movies or episodes, or even played games involving the characters and setting used in the video clip. The Video Familiarity Survey is included in Appendix H.

Design

This study used a multi-factorial experimental design to make both between and within-subjects comparisons of participant learning. One independent variable was exposure to one of three conditions during treatment. In the two experimental conditions, participants viewed either familiar (FV) or unfamiliar (UV) video clips with seductive details before target learning information. In the control condition, the participants were exposed to target learning information without a preceding video clip (NV). Participants were assigned to one of three

lesson versions in which conditions were counterbalanced to control for order and carryover effects. Each student received each condition two times during instruction (i.e., viewing the narrated PowerPoint lesson). Participant learning was measured using a posttest, counterbalanced to reduce order and carryover effects, administered the day following instruction and, once again, two weeks after instruction.

The study also examined the effect of a moderator variable, prior exposure to seductive details, using data collected from a Video Familiarity Survey administered immediately following the first post-test. Participants recorded the estimated number of times they had viewed the video clips presented in the narrated PowerPoint lesson and the number of times they had viewed other media (e.g., books, games, videos) directly related to video clip content.

Dependent Measures

Number of correct posttest responses. Factual recall and applied questions have been used to measure learning in many seductive detail effect studies (see Rey, 2012; Thalheimer, 2004). In a meta-analysis, Rey (2012) reported highly significant small to medium effect size for retention [i.e., $d = 0.30$ (99% confidence interval 0.20-0.39)] and a highly significant medium effect size for transfer [i.e., $d = 0.48$ (99% confidence interval 0.34-0.61)]. However, studies using seductive details in video have shown mixed results (Mayer et al., 2001; Shen et al., 2006; Rowland-Bryantet al., 2011; Yoo & Catrambone, 2016). To extend existing research and allow for comparable learning data, posttest items were divided between these two formats.

Posttest items were constructed with the assistance of high school psychology teachers, and face validity was established through a review by the participating teachers. The internal reliability of the posttest was found to be good (Cronbach's $\alpha = .73$) (George & Mallory, 2003). Posttests were administered the day following instruction and two weeks after instruction. The

number of correct recall and applied items for each lesson subunit was calculated for each learner. The video clip condition (i.e., NV, FV, or UV) for each item, as indicated by PowerPoint lesson version, was also recorded with item response data. This allowed within-subject and between-subject comparisons to be made across conditions.

Interscorer agreement. To establish the agreement between scorers of posttest responses, interscorer agreement was calculated using a random sample of 30% of completed posttests. Interscorer reliability was calculated separately for the next-day and two-week posttests. Reliability was calculated by taking the number of agreements of responses and dividing by the total number of agreements and disagreements. Minimum acceptable reliability was 90%.

Independent Variable

Students participated in three conditions: (a) video clips drawn from sources believed to be highly familiar to the students (FV), (b) videos believed to be unfamiliar to the students (UV), or (c) no video clip (NV). Video clip sources believed to be familiar to students included media that had current and/or long-lasting pop culture presence or were produced within the last 20 years. Video clips believed to be unfamiliar to the students were drawn from sources that lacked current pop-culture presence or were produced more than twenty years ago. All video clips were rated as acceptable for viewing by general audiences. Both familiar and unfamiliar video clips contained information relevant to learning goals and both visual and audio seductive details.

Moderator Variable

The moderator variable investigated in this experiment was the number of times each student had viewed the video clips presented in the narrated PowerPoint less and the number of times the student has viewed other media (e.g., books, games, videos) directly related to video

clip content. Participants recorded an estimated number of viewings for each video clip on the Video Familiarity Survey. This variable was used as a measure of student prior knowledge of the information included in the seductive details conditions. See Appendix L for the script for this survey.

Analysis

To gauge prior knowledge of the video clips used in the PowerPoint lessons, participants completed the Video Familiarity Survey. Participants recorded estimated prior exposures to the specific video clips used in instruction and an estimate of prior exposures to other media related to the video clips. SPSS® Version 24 software was used to conduct paired-sample t-tests comparing reported prior video clip and combined media views for clips classified as familiar and unfamiliar.

To assess and compare student learning outcomes across conditions, next-day and two-week posttest scores were analyzed. A paired *t*-test and Pearson product-moment correlation was conducted using SPSS® Version 24 software to compare and determine the relation between participant scores on the posttests. To evaluate the within- and between-subject relations between posttest scores, experimental condition, question type, lesson version, prior video clip views, and combined prior media exposures, a generalized linear mixed effects analysis was performed using GLIMMIX procedures in SAS® Version 9.4 software.

Procedures

Approval for this study was obtained through the University of Tennessee, Knoxville Institutional Review Board. Permission to conduct research in the participating high school classes was given by the high school principal, school superintendent, and key school system officials. This experiment was designed to limit disruption to normal educational activities, and

the treatment lesson was aligned with state curriculum standards. This lesson was part of the students' regular coursework, and the teachers continued instruction and activities related to the lesson topic after collection of two-week posttest data. To protect the integrity of regular class room instruction and to protect the privacy of those students who did not wish to participate, all students in the classes took part in research activities. Data from students who did not participate were not included in the study database, and the right to withdraw from the study was stressed in both parent consent and student assent.

Researcher training. The primary researcher for this study was a graduate student in School Psychology in the Department of Educational Psychology and Counseling at the University of Tennessee, Knoxville. The primary researcher and graduate student research assistants participated in training sessions on assent collection, treatment delivery, posttest/survey administration, and posttest/survey scoring. Specifically, graduate student researchers were provided treatment delivery, posttest administration, and survey administration scripts (See Appendices I, L, & N) to facilitate consistent administration. Scripts were reviewed and practiced ensuring accurate execution. Graduate student researchers were also trained in operating study laptops and narrated PowerPoint lessons.

Graduate researchers reviewed and scored both posttest versions (next-day and two-week) and the video familiarity survey. Each graduate student researchers provided five completed sample next-day post-tests, five completed sample two-week post-tests, and five completed sample video familiarity surveys. Graduate researchers achieved 90% interscorer agreement on sample measures before taking part in the study.

Experiment stages. The study was conducted on three separate days during four class periods each day. Treatment was delivered on the first day. Posttest and video familiarity survey

administration were conducted on the second day. Finally, a second posttest was administered two-weeks after instruction.

Treatment delivery. On the first day of the experiment, researchers obtained participant assent or consent and delivered treatment. The researchers used a treatment delivery script (See Appendix I) and procedural checklist (see Appendix J). Upon entering each classroom, the primary researcher and graduate student research assistants introduced themselves to the teacher and set up laptops and headphones at each student desk. Each laptop was preloaded by the researchers with a version of the narrated PowerPoint lesson, and researchers recorded the laptop number and version on the treatment delivery record sheet (See Appendix K). After the students entered the class and took their seats, the researchers introduced themselves to the class and described the research study. Students were informed that the researchers were conducting a research study about learning, and the class would be viewing narrated PowerPoint lessons on the Five Factor Model of personality traits and dispositional attribution developed in conjunction with their teacher as part of their regular classroom lesson for the day. While every student viewed a narrated PowerPoint lesson and completed post-lesson activities as part of regular classroom instruction, the class was informed that allowing data from their responses to be used in the study was completely voluntary and that they could withdraw from the study at any time without penalty prior to the analysis of the data.

Researchers obtained participant assent or consent and collected signed forms. Next, the name of each student was recorded on the treatment record delivery record sheet next to the corresponding laptop and PowerPoint version numbers. Then, students were provided with instructions on how to operate the PowerPoint lesson and adjust the headphones volume. Researchers answered student questions about accessing the lesson before instructing the

students to begin the PowerPoint lesson. While students viewed the PowerPoint lesson, researchers were available to assist students with any laptop or software technical difficulties. After all students completed the PowerPoint lesson, the researchers collected the research materials and thanked the class for their time. Students were assigned a participant number on the treatment delivery record sheet to allow for de-identification.

Posttest and video familiarity survey administration. Researchers returned to each class the day after instruction to administer the next day posttest and Video Clip Familiarity Survey. The researchers used the posttest and video familiarity survey administration script (see Appendix L) and posttest and video familiarity administration procedural checklist (See Appendix M). All students participated in this activity as part of regular classroom instruction. After students were seated, the researchers greeted the students and informed them that they would be taking a lesson posttest and completing a survey. The class was told that every student must complete post-lesson activities as part of regular classroom instruction, but that allowing data from their responses to be used in the study was completely voluntary and that they may withdraw from the study at any time without penalty prior to the analysis of the data.

Researchers provided the students with instructions and answered questions for completing the posttest and video familiarity survey. The researchers handed out posttests and surveys to the students one at a time. Consulting the treatment delivery record sheet, the researchers asked for each student's name and recorded their participant number at the top of each form. Researchers were available to assist students as they completed the posttest and survey. After participants completed the posttest and video familiarity survey, researchers thanked them and collected all research materials.

Two-week posttest administration. Researchers returned to each class two-weeks after instruction to administer the two-week posttest. The researchers used the two-week posttest administration script (see Appendix N) and two-week posttest administration procedural checklist (See Appendix O). All students participated in this activity as part of regular classroom instruction. After students were seated, the researchers greeted the students and informed them that they would be taking a follow-up lesson post-test. The class was told that every student must complete post-lesson activities as part of regular classroom instruction, but that allowing data from their responses to be used in the study was completely voluntary and that they may withdraw from the study at any time without penalty prior to the analysis of the data.

Researchers provided the students with instructions and answered questions for completing the posttest. The researchers handed out posttests to the students one at a time. Consulting the treatment delivery record sheet, the researchers asked for each student's name and recorded their participant number at the top of each form. Researchers were available to assist students as they completed the posttest. After participants completed the post-test, researchers thanked them and collected all research materials.

CHAPTER IV Results

Participant data was collected from the Video Familiarity Survey and two lesson posttests. First, responses from the survey were compared to determine the accuracy of the unfamiliar and familiar video clip categorizations. Second, participant scores on posttests taken the day following and two weeks after viewing the multimedia lesson were analyzed to test for differences in performance across time. Third, tests for the effects of video familiarity, media views, question types, lesson version, and posttest version on student posttest scores were conducted using a generalized linear mixed model.

Video Clip Familiarity

To measure prior knowledge of the video clips presented in the seductive details conditions, 44 participants completed the Video Familiarity Survey. Video clips presented in lesson subunits were designated as either familiar or unfamiliar based upon assumptions described above. To evaluate the accuracy of these designations and examine prior exposure as a covariant of the seductive details effect, participants reported the estimated number of times they had previously viewed each video clip as well as the estimated number of times they had been exposed to media related to the video clip. Figure 1 depicts the mean prior views for each video reported in the survey, and Figure 2 illustrates mean prior views of each video clip plus associated media.

SPSS® Version 24 software was used to conduct paired-sample t-tests comparing reported prior video clip and combined media views for clips classified as familiar and unfamiliar. Overall, a significant difference was found between reported total video clip views of familiar ($M = 99.77$, $SD = 138.93$) and unfamiliar video clips ($M = 8.00$, $SD = 19.63$); $t\ (43) =$

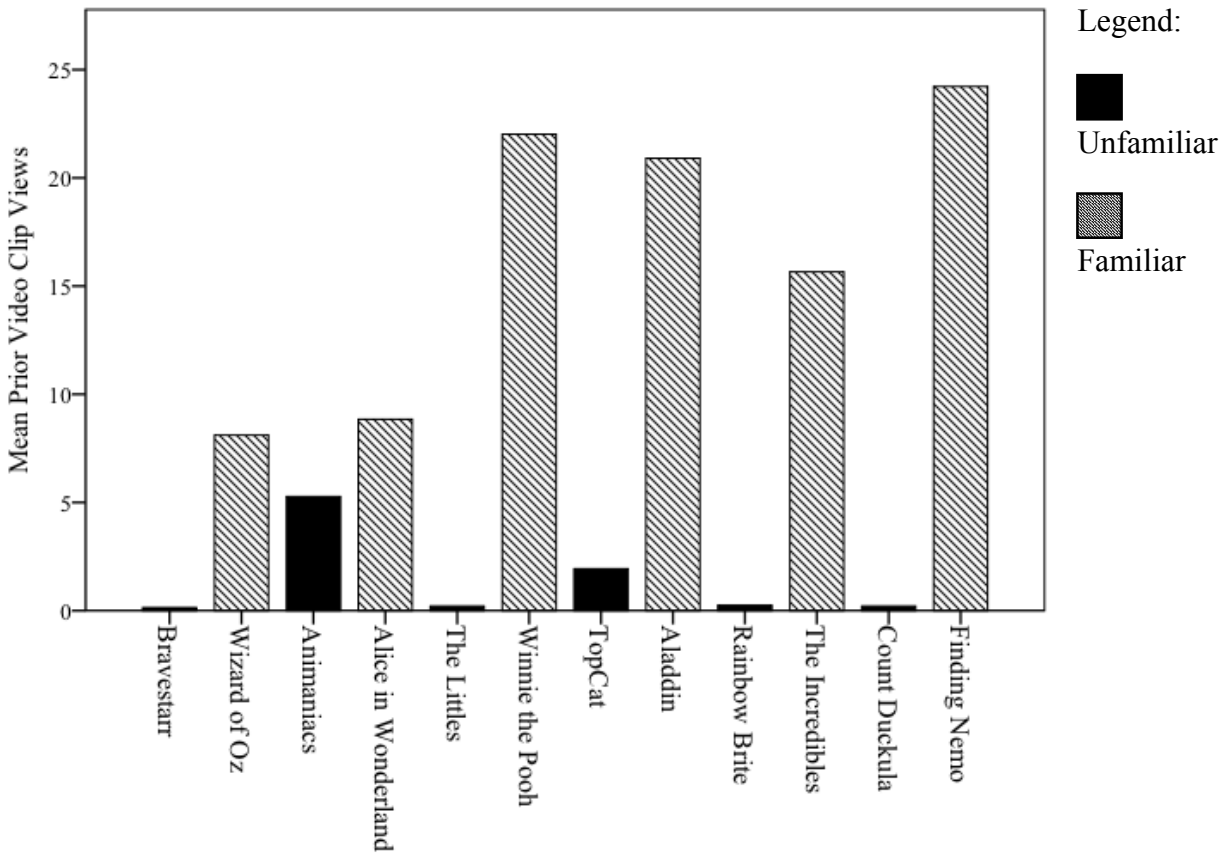

Figure 1

Mean Prior Views of Familiar and Unfamiliar Video Clips

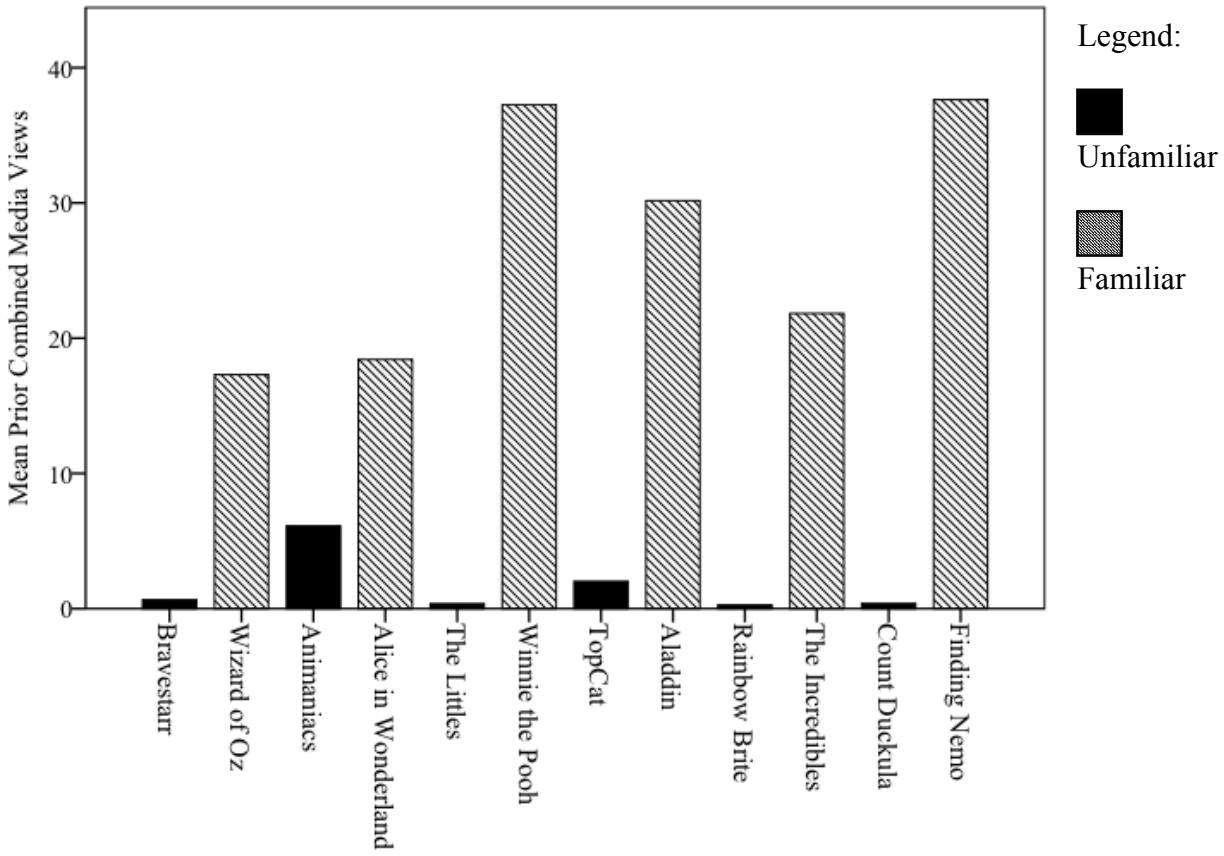

Figure 2

Mean Prior Combined Views of Familiar and Unfamiliar Video Clips and Related Media

4.47, $p = .000$. Significant differences were found between prior views of all familiar and unfamiliar video clip subunit pairs except one. There was not a significant difference between reported views of the familiar, *Alice in Wonderland* (1951), ($M = 8.84$, $SD = 17.29$) and the unfamiliar, *Animaniacs* (1993), ($M = 5.37$, $SD = 17.61$) video clips; $t\ (43) = -0.975$, $p = .335$. Table 3 provides means, standard deviations, and standard error of the mean for video clip views, and Table 4 depicts paired *t*-test results for video clips used in each lesson subunit.

When related media views were added to prior views of the specific video clips, a significant difference was also found between total combined media views of familiar ($M = 162.59$, $SD = 169.14$) and unfamiliar ($M = 9.82$, $SD = 22.13$) videos; $t\ (43) = 6.08$, $p = .000$. The videos mentioned above, *Alice in Wonderland* (1951) ($M = 18.43$, $SD = 24.21$) and *Animaniacs* (1993) ($M = 6.11$, $SD = 18.18$), which did not differ significantly in reported specific video clip views were found to be significantly different in combined media views; $t\ (43) = -2.71$; $p = .010$. Tables 5 and 6 illustrate means, standard deviations, and standard error of the mean for combined media views and paired *t*-test results for combined media views respectively.

Posttest Scores

Interscorer agreement. Interscorer agreement for posttest answers was calculated by dividing the number of agreed responses by the total number of agreements and disagreements. For Posttest #1, item scores from 13 randomly selected posttests were compared. Interscorer agreement for this posttest was 98.9%. Interscorer agreement for Posttest #2 was also calculated by comparing item scores from 13 randomly selected tests. The interscorer agreement for Posttest #2 was 98.4%. Both interscorer agreement scores were above 90% acceptability threshold.

Table 3

Means, Standard Deviations, and Standard Error of the Means of Views for Familiar and Unfamiliar Video Clips

	Video Clip	*M*	*SD*	*SEM*
Pair 1	*Bravestarr* (Unfamiliar)	0.14	0.46	0.07
	Wizard of Oz (Familiar)	8.11	6.8	1.03
Pair 2	*Animaniacs* (Unfamiliar)	5.27	17.61	2.66
	Alice in Wonderland (Familiar)	8.84	17.29	2.61
Pair 3	*The Littles* (Unfamiliar)	0.20	0.93	0.14
	Winnie the Pooh (Familiar)	22.02	35.20	5.31
Pair 4	*TopCat* (Unfamiliar)	1.93	6.80	1.03
	Aladdin (Familiar)	20.91	34.190	5.15
Pair 5	*Rainbow Brite* (Unfamiliar)	0.25	1.12	0.17
	The Incredibles (Familiar)	15.66	29.42	4.44
Pair 6	*Count Duckula* (Unfamiliar)	0.20	0.59	0.09
	Finding Nemo (Familiar)	24.23	34.79	5.25
Total	Total Unfamiliar	8.00	19.63	2.96
	Total Familiar	99.77	138.93	20.95

Table 4

Paired-Samples Tests of Mean Familiar and Unfamiliar Video Clip Views

	Video Clip	*M*	*SD*	*SEM*	*t*	df	Sig. (2-tailed)
Pair 1	*Bravestarr* (Unfamiliar) *Wizard of Oz* (Familiar)	-7.98	6.68	1.01	-7.92	43	.000
Pair 2	*Animaniacs* (Unfamiliar) *Alice in Wonderland* (Familiar)	-3.57	24.28	3.66	-0.98	43	.335
Pair 3	*The Littles* (Unfamiliar) *Winnie the Pooh* (Familiar)	-21.82	35.16	5.30	-4.18	43	.000
Pair 4	*TopCat* (Unfamiliar) *Aladdin* (Familiar)	-18.98	33.48	5.05	-3.76	43	.001
Pair 5	*Rainbow Brite* (Unfamiliar) *The Incredibles* (Familiar)	-15.41	28.74	4.33	-3.56	43	.001
Pair 6	*Count Duckula* (Unfamiliar) *Finding Nemo* (Familiar)	-24.02	34.79	5.24	-4.58	43	.000
Total	Total Unfamiliar Total Familiar	91.77	136.07	20.51	4.47	43	.000

Table 5

Means, Standard Deviations, and Standard Error of the Means of Combined Media Views for Familiar and Unfamiliar Videos

	Video Clip	*M*	*SD*	*SEM*
Pair 1	*Bravestarr* (Unfamiliar)	0.66	3.05	0.46
	Wizard of Oz (Familiar)	17.30	15.90	2.40
Pair 2	*Animaniacs* (Unfamiliar)	6.11	18.18	2.74
	Alice in Wonderland (Familiar)	18.43	24.21	3.65
Pair 3	*The Littles* (Unfamiliar)	0.36	1.241	0.19
	Winnie the Pooh (Familiar)	37.25	48.95	7.38
Pair 4	*TopCat* (Unfamiliar)	2.02	6.84	1.03
	Aladdin (Familiar)	30.16	42.35	6.38
Pair 5	*Rainbow Brite* (Unfamiliar)	0.27	1.17	0.18
	The Incredibles (Familiar)	21.82	31.53	4.75
Pair 6	*Count Duckula* (Unfamiliar)	0.39	1.13	0.17
	Finding Nemo (Familiar)	37.64	50.29	7.58
Total	Total Unfamiliar Combined	9.82	21.13	3.19
	Total Familiar Combined	162.59	169.14	25.50

Table 6

Paired-Samples Tests of Mean Familiar and Unfamiliar Combined Views

	Video Clip	*M*	*SD*	*SEM*	*t*	df	Sig. (2-tailed)
Pair 1	*Bravestarr* (Unfamiliar) *Wizard of Oz* (Familiar)	-16.64	15.87	2.40	-6.95	43	.000
Pair 2	*Animaniacs* (Unfamiliar) *Alice in Wonderland* (Familiar)	-12.39	30.19	4.55	-2.71	43	.010
Pair 3	*The Littles* (Unfamiliar) *Winnie the Pooh* (Familiar)	-36.89	48.94	7.38	-5.00	43	.000
Pair 4	*TopCat* (Unfamiliar) *Aladdin* (Familiar)	-28.14	41.19	6.20	-4.54	43	.000
Pair 5	*Rainbow Brite* (Unfamiliar) *The Incredibles* (Familiar)	-21.55	30.95	4.67	-4.62	43	.000
Pair 6	*Count Duckula* (Unfamiliar) *Finding Nemo* (Familiar)	-37.25	50.25	7.58	-4.92	43	.000
Total	Total Unfamiliar Total Familiar	152.77	166.61	25.12	6.083	43	.000

Posttest #1 and #2 score comparison. Participant learning was measured using two posttests. 44 participants completed Posttest #1 the day after instruction, and 43 participants completed Posttest #2 two-weeks following the lesson. A paired *t*-test using SPSS ® of Posttest #1 ($M = 0.59$, $SD = .49$) and Posttest #2 ($M = .57$, $SD = .50$) test scores revealed no significant differences in student performance on Posttest #1 and Posttest #2; $t\ (23) = 1.705$; $p = .088$. A two-tailed Pearson product-moment correlation coefficient was used to determine the relationship between scores on Posttest #1 and Posttest #2. There was a medium correlation ($r = .39$) between the scores; $n = 1032$, $p = .000$. Figure 3 depicts mean item scores for both posttests.

Generalized linear mixed model. GLIMMIX procedures were performed using SAS® Version 9.4 software to conduct a generalized linear mixed effects analysis of the relationship between participant posttest scores and lesson video clip conditions. Lesson version, experimental condition (e.g., no video clip, familiar video clip, and unfamiliar video clip), question type (e.g., recall and applied), prior video clip views, and combined prior media views were entered as fixed effects. Individual scores were grouped by participant ID# within the model. The model response distribution was binomial, and the logit link function was used. The marginal variance matrix was block-diagonal and was blocked by participant ID#. The estimation technique used in the GLIMMIX procedures was residual pseudo-likelihood with a subject-specific expansion (RSPL). Degrees of freedom were determined using the between-within method which is used in repeated statement conditions to divide residual degrees of freedom into between- and within-subject groups. See Table 7 for posttest median scores per lesson version, experimental condition, and question type respectively.

Posttest #1. On Posttest #1, tests of fit suggest under-dispersion of data in the model; $X^2/df = 0.48$. Lesson versions did not account for significant variation between posttest scores;

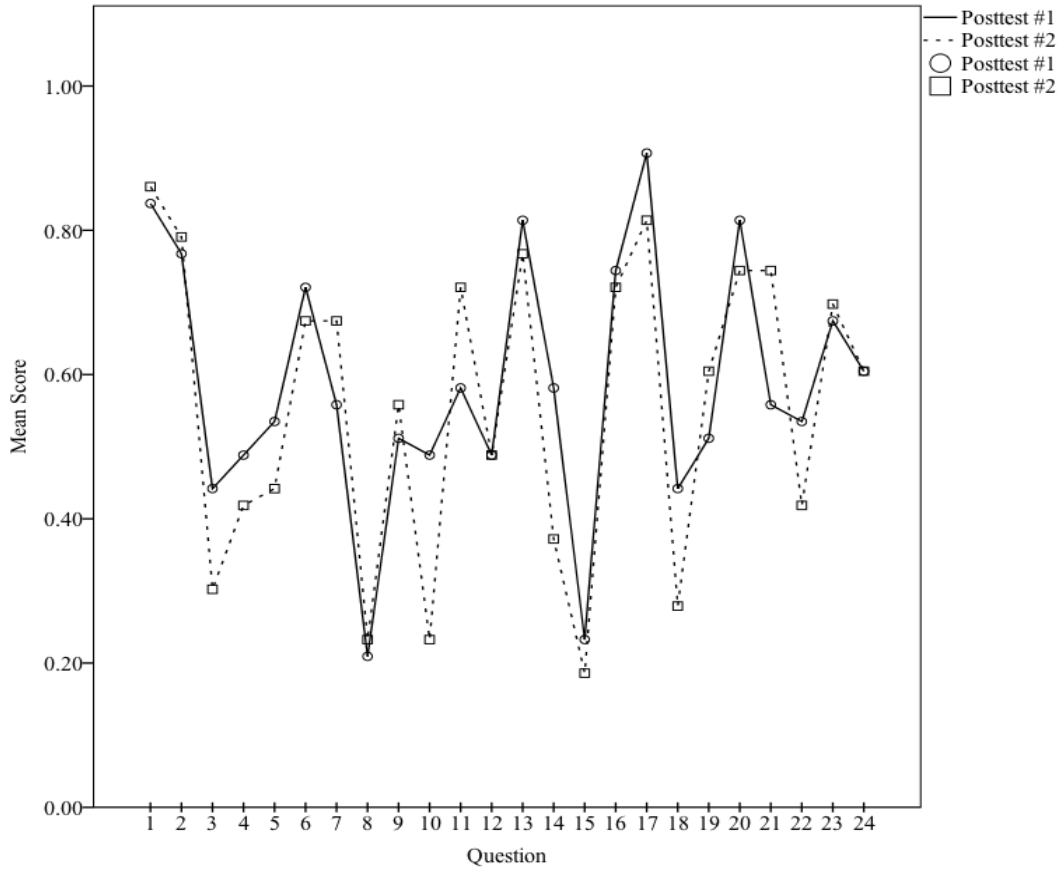

Figure 3

Mean Item Scores for Posttest #1 and Posttest #2

Table 7

Descriptive Statistics for Posttest Item Scores per Lesson Version, Experimental Condition, and Question Type

Factor	Posttest	N	*M*	*SD*	*SEM*
Lesson Version 1	#1	384	.60	.49	.025
	#2	384	.55	.50	.028
Lesson Version 2	#1	312	.53	.50	.028
	#2	312	.54	.50	.028
Lesson Version 3	#1	360	.59	.49	.026
	#2	336	.57	.50	.027
No Video	#1	352	.55	.50	.027
	#2	344	.54	.50	.027
Familiar Video	#1	352	.58	.50	.026
	#2	344	.57	.50	.027
Unfamiliar Video	#1	352	.61	.49	.026
	#2	344	.57	.50	.027
Recall Questions	#1	528	.56	.50	.022
	#2	516	.55	.50	.022
Applied Questions	#1	528	.60	.49	0.21
	#2	516	.56	.50	0.22

F (2, 1048) = 2.10, p = .12. No significant fixed effects were found for any experimental conditions on participant scores; F (2, 1048) = 0.90, p = .41. Analysis of question type also yielded no significant fixed effects for either recall or applied questions on posttest scores; F (2, 1048) = 1.06, p = .30. Figure 4 illustrates mean Posttest #1 scores per experimental condition and question type. Likewise, modeling of prior video clip views [F (1, 1048) = 0.62, p = .43] and combined prior media views [F (1, 1048) = 0.26, p = .61] had no significant effect on participant performance. Solutions for fixed effects are depicted in Table 8.

Posttest #2. Fit statistics for Posttest #2 also suggest under-dispersion; $X^2/df = 0.48$. No significant fixed effects were found for lesson version on participant test performance; F (2, 1024) = 0.45, p = .64. The experimental condition also lacked significant effect on participant scores; F (2, 1024) = 0.28, p = .76. Similarly, as in Posttest #1, question type did not account for significant variance of scores on Posttest #2; F (1, 1024) = 0.21, p = .65. See Figure 5 for an illustration of mean Posttest #2 scores according to experimental condition and question type. Prior video clip views did not have a significant effect on performance; F (1, 1024) = 0.92, p = .2. Nor did prior combined media views; F (1, 1024) = 0.06, p = .81. Table 9 displays the solutions for fixed effects for Posttest #2.

Difference between posttest scores. The difference between student scores on posttests was also analyzed. This model, as with the prior models, suggested under-dispersion; $X^2/df = 0.60$. Aligning with findings from individual analysis of the posttests, no significant effects for lesson version [F (2, 884) = 0.40, p= .67], experimental condition [F (2, 885) = 0.31, p = .73], question type [F (1, 884) = 0.39, p =.53], prior video clip views [F (1, 884) = 0.76, p = .38], or prior combined media views [F (1, 884) = 1.04, p = .31] were found. The solutions for fixed effects can be found in Table 10.

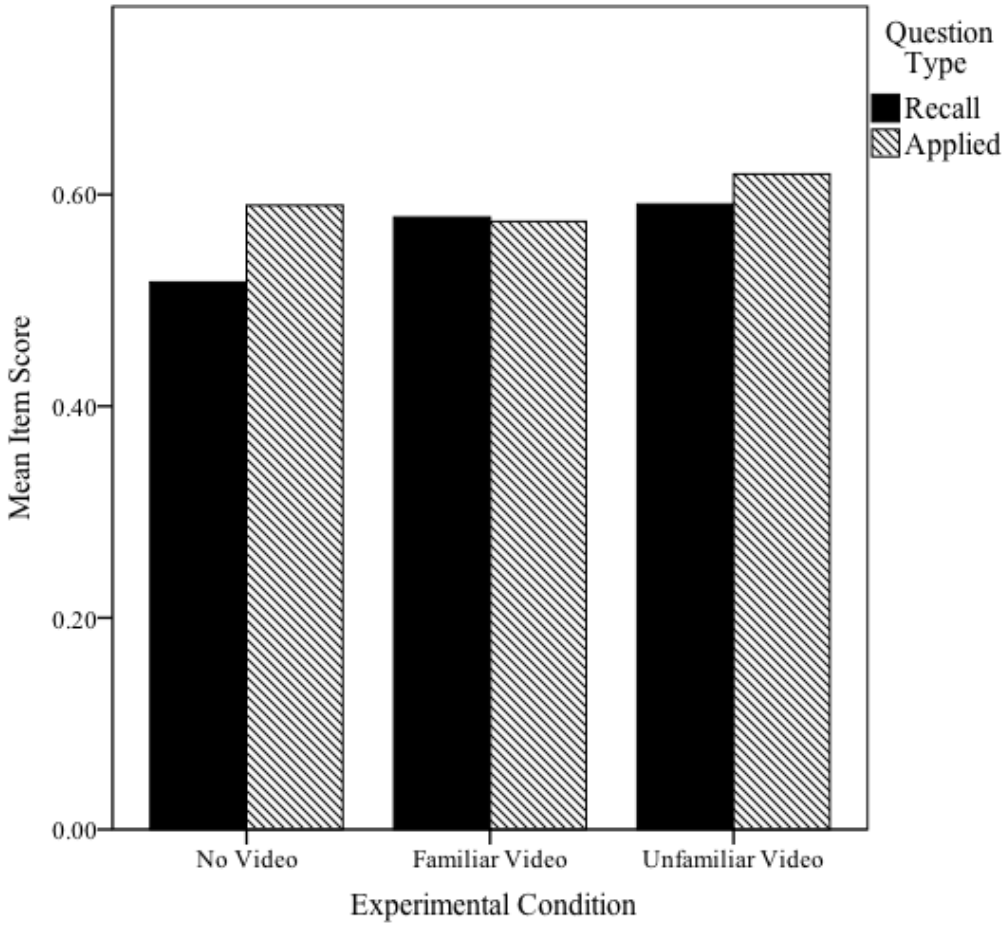

Figure 4

Mean Posttest #1 Scores Per Experimental Condition and Question Type

Table 8

Solutions for Fixed Effects on Posttest #1

Parameter	Estimate	Std. Error	df	*t*	Sig.
Intercept	0.5529	0.1545	1048	3.58	0.0004
Lesson Version 1	0.02932	0.1506	1048	0.19	0.8457
Lesson Version 2	-0.2932	0.1574	1048	-1.68	0.0933
Lesson Version 3	0	.	.	.	.
Condition: No Video Clip	-0.2035	0.1542	1048	-1.32	0.1874
Condition: Familiar Video Clip	-0.1353	0.1677	1048	-0.81	0.4199
Condition: Unfamiliar Video Clip	0	.	.	.	.
Question Type: Recall	-.1297	0.1257	1048	-1.03	0.3024
Question Type: Applied	0	.	.	.	.
Prior Video Clip Views	0.006557	0.008319	1048	0.79	0.4308
Prior Combined Media Views	-0.00293	0.005719	1048	-0.51	0.6090

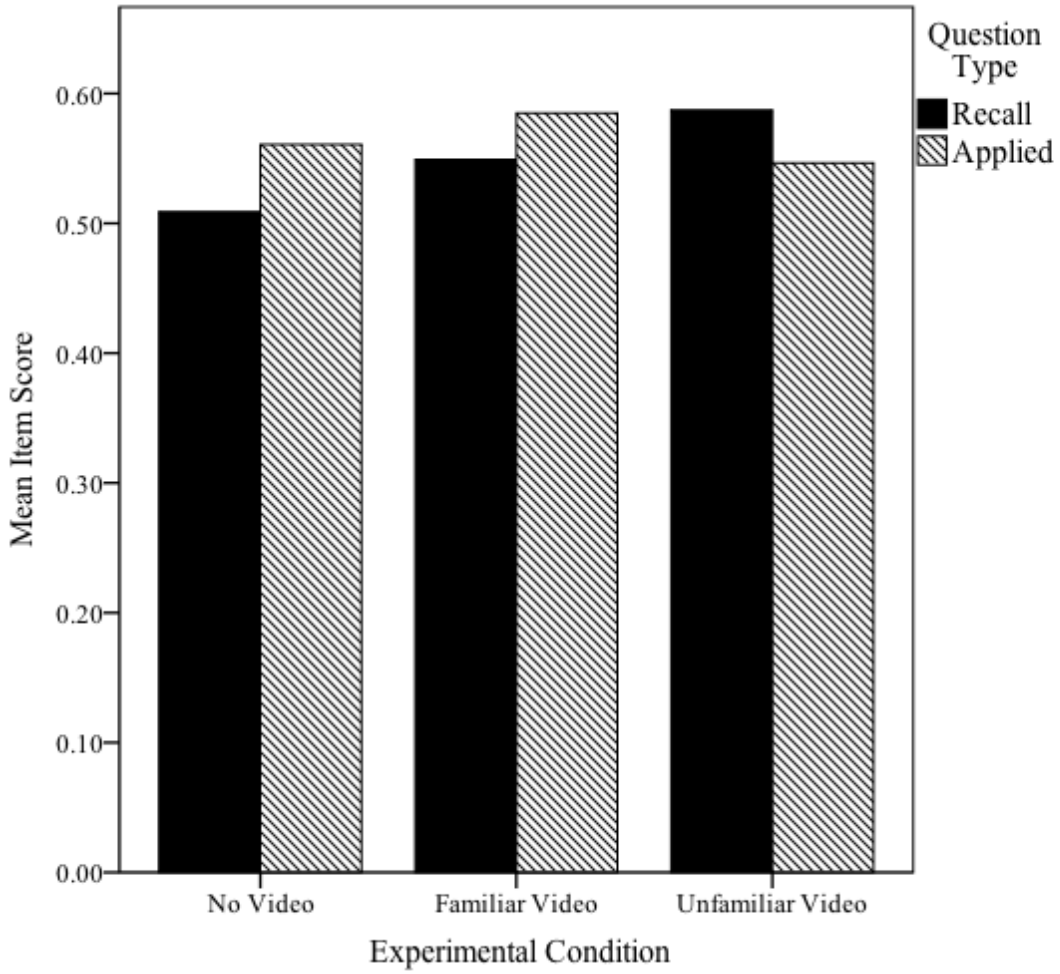

Figure 5

Mean Posttest #2 Scores Per Experimental Condition and Question Type

Table 9

Solutions for Fixed Effects on Posttest #2

Parameter	Estimate	Std. Error	df	*t*	Sig.
Intercept	0.3620	0.1561	1024	2.32	0.0206
Lesson Version 1	-0.09771	0.1518	1024	-0.64	0.5196
Lesson Version 2	-0.1489	0.1596	1024	-0.93	0.3512
Lesson Version 3	0	.	.	.	.
Condition: No Video Clip	-0.1120	0.1544	1024	-0.73	0.4684
Condition: Familiar Video Clip	-0.08068	0.1678	1024	-0.48	0.6308
Condition: Unfamiliar Video Clip	0	.	.	.	.
Question Type: Recall	-0.05764	0.1262	1024	-0.46	0.6479
Question Type: Applied	0	.	.	.	.
Prior Video Clip Views	0.008320	0.008695	1024	0.96	0.3388
Prior Combined Media Views	-0.00143	0.005900	1024	-0.24	0.8088

Table 10

Solutions for Fixed Effects on Differences Between Posttest #1 and Posttest #2

Parameter	Estimate	Std. Error	df	*t*	Sig.
Intercept	-1.4601	0.2089	884	-6.99	<0.0001
Lesson Version 1	0.1793	0.2057	884	0.87	0.3837
Lesson Version 2	0.1349	0.2210	884	0.61	0.5416
Lesson Version 3	0	.	.	.	.
Condition: No Video Clip	-0.1586	0.2121	884	-0.75	0.4548
Condition: Familiar Video Clip	-0.02281	0.2245	884	-0.10	0.9191
Condition: Unfamiliar Video Clip	0	.	.	.	.
Question Type: Recall	-0.1078	0.1718	884	-0.63	0.5305
Question Type: Applied	0	.	.	.	.
Prior Video Clip Views	-0.01023	0.01175	884	-0.87	0.3841
Prior Combined Media Views	0.007761	0.007610	884	1.02	0.3080

CHAPTER V Discussion

Discussion of Research Questions and Hypotheses

Research Question 1

Research question one asked if the inclusion of video clips in a multimedia lesson would affect participant learning in a positive or negative manner. According to the seductive details effect, extraneous details present in the video clips should decrease learning outcomes (Harp & Mayer, 1997; Mayer et al., 2008). However, recent studies using video clips in lessons (Rowland-Bryant et al., 2011; Yoo & Catrambone, 2016) contradict this notion. The first hypothesis related to this question proposed that the inclusion of video clips containing relevant and seductive details would not decrease scores on posttests administered after the lesson. A comparison of scores from Posttest #1, administered the day after the lesson, supports this hypothesis. Scores on applied and recall questions associated with lesson subunits with seductive video clips were not lower than scores for questions about information presented in the absence of seductive details.

Based upon the theory that increased situational interest generated by the video clips would improve learning (Schraw & Lehman, 2001), the second hypothesis for research question one stated that participants would have higher scores on posttest questions linked to information presented with video clips than questions presented without video clips. Analysis of Posttest #1 scores do not support this hypothesis. Unlike results reported by Rowland-Bryant et al. (2011), no significant differences were found between participant scores for questions across the video clip and no video clip conditions. Overall, the findings suggest that the inclusion of video clips that include seductive details in a multimedia lesson neither facilitate or hinder learning.

Research Question 2

The second research question pertains to the moderating effect of participant prior knowledge, or familiarity, on the seductive details effect. While previous studies (Magner et al., 2014; Park et al., 2005; Park et al., 2011; Park, Korbach, and Brünken, 2015) demonstrated that prior knowledge of target learning material may moderate the seductive details effect, prior knowledge of the seductive materials presented in a lesson has not been measured. Applying the cognitive load theories used by these researchers, the hypothesis for this research question proposed that prior exposures to seductive information would reduce the extraneous cognitive load caused by seductive details and mitigate their impact on learning outcomes. Conversely, a lack of prior exposures to seductive details found in unfamiliar video clips should lower scores on applied and recall posttest questions.

While a comparison of previous video clip and related media views reported on the Video Clip Familiarity Survey showed significantly more exposures to media used in the familiar condition than media used in the unfamiliar condition, no significant effects for prior views were found on posttest scores. Learning with familiar video clips did not result in improved participant learning, nor did viewing unfamiliar video clips contribute to poor test scores. Prior knowledge of the seductive details included in the lesson did not appear to moderate student learning or performance on recall or applied questions.

Research Question 3

The focus of research question three is whether viewing video clips with seductive details in a lesson hinders or supports long-term earning. Study of knowledge retention and application beyond the day of the lesson in seductive details studies is limited (Rey, 2012). Replicating research by Magner et al. (2014), the participants in this study were given a second posttest two

weeks after receiving the instruction. Based upon these previous findings, the initial hypothesis for this question is seductive details within video clips used in a multimedia lesson will not cause lower scores on recall and applied posttest questions. Like the findings discussed in research question one, a comparison of question scores on the second posttest supports this hypothesis. Participant performance on recall or applied questions in the no seductive details condition was not significantly better that performance on questions in the seductive details conditions. Therefore, seductive details did not appear to affect long-term learning outcomes for the participants.

Conversely, analysis results did not support the second hypothesis for this question which stated that, due to increased situational interest (Schraw & Lehman, 2001), participants would earn higher scores on questions connected to the video clip conditions than on questions for the no video condition on the second posttest. Echoing findings on the first posttest, no significant effects for this experimental condition were found on participant scores on this posttest. The presence of video clips with seductive details did not appear to be a factor in student learning measured two weeks after the multimedia lesson.

Research Question 4

Similar to research question two, this question asked whether participant prior knowledge of seductive details included in video clips moderated the seductive details effect on measures of learning administered two weeks following the lesson. No evidence was found supporting the first hypothesis that seductive detail prior knowledge would moderate the effect of seductive details on participant performance on the second posttest. Likewise, less prior knowledge of seductive details did not account for significant variation in posttest scores. As with the more

immediate measure of learning, prior exposure to seductive materials does not appear to hinder or improve student long-term ability to recall or apply information learned two-weeks earlier.

General Discussion

Seductive Details Effect

To stimulate situational interest and attention in learning, seductive, or extraneous, details are frequently included in lessons and learning materials (e.g., text books) found in most classrooms (Garner et al., 1989; Maslich, 2005; Mayer, 2005; Schraw & Lehman, 2001). Researchers have demonstrated that, while increasing student interest, lessons including seductive details can decrease learning in comparison to instruction without extraneous information (Rey, 2012; Schraw & Lehman, 2001; Thalheimer, 2004). However, this phenomenon, known as the seductive details effect, has not been demonstrated consistently across learning conditions (Rey, 2012; Thalheimer, 2004). Results from this study contribute to the body of research (e.g., Garner et al., 1991; Magner et al., 2014; Park et al., 2011; Rowland-Bryant et al., 2011) showing neutral or positive effects from seductive details. These findings also add to inconsistent and limited research (Mayer et al., 2001; Rowland-Bryant et al., 2011; Shen et al., 2006; Yoo & Catrambone, 2016) on seductive details within video clips used in instruction. Furthermore, this study evaluated the effect of seductive details on long-term outcomes with results suggesting that seductive details included in video clips relevant to learning may not be detrimental to academic performance. To better understand results from this experiment in the context of existing seductive detail theory, it is beneficial to examine the findings within the framework of the four primary hypotheses for the effect.

Distraction hypothesis. Harp and Mayer's (1998) distraction hypothesis, and Lehman et al.'s (2007) reduced attention hypothesis, states that highly interesting seductive details seize and

divert the learner's attention away from target content. The distracted learners are predicted to spend more time attending and processing the extraneous details at the expense of relevant information (Garner et al., 1989; Harp & Mayer, 1998; Mayer & Jackson, 2005; Rowland et al., 2008). According to this hypothesis, exposure to seductive details in video clips prior to target information should interfere with participant learning of relevant information. However, results in this study do not support the distraction hypothesis. Examination of student performance on two posttests found no differences between student scores when videos were presented before target material and when no videos were shown.

Several factors may explain why participants in this experiment were not distracted by seductive details in video clips. First, the seductive details in the videos may not have been interesting enough to capture and divert attention away from the target material. In other words, the extraneous details may have not been "seductive" enough to hinder learning. Second, the seductive details in video clips are more transient than seductive details contained in other modalities (e.g., text or picture). When presented in static formats, seductive details can remain in extended competition with target information for the learner's attention. In contrast, studies of auditory (Harp & Maslich, 2005; Mayer, Heiser, & Lonn, 2001; Towler, 2009), video (Mayer et al., 2001; Rowland-Bryant et al., 2011; Shen et al., 2006; Yoo & Catrambone, 2016), and multimedia (Muller et al., 2008; Towler et al., 2008) seductive details have demonstrated comparable mixed results. Finally, other moderating factors (e.g., affect, prior knowledge, or personal interest) may limit the distractibility of seductive details.

Disruption hypothesis. Per the disruption hypothesis (Harp & Mayer, 2008), seductive details impede learning by interfering with the transition and connection of one unit of relevant information to the next. This disruption in learning leads to an incoherent mental model of the

subject that reduces understanding of key ideas. Eye-tracking research (Park, Korbach, & Brünken, 2015) has shown seductive details interfering with gaze transitions between key learning targets. Consequently, videos containing seductive details embedded within a multimedia lesson should disrupt and decrease participant performance on posttest scores. However, analysis of student scores in this study did not provide evidence for disrupted learning due to seductive details.

As mentioned in discussion of the distraction hypothesis, other factors may have moderated the negative impact of seductive details in the multimedia lesson. It is possible that the seductive details within the videos were not "seductive" enough to disrupt participant learning. Given extraneous details that are more seductive, the students may not be able to construct a coherent mental model necessary to comprehend the target information correctly. Additionally, the format and placement of the video clips within the lesson may have reduced their disruptive qualities. Park, Flowerday, and Brünken (2015) suggested the disruptive quality of seductive details may depend on modality. While the videos contained relevant lesson information as well as seductive details, the participants viewed the video clips before each target subunit. Embedding the same videos in the middle of the informational units may have resulted in greater learning interference.

Diversion hypothesis. Harp and Mayer's (1998) third explanation for the seductive details effect is the diversion hypothesis. This hypothesis states that seductive details prime inappropriate schemas that are not directly related to target learning materials. When the learner processes the incoming stimuli, he/she attempts to organize the information within the framework of the irrelevant schema. As a result, the learner develops misconceptions and poor understanding. Researchers (Harp & Mayer, 1998; Mayer et al., 2001; Rowland et al., 2008)

have suggested that, per the diversion hypothesis, seductive details presented before target information should have a stronger effect on learning than those placed later in the lesson. The placement of video clips before informational subunits in this study's multimedia lesson should have, therefore, caused significant decreases in student performance.

However, the results predicted by the diversion hypothesis were not manifested in participant posttests scores. These findings align with those of other researchers (Lehman et al., 2007; Rowland-Bryant et al., 2011) who did not find evidence to support the notion that seductive details cause the generation of inapplicable schemas. It may be possible that the relevant information within the video clips was salient enough to facilitate the priming of correct schemas by the participants, or the seductive details may not have diverted the participants' cognitive processes sufficiently enough to impede accurate schematic priming.

Cognitive load theories. Cognitive Load Theory (CLT; Garner et al., 1992; Plass, Moreno, & Brünken, 2010; Sweller, Ayers, & Kalyuga, 2011), and its extensions, Cognitive Theory of Multimedia Learning (CTML; Mayer, 2005) and Cognitive-Affective Theory of Learning with Media (CATLM; Moreno, 2005, 2006; Park, Plass, & Brünken, 2014) suggest that the seductive details effect results from excessive extraneous cognitive load on a learner's information processing systems. Cognitive resources that should be delegated to address the intrinsic and germane demands imposed by target information and learning activities are instead engaged with more interesting seductive details. The learner is then left with inadequate resources to process the academically important information (Mayer et al., 2008; Park, Flowerday, & Brünken, 2015).

The absence of the seductive details effect in this experiment can be interpreted through CLT in several ways. According to the additivity hypothesis (Moreno & Park, 2010; Park, 2010;

Sweller, 1993) impaired learning occurs when aggregate cognitive load exceeds an individual's total processing capacity. Intrinsic and germane loads were kept constant across participants and conditions by using the same subject matter and lesson structure for all students. With no significant variation in student performance across video and no video conditions, it appears that the addition of irrelevant information did not overburden the participants' mental resources. As mentioned in discussion of other seductive details hypotheses, the results may be due to the extraneous details in the videos lacking sufficient interestingness to interfere with learning. If irrelevant details were dismissed or ignored, the participants could devote cognitive resources to target lesson materials. While the processes employed to recognize and separate irrelevant details from relevant ones generate some level of extraneous cognitive load regardless of how interesting the individual finds them, he/she may be less likely to experience cognitive overload.

Lesson modality may also be a factor in the failure to produce the seductive details effect in this study. The multimedia lesson and accompanying video clips delivered information in both visual and auditory formats. In alignment with Mayer's (2005) CTML, researchers (Moreno, 2006; Pavio, 1986) have proposed that dividing the cognitive load between the auditory and visual channels of the working memory reduces overall cognitive load and allocates additional processing resources to schema construction and integration. Numerous studies of multimedia lessons (Doolittle & Altstaeder, 2009; Grice & Hughes, 2009; Park et al., 2011; Park, Korbach, & Brünken, 2015) and videos (Mayer et al., 2001; Rowland-Bryant et al., 2011; Yoo & Catrambone, 2016) presenting information in bimodal formats found limited or no evidence for the seductive details effect on participant learning. It is possible that modality effect (Mayer, 2001; Mayer et al., 2008; Moreno & Mayer, 1999) reduced the total cognitive load experienced

by participants and afforded them sufficient processing resources to address extraneous details without detriment.

The theory of element interactivity (Sweller et al., 2011) posits that new information that is not formed or integrated into a schema is processed as individual units and impose greater cognitive demands. For learners who are familiar with a subject, units of information already known and incorporated into schema are processed as single elements and produce less load (Pass et al., 2003; Sweller, 1994). CLT researchers (Magner et al., 2014; Sweller, 2005) have demonstrated prior knowledge of target lesson information can moderate the seductive details effect by lessening the intrinsic load experienced by learners. In the current study, the psychology lesson included theoretical information that had not been taught to the students in the regular course of instruction. While the participants had not received formal instruction in the subject, elements of the personality theory taught in the lesson may have been encountered outside of the classroom. For example, the concept of extroversion is one that is mentioned regularly in media. Consequently, participants may have had prior knowledge of target lesson content which reduced intrinsic cognitive demands enough to allow seductive details to be processed without exceeding their cognitive load threshold.

Prior knowledge of seductive details. Related to the effect of element interactivity on the cognitive load imposed by target lesson materials (Magner et al., 2014; Pass et al., 2003; Sweller, 1994, 2005; Sweller et al., 2011), this study examined the moderating role of prior knowledge of the seductive details. Based upon the notion that familiarity with target information reduces intrinsic load, it was hypothesized that being familiar with the seductive details would likewise reduce cognitive load. Instead of processing the extraneous details in

familiar video clips as individual units, the leaner would process the irrelevant details as schemas and have more resources to allocate to intrinsic and germane demands.

The videos used in the lessons were designated as unfamiliar and familiar based upon criteria intended to estimate the likelihood that participants had been exposed to each specific video clip and its associated media. A comparison of reported exposures through participant survey responses indicates that the designations of familiarity were accurate and significant differences existed between reported viewings of familiar and unfamiliar video clip pairings. Despite differences in prior knowledge of each clip, the performance of participants across familiar and unfamiliar videos were not significantly different.

Initial findings suggest that prior knowledge of extraneous stimuli does not moderate the effect of seductive details on learning. While prior knowledge of domain-specific information (Magner et al., 2014; Park et al., 2011; Park, Korbach, & Brünken, 2015) has been shown to moderate the seductive details effect, familiarity of seductive details may not reduce cognitive load in the same fashion. Prior knowledge of domain-specific information reduces element interactivity because prior learning has incorporated singular, related informational units into coherent schema. Using schema during information processing assists the learner in efficiently recognizing, focusing on, and integrating new relevant information. Seductive information, however, is an imprecise term that describes a myriad of nonspecific and, possibly, unrelated details. Participants may have prior knowledge of some seductive elements in the video clip and possess a schema that has organized these concepts into an easily processed unit. The videos, even those more familiar to the student, may also contain disparate seductive details that remain unorganized or are organized into multiple discrete schema requiring individual processing.

These seductive elements may impose a level of cognitive load that does not vary with prior knowledge.

Limitations

Several limitations should be considered when interpreting the results of this study. The first key limitation is data from the Video Clip Familiarity Survey used to estimate participant prior exposures to seductive details. The students were asked to recall the number of times they had previously viewed each video clip used in the experiment as well as exposures to media related to the video. The survey requested an exact number of prior exposures instead of using a familiarity rating scale. The number of views provided a finer measure of variability than a limited scale. However, the exposures reported by the students may not accurately or precisely represent their prior knowledge. The participants reported a wide-range of exposures for some video clips (e.g., *The Many Adventures of Winnie the Pooh* (1977) $M = 22.02$, $SD = 34.19$, range = 0-160), suggesting that they may have minimized or inflated the number of times they had viewed the media.

Inaccurate reporting may also have been due to misunderstanding the survey directions and parameters of each item. Imprecise numbers may have been reported by participants due to difficulty remembering how often they viewed a cartoon or encountered associated media. Students who were particularly fond of a particular cartoon or movie may believe that they watched it more times as a child than they actually did, and, conversely, students who did not like or were not interested in a cartoon while growing up may not easily recall encounters with the material. If the participants incorrectly estimated their exposure history, then reported survey figures may have deflated or inflated the amount of variance in participant scores attributed to prior exposures in this experiment.

The choice of using cartoon video clips may also account for the failure to find differences in learning. Due to the age of participants and the public-school setting used in the experiment, videos with more mature content, like those used by Rowland-Bryant et al. (2011), were precluded from this study. As a regular feature in many childhood homes and schools, cartoons seemed more likely to offer seductive information that would be familiar to most participants. Despite the appeal of using cartoons in this study, two features of this media may have limited its utility. First, cartoons are generally structured in a manner that is simple and easily understood by children. As high school students, the participants may not experience significant germane cognitive load when processing information delivered in a direct and juvenile format. Lower levels of germane load may have allowed the allocation of additional resources to process extraneous load from seductive details without hampering learning. Second, cartoons often contain many tropes and culturally archetypes that are shared and repeated across media formats (Faber & Mayer, 2009). Thus, even if the participant lacked prior exposure to a specific cartoon video clip, it is possible that he/she may have prior knowledge of the archetypes presented in the film.

This point is illustrated by contrasting the *TopCat* (Platt, Hanna, & Barbera, 1961) video clip, categorized as unfamiliar, with a clip from *Aladdin* (Clements & Musker, 1992), categorized as familiar. Both videos portray main characters exhibiting relevant traits associated with extroversion that are displayed by many pop culture characters. Seductive details found in the videos may also align with common tropes. For example, a police officer in the *TopCat* (Platt, Hanna, & Barbera, 1961) clip engages in cliché cartoon bumbling and conflict with the protagonist while the *Aladdin* (Clements & Musker, 1992) clip features the trope of a clever animal sidekick. Due to generalization, these irrelevant details, even when viewed for the first

time, may impose smaller cognitive loads when integrated into existing schema than may be generated by less familiar seductive elements.

Another limitation that constrains seductive details research is the target learning material. As indicated by Wang and Adesope (2014), the greater balance of seductive details research has been conducted using lessons on the natural sciences. It is possible that research of instruction in one subject may provide results that are not transferable to different subject areas. Indeed, several studies using other topics resulted in findings that provide mixed or no support for the seductive details effect (Garner & Gillingham, 1991; Magner et al., 2014; Rowland et al., 2008; Rowland-Bryant et al., 2011; Towler, 2009; Towler et al., 2008). Variances between how individuals process, organize, and apply information to meet topic dependent objectives may explain inconsistent learning in the presence of seductive details. However, subject area differences were not examined in the course of this experiment.

Finally, other features in experimental design and implementation also limit conclusions that may be drawn from this study. Participation in this study was restricted to high school students enrolled in general and AP psychology classes. As an elective course, students in these classes often enroll due to a preexisting interest in the subject matter. With personal interest in the subject area already established, situationally interesting seductive details may draw less student attention and cause less interference in learning. Additionally, the students' participation was voluntary and may have created a self-selected sample that did not represent the general student population.

The experiment was conducted within the students' typical classrooms, and the students selected their own seats. While the classroom setting allowed for research in a more natural environment, the presence of researchers; the use of a narrated, multimedia lesson; and the

administration of posttests and surveys altered normal classroom climates and patterns. The participants may have been more or less attentive during instruction and posttest administration due to novelty of the situation or wishing to perform well for researchers. Consequently, the results may be unreflective of how seductive details influence their learning during a typical lesson. Other instructional factors, including time of day, class schedule, time of year, classroom arrangement, or teacher differences, were also not accounted for in the experimental design.

The posttests used in this experiment was evaluated for face validity by the high school teachers participating in the study, and internal reliability was found to be acceptable (Cronbach's $\alpha = .73$) (George & Mallory, 2003). However, a weak test-retest reliability correlation ($r = .39$) was found between posttest scores with a two-week interval between posttest administration, and more stringent tests validity or sensitivity were not conducted. Furthermore, operationalizing successful student learning as correct responses to recall and applied questions may not be optimal for measuring the effects of seductive details. Inconsistent or incorrect operationalization of dependent measures used in seductive details research may account for the lack of homogenous or definitive findings in literature.

Conclusion

As access to technology and media continues to increase, educators must consider how to integrate these tools into their classrooms in a way that best facilitates student learning. Evolving computer technology presents many avenues to stimulate student interest and focus them on learning. Making curriculum and learning activities interesting helps capture attention (Ainley et al., 2002; Izard & Ackerman, 2000) and influences how students process information (Hidi, 1990; Schiefele, 1999; Schraw & Lehman, 2001). When developing multimedia or computer-based lessons, teachers can foster interest through several means, including incorporating

emotional elements (Kintsch, 1980) or establishing goals that are clear and obtainable by the students (Schraw & Lehman, 2001). Generating interest has, for the most part, been shown to improve learning (Hidi & Baird, 1986; Schraw & Lehman, 2001), but research on the use seductive details, or irrelevant details that evoke heightened interest, (Garner et al., 1989; Maslich, 2005; Mayer, 2005; Schraw & Lehman, 2001) demonstrates possible risks.

Decreased learning attributed to the seductive details effect has been reported in many studies, but other studies present contrary or mixed results (Rey, 2012; Thalheimer, 2004). Over the course of 30 years, researchers have attempted to account for factors that cause the seductive details effect in some situations and its absence from others. Answering these questions is of practical importance to educators who wish to make learning interesting without hampering student progress. To add to the body of literature examining the effects of seductive information in various modalities, across subject areas, and in the presence of certain factors, this study explored the effect seductive details found alongside relevant information in short video clips embedded in a narrated, multimedia lesson. The moderating role of participant prior knowledge of seductive details in the videos was also investigated.

Congruent with several studies of seductive details in videos (Mayer et al., 2001; Rowland-Bryant et al., 2011; Yoo & Catrambone, 2016), the inclusion of video clips with relevant and irrelevant details did not account for differences in student learning when compared to learning absent video clips. Nor did familiarity with, or prior exposure to, the seductive videos appear to moderate learning outcomes. While these results suggest that teachers may include videos in multimedia lessons without concern for seductive details, these findings are by no means definitive. On the contrary, this research only demonstrates that seductive details may have different functions and effects dependent on a variety of unclear factors, and additional

studies are necessary to understand the complex variables at play when seductive information is present in a lesson.

Future researchers should continue to contrast and examine how seductive details operate across modalities and determine what factors influence the impact of seductive information. As noted earlier, the seductive details effect may also vary according to subject area or lesson type. More research in subject areas outside of the hard sciences is needed to help instructors address specific classroom needs. Without strong evidence supporting many suggested moderating factors, continued research into factors that have already been examined (e.g., prior knowledge, placement, format, or interestingness) as well as factors that have received little attention (e.g., lesson length, single vs. multiple lessons, behavior, or classroom environment) is required to develop an applied understanding of how student interest can be successfully raised in schools without inadvertently obstructing learning.

REFERENCES

Ainley, M., Hidi, S., & Bernhoff, D. (2002). Interest, learning, and the psychological processes that mediate their relationship. *Journal of Educational Psychology, 94*(3), 545-561.

Alexander, P. A., & Jetton, T. L. (1996). The role of importance and interest in the processing of text. *Educational Psychology Review, 8*, 89-121.

Alexander, P. A., & Kulikowich, J. M. (1994). Learning from physics text: A synthesis of recent research. *Journal of Research in Science Teaching, 31*(9), 895-911.

Alexander, P. A., & Murphy, P. K. (1998). Profiling the differences in students' knowledge, interest, and strategic processing. *Journal of Educational Psychology, 90*(3), 435-447.

Anderson, J. R. (2005) *Cognitive psychology and its implications* (6th ed.). New York: Worth.

Anderson, R. C., Mason, J., & Shirely, J. (1984). The reading group: An experimental investigation of a labyrinth. *Reading Research Quarterly, 20*, 6-38.

Asher, S. R. (1980). Topic interest and children's reading comprehension. In R. J. Spiro, B. C. Bruce, & W. F. Brewer (Eds.), *Theoretical issues in reading comprehension* (pp. 525-534), Hillsdale, NJ: Erlbaum.

Asher, S. R., Hymel, S., & Wigfield, A. (1978). Influence of topic interest on children's reading comprehension. *Journal of Reading Behavior, 10*, 35-47.

Atkinson, R. C., & Shiffrin, R. M. (1968). Human memory: A proposed system and its control processes. In K. W. Spence & J. T. Spence (Eds.), *The psychology of learning and motivation: Advances in research and theory* (Vol. 2, pp. 89-195). San Diego, CA: Academic Press.

Baddeley, A. D. (1986). *Working memory*. New York: Oxford University Press.

Baddeley, A. D. (1992). Working memory: The interface between memory and cognition. *Journal of Cognitive Neuroscience, 4*(3), 281-288.

Baddeley, A. D. (2001). Is working memory still working? *American Psychologist, 56*(11), 851-864.

Baddeley, A. D., & Logie, R. H. (1999). Working memory: the multiple component model. In A. Miyake & P. Shah (Eds.), *Models of working memory: Mechanisms of active maintenance and executive control* (pp. 28-61). Cambridge: Cambridge University Press.

Barron, B. (2006). Interest and self-sustained learning as catalysts of development: A learning ecologies perspective. *Human Development, 49*(4), 193-224.

Bartsch, R. A., & Cobern, K. M. (2003). Effectiveness of PowerPoint presentations in lectures. *Computers and Education, 41*, 77-86

Benton, S. L., Corkill, A. J., Sharp, J. M., Downey, R. G., & Khramtsova, I. (1995). Knowledge, interest and narrative writing. *Journal of Educational Psychology, 87*, 66-79.

Chandler, P., & Sweller, J. (1991). Cognitive theory and the format of instruction. *Cognition and Instruction, 8*(4), 293-332.

Chandler, P., & Sweller, J. (1992). The split-attention effect as a factor in the design of instruction. *British Journal of Educational Psychology, 62*(2), 233-246.

Cowan, N. (2007). What infants can tell us about working memory development. In L. M. Oakes & P. J. Bauer (Eds.), *Short- and long-term memory in infancy and early childhood: Taking the first steps toward remembering* (pp. 126-150). New York: Oxford University Press.

Cowan, N. (2010). The magical mystery four: How is working memory capacity limited and why? *Current Directions in Psychological Science, 19*, 51-57.

Daneman, M., & Carpenter, P. A. (1980). Individual differences in working memory and reading. *Journal of Verbal Learning & Verbal Behavior, 19*(4), 450-466.

Deci, E. L. (1992). The relation of interest to the motivation of behavior: A self-determination theory perspective. In A. Renninger, S. Hidi, and A. Krapp (Eds.), *The role of interest in learning and development* (pp. 43-70). Hillsdale, NJ: Lawrence Erlbaum.

Dewey, J. (1913). *Interest and effort in education*. Boston, MA: Riverside Press.

Dienstbier, R. A. (1995). The impact of humor on energy, task choices, and attributions: Exploring hypotheses from toughness theory. *Motivation Emotion, 19*(4), 255-267.

Doolittle, P., & Altstaedter, L. L. (2009). The effect of working memory capacity on multimedia learning: Does attentional control result in improved performance? *Journal of Research in Innovative Teaching, 2*, 7-23.

Elliot, A. J., Murayama, K., & Pekrun, R. (2011). A 3 x 2 achievement goal model. *Journal of Educational Psychology, 103*(3), 632-648.

Evertson, C., Emmer, E., & Worsham, M. (2003). *Classroom management for elementary teachers* (6th ed.). Boston, MA: Allyn & Bacon.

Faber, M. A., & Mayer, J. D. (2009). Resonance to archetypes in media: There's some accounting for taste. *Journal of Research in Personality*, *43*(3), 307-322.

Flowerday, T., Schraw, G., & Stevens, J. (2004). The role of choice and interest in reader engagement. *Journal of Experimental Education, 72*(2), 93-114.

Ford, M. E., & Smith, P. R. (2007). Thriving with social purpose: An integrative approach to the development of optimal human functioning. *Educational Psychologist, 42*(3), 153-171.

Gagné, R. M. (1965). *The conditions of learning*. New York: Holt, Rinehart, & Winston.

Gagné, R. M., Briggs, L. J., & Wager, W. W. (1988). *Principles of instructional design*. New York: Holt, Rinehart, & Winston.

Garner, R. (1992). Learning from school texts. *Educational Psychologist, 27*, 53-63.

Garner, R., Brown, R., Sanders, S., & Menke, D. (1992). "Seductive details" and learning from text. In K. A. Renninger, S. Hidi, & A. Krapp (Eds.), *The role of interest in learning and development* (pp. 239-254). Hillsdale, NJ: Erlbaum.

Garner, R., Gillingham, M. G., & White, C. S. (1989). Effects of 'seductive details' on macro-processing and microprocessing in adults and children. *Cognition Instruction*, *6*, 41-57.

Garner, R., Alexander, P. A., Gillingham, M. G., Kulikowich, J. M., & Brown, R. (1991). Interest and learning in text. *American Educational Research Journal, 28*(3), 643-659.

George, D., & Mallery, P. (2003). *SPSS for Windows step by step: A simple guide and reference. 11.0 update* (4th ed.). Boston: Allyn & Bacon.

Ginns, P. (2005). Meta-analysis of the modality effect. *Learning and Instruction, 15*(4), 313-331.

Goetz, E. T., and Sadoski, M. (1995). Commentary: The perils of seduction: Distracting details or incomprehensible abstractions? *Reading Research Quarterly, 30*(3), 500-511.

Graves, M. F., Slater, W. H., Roen, D., Redd-Boyd, T., Duin, A. H., Furniss, D. W., & Hazeltine, P. (1988). Some characteristics of memorable expository writing: Effects of revisions by writers with different backgrounds. *Research in Teaching English, 22*(3), 242-265.

Grice, S., & Hughes, J. (2009). Can music and animation improve the flow and attainment in online learning? *Journal of Educational Multimedia and Hypermedia, 18*(4), 385-403.

Harp, S. F. & Maslich, A. A. (2005). The consequences of including seductive details during lecture. *Teaching of Psychology, 32*(2), 100-103.

Harp, S. F., & Mayer, R. E. (1997). The role of interest in learning from scientific text and illustrations: On the distinction between emotional interest and cognitive interest. *Journal of Educational Psychology, 89*, 92-102.

Harp, S. F., & Mayer, R. E. (1998). How seductive details do their damage: A theory of cognitive interest in science learning. *Journal of Educational Psychology, 90*(3), 414-434.

Hidi, S. (1990). Interest and its contribution as a mental resource for learning. *Review of Educational Research, 60*(4), 549–571.

Hidi, S., & Baird, W. (1986). Interestingness-A neglected variable in discourse processing. *Cognitive Science, 10*(2), 179-194.

Hidi, S., & Baird, W. (1988). Strategies for increasing text-based interest and students' recall of expository texts. *Reading Research Quarterly, 23*(4), 465-483.

Hidi, S., & Anderson, V. (1992). Situational interest and its impact on reading and expository writing. In A. Renninger, S. Hidi, and A. Krapp (Eds.), *The role of interest in learning and development* (pp. 215-238). Hillsdale, NJ: Lawrence Erlbaum.

Hidi, S., & Harackiewicz, J. H. (2000). Motivating the academically unmotivated: A critical issue for the 21st century. *Review of Educational Research, 70*(2), 151-179.

Hidi, S., & Renninger, K. A. (2006). The four-phase model of interest development. *Educational Psychologist, 41*(2), 111-127.

Hidi, S., Renninger, K. A., & Krapp, A. (1992). The present state of interest research. In A. Renninger, S. Hidi, and A. Krapp (Eds.), *The role of interest in learning and development* (pp. 433-446). Hillsdale, NJ: Lawrence Erlbaum.

Isen, A. M., Daubman, K. A., & Nowicki, G. P. (1987). Positive affect facilitates creative problem solving. *Journal of Personality and Social Psychology, 52*(6), 1122-1131.

Izard, C. E., & Ackerman, B. P. (2000). Motivational, organizational, and regulatory functions of discrete emotions. In M. Lewis & J. M. Haviland-Jones (Eds.), *Handbook of emotion* (Vol. II, pp. 253-264). New York, NY: Guildford Publications, Inc.

Jose, P. E., & Brewer, W. F. (1984). Development of story liking: Character identification, suspense, and outcome resolution. *Developmental Psychology, 20*(5), 911-924.

Kalyuga, S. (2006). *Instructing and testing advance learners: A cognitive load approach.* New York: Nova Science.

Kalyuga, S. (2007). Expertise reversal effect and its implications for learner-tailored instruction. *Educational Psychology Review, 19*(4), 509-539.

Kalyuga, S., Ayers, P., Chandler, P., & Sweller, J. (2003). The expertise reversal effect. *Educational Psychologist, 38*, 23-31.

Keenan, J., Baillet, S., & Brown, P. (1984). The effects of causal cohesion on comprehension and memory. *Journal of Verbal Learning and Verbal Behavior, 23*(2), 115-126.

Kintsch, W. (1980). Learning from text, levels of comprehension, or: Why anyone would read a story anyway. *Poetics, 9*, 87–89.

Kintsch, W. (1998). *Comprehension: A Paradigm for Cognition*, Cambridge University Press, Cambridge, England.

Krapp, A., Hidi, S., and Renninger, K. A. (1992). Interest, learning and development. In A. Renninger, S. Hidi, and A. Krapp (Eds.), *The role of interest in learning and development* (pp. 3-25). Hillsdale, NJ: Lawrence Erlbaum.

Lehman, S., Schraw, G., McCrudden, M. T., & Hartley, K. (2007). Processing and recall of seductive details in scientific text. *Contemporary Educational Psychology, 32*(4), 569-587.

Lien, M. C., Ruthruff, E., & Johnston, J. C. (2006). Attentional limitations in doing two tasks at once: The search for exceptions. *Current Directions for Psychological Science, 15*(2), 89-93.

Magner, U. I. E., Schwonke, R., Aleven, V., Popescu, O., & Renkl, A. (2014). Triggering situational interest by decorative illustrations both fosters and hinders learning in computer-based learning environments. *Learning and Instruction, 29*, 141-152.

Mayer, R. E. (2005). Cognitive theory of multimedia learning. In R. E. Mayer (Ed.), *The Cambridge handbook of multimedia learning* (pp.31-48). New York: Cambridge University Press.

Mayer, R. E., Griffith, E., Jurkowitz, I. T. N., & Rothman, D. (2008). Increased interestingness of extraneous details in a multimedia science presentation leads to decreased learning. *Journal of Experimental Psychology: Applied, 14*(4), 329-339.

Mayer, R. E., Heiser, J., & Lonn, S. (2001). Cognitive constraints on multimedia learning: When presenting more material results in less understanding. *Journal of Educational Psychology, 93*, 187-198.

Mayer, R. E., & Jackson, J. (2005). The case for coherence in scientific explanations: Quantitative details can hurt qualitative understanding. *Journal of Experimental Psychology: Applied, 11,* 13-18.

Mayer, R. E., & Moreno, R. (1998). A split-attention effect in multimedia learning: Evidence for dual processing systems in working memory. *Journal of Educational Psychology, 90*(2), 312-320.

Mayer, R. E., & Moreno, R. (2003). Nine ways to reduce cognitive load in multimedia learning. In R. Bruning, C. A. Horn, & L. M. PytlikZillig (Eds.), *Web-based learning: What do we know? Where do we go?* (pp. 23-44). Greenwich, CT: Information Age Publishing.

Mayer, R. E., & Sims, V. K. (1994). For whom is a picture worth a thousand words? Extensions of a dual-coding theory of multimedia learning. *Journal of Educational Psychology, 86*(3), 389-401.

McCrae, R. R., & Costa, P. T. Jr. (1990). *Personality in adulthood*. New York, NY: Guilford.

McCrudden, M. T., & Corkill, A. J. (2010). Verbal ability and the processing of scientific text with seductive details sentences. *Reading Psychology, 31*(3), 282-300.

McDaniel, M. A., Waddill, P. J., Finstad, K., & Bourg, T. (2000). The effects of text-based interest on attention and recall. *Journal of Educational Psychology, 92*(3), 492-502.

Miller, G. A. (1956). The magical number seven, plus or minus two: Some limits on our capacity for processing information. *Psychological Review, 63*(2), 81-97.

Mitchell, M. (1993). Situational interest: Its multifaceted structure in the secondary school mathematics classroom. *Journal of Educational Psychology, 85*(3), 424-436.

Moreno, R. (2005). Instructional technology: Promise and pitfalls. In L. PythlikZillig, M. Bodvarsson, & R. Bruning (Eds.), *Technology-based education: Bringing researchers and practitioners together* (pp. 1-19). Greenwich, CT: Information Age Publishing.

Moreno, R. (2006). Does the modality principle hold for different media? A test of the method-affects-learning hypothesis. *Journal of Computer Assisted Learning, 22*(3), 149-158.

Moreno, R., & Mayer, R. E. (1999). Cognitive principles of multimedia learning: the role of modality and contiguity. *Journal of Educational Psychology, 91*(2), 358-368.

Moreno, R., & Mayer, R. E. (2000). A coherence effect in multimedia learning: The case for minimizing irrelevant sounds in the design of multimedia instructional messages. *Journal of Educational Psychology, 92*, 117-125.

Moreno, R., & Mayer, R. E. (2002). Verbal redundancy in multimedia learning: When reading helps listening. *Journal of Educational Psychology, 92*, 156-163.

Moreno, R., & Park, B. (2010). Cognitive load theory: Historical development and relation to other theories. In J. Plass, R. Moreno, & R. Brünken (Eds.), *Cognitive load theory* (pp. 9-28). New York: Cambridge University Press.

Moreno, R., Mayer, R. E., Spires, H. A., & Lester, J. C. (2001). The case for social agency in computer-based teaching: Do students learn more deeply when they interact with animated pedagogical agents? *Cognition and Instruction, 19*(2), 177-213.

Muller, D. A., Lee, K. J., & Sharma, M. D. (2008). Coherence or interest: Which is the most important in online multimedia learning? *Australasian Journal of Educational Technology, 24*(2), 211-221.

Murphy, G. L., & Wright, J. C. (1984). Changes in conceptual structure with expertise: Differences between real-world experts and novices. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 10*, 144-155.

National Governors Association Center for Best Practices & Council of Chief State School Officers. (2010). *Common Core State Standards*. Washington, DC: Author.

Paas, F., Renkl, A., & Sweller, J. (2003). Cognitive load theory and instructional design: Recent developments. *Educational Psychologist, 38*, 1-4.

Paris, S. G., & Turner, J. C. (1994). Situated motivation. In P. R. Pintrich, D. R. Brown, & C. E. Weinstein (Eds.), *Student motivation, cognition, and learning: Essays in honor of Wilbert J. McKeachie* (pp. 213-238). Mahwah, NJ: Erlbaum.

Park, B., Flowerday, T., & Brünken, R. (2015). Cognitive and affective effects of seductive details in multimedia learning. *Computers in Human Behavior, 44*, 267-278.

Park, S., Kim, M., Lee, Y., Son, C., & Lee, M. (2005). The effects of visual illustrations on learners' achievement and interest in PDA- (Personal Digital Assistant) based learning. *Journal of Educational Computing Research, 33*(2), 173-187.

Park, B., Korbach, A., & Brünken, R. (2015) Do learner characteristics moderate the seductive-details-effect? A cognitive-load-study using eye-tracking. *Educational Technology & Society, 18*(4), 24-36.

Park, B., Plass, J. L., & Brünken, R. (2014). Cognitive and affective processes in multimedia learning. *Learning and Instruction, 29*, 125-127.

Park, S., & Lim, J. (2007). Promoting positive emotion in multimedia learning using visual illustrations. *Journal of Educational Multimedia and Hypermedia, 16*(2), 141-162.

Pavio, A. (1986). *Mental representations: A dual coding approach*. Oxford, England: Oxford University Press.

Peshkam, A., Mensink, M. C., Putnam, A. L., & Rapp, D. N. (2011). Warning readers to avoid irrelevant information: When being vague might be valuable. *Contemporary Educational Psychology, 36*(3), 219-231.

Plass, J. L., Chun, D. M., Mayer, R. E., & Leutner, D. (2003). Cognitive load in reading a foreign language text with multimedia aids and the influence of verbal and spatial abilities. *Computers in Human Behavior, 19*(2), 221-243.

Plass, J., Moreno, R., & Brünken, R. (Eds.) (2010). *Cognitive load theory*. New York, NY: Cambridge University Press.

Renninger, K. A. (1992). Individual interest and development: Implications for theory and practice. In A. Renninger, S. Hidi, and A. Krapp (Eds.), *The role of interest in learning and development* (pp. 362-395). Hillsdale, NJ: Lawrence Erlbaum.

Rey, G. D. (2011). Seductive details in multimedia messages. *Journal of Educational Multimedia and Hypermedia, 20*(3), 283-314.

Rey, G. D. (2012). A review of research and a meta-analysis of the seductive detail effect. *Educational Research Review, 7*(3), 216-237.

Rowland-Bryant, E., Skinner, A. L., Dixon, L., Skinner, C. H., Saudargas, R. (2011). Using relevant video clips from popular media to enhance learning in large introductory psychology classes: A pilot study. *Journal on Excellence in College Teaching, 22*(2), 51-65.

Rowland, E., Skinner, C. H., Davis-Richards, K., Saudargas, R., & Robinson, D. H. (2008). An investigation of placement and type of seductive details: The primacy effect of seductive details on text recall. *Research in the Schools, 15*(2), 80-90.

Rueda, R., & Moll, L. C. (1994). A sociocultural perspective on motivation. In H. F. O'Neil, Jr., & M. Drillings (Eds.), *Motivation: Theory and research* (pp. 117-137). Mahwah, NJ: Erlbaum.

Rummer, R., Schweppe, J., Fürstenberg, A., Seufert, T., & Brünken, R. (2010). Working memory interference during processing texts and pictures: Implications for the explanation of the modality effect. *Applied Cognitive Psychology, 24*(2), 164-176.

Sanchez, C., & Wiley, J. (2006). An examination of the seductive details effect in terms of working memory capacity. *Memory and Cognition, 34*(2), 344-355.

Sansone, C., Wiebe, D. J., & Morgan, C. (1999). Self-regulating interest: The moderating role of hardiness and conscientiousness. *Journal of Personality,67*(3), 701-733.

Schank, R. C. (1979). Interestingness: Controlling influences. *Artificial Intelligence, 12*(3), 273-297.

Schiefele, U. (1991). Interest, learning, and motivation. *Educational Psychologist, 26*(3), 299-324.

Schiefele, U. (1992). Topic interest and levels of text comprehension. In A. Renninger, S. Hidi, and A. Krapp (Eds.), *The role of interest in learning and development* (pp. 151-182). Hillsdale, NJ: Lawrence Erlbaum.

Schiefele, U. (1996). Topic interest, text representation, and quality of experience. *Contemporary Educational Psychology, 21*, 3-18.

Schiefele, U. (1999). Interest and learning in text. *Scientific Studies of Reading, 3*(3), 257-280.

Schnotz, W. (2011). Colorful bouquets in multimedia research: A closer look at the modality effect. *Zeitschrift für Pädogogische Psychologie, 25*(4), 269-276.

Schnotz, W., Fries, S., & Horz, H. (2009). Motivational aspects of cognitive load theory. In M. Wosnitza, S. A. Karabenick, A. Efklides, & P. Nenniger (Eds.), *Contemporary motivation research: From global to local perspectives* (pp. 69-96). Göttingen & New York: Hogrefe & Huber.

Schraw, G. (1997). Situational interest in literary text. *Contemporary Educational Psychology, 22*(4), 436-456.

Schraw, G. (1998). Processing and recall differences among seductive details. *Journal of Educational Psychology, 90*, 3-12.

Schraw, G., & Dennison, R. S. (1994). The effect of reader purpose on interest and recall. *Journal of Reading Behavior, 26*, 1-18.

Schraw, G., & Lehman, S. (2001). Situational interest: A review of the literature and directions for future research. *Educational Psychology Review, 13*(1), 23-52.

Schraw, G., Bruning, R., & Svoboda, C. (1995). Sources of situational interest. *Journal of Reading Behavior, 27*, 1-17.

Schutz, P. A. (1994). Goals as the transactive point between motivation and cognition. In P. R. Pintrich, D. R. Brown, & C. E. Weinstein (Eds.), *Student motivation, cognition, and learning: Essays in honor of Wilbert J. McKeachie* (pp. 113-133). Mahwah, NJ: Erlbaum.

Shen, B., McCaughtry, N., Martin, J., & Dillion, S. (2006). Does "Sneaky Fox" facilitate learning? Examining the effects of seductive details in physical education. *Research Quarterly for Exercise and Sport, 77*(4), 498-506.

Sweller, J. (1994). Cognitive load theory, learning difficulty, and instructional design. *Learning and Instruction, 4*(4), 295-312.

Sweller, J. (2003). Evolution of human cognitive architecture. In B. Ross (Eds.), *The psychology of learning and motivation* (Vol. 43, pp. 215-266). San Diego, CA: Academic Press.

Sweller, J. (2005). Implications of cognitive load theory for multimedia learning. In R. E. Mayer (Ed.), *The Cambridge handbook of multimedia learning* (pp. 19-30). Cambridge: University Press.

Sweller, J., Ayres, P., & Kalyuga, S. (2011). *Cognitive load theory*. New York, NY: Springer.

Sweller, J., & Chandler, P. (1991). Evidence for cognitive load theory. *Cognition and Instruction, 8*(4), 351-362.

Sweller, J., van Merriënboer, J. J. G., & Paas, F. G. W. C. (1998). *Educational Psychology Review, 10*(3), 251-296.

Thalheimer, W. (2004, November). *Bells, whistles, neon, and purple prose: When interesting words, sounds, and visuals hurt learning and performance—a review of the seductive-augmentation research*. Retrieved November 13, 2016 from http://willthalheimer. typepad.com /files/review_seductive_augmentations_pdf6.pdf

Tobias, S. (1994). Interest, prior knowledge, and learning. *Review of Educational Research, 64*, 37-54.

Tobias, S. (1996). Interest and metacognitive word knowledge. *Journal of Educational Psychology, 87*(3), 399-405.

Towler, A., Kraiger, K., Sitzmann, T., Van Overberghe, C., Cruz, J., Ronen, E., & Stewart, D. (2008). The seductive details effect in technology-delivered instruction. *Performance Improvement Quarterly, 21*, 1-23.

Towler, A. (2009). Effects of trainer expressiveness, seductive details, and trainee goal orientation on training outcomes. *Human Resource Development Quarterly, 20*(1), 65-84.

Turner, J. C., & Patrick, H. (2008). How does motivation develop and why does it change? Reframing motivation research. *Educational Psychologist, 43*(3), 119-131.

Turner, M. L., & Engle, R. W. (1989). Is working memory capacity task dependent? *Journal of Memory & Language, 28*(2), 127-154.

Um, E. R., Plass, J. L., Hayward, E. O., & Homer, B. D. (2012). Emotional design in multimedia learning. *Journal of Educational Psychology, 104*(2), 485-498.

vin Dijk, T. A., & Kitntsch, W. (1983). *Strategies for discourse processing*. New York, NY: Academic Press.

Voorhies, D. and Scandura, J.M. 1977. "Determination of memory load in information processing". In J. M. Scandura (Ed.), *Problem solving*. New York: Academic Press.

Wade, S. E. (1992). How interest affects learning from text. In A. Renninger, S. Hidi, and A. Krapp (Eds.), *The role of interest in learning and development* (pp. 281-296). Hillsdale, NJ: Lawrence Erlbaum.

Wade, S. E., & Adams, B. (1990). Effects of importance and interest in recall of biographical text. *Journal of Reading Behavior, 22*(4), 331-353.

Wade, S. E., Buxton, W. M., & Kelly, M. (1999). Using think-alouds to examine reader-text interest. *Reading Research Quarterly, 34*(2), 194-216.

Wade, S. E., Schraw, G., Buxton, W. M., & Hayes, M. T. (1993). Seduction of the strategic reader: Effects of interest on strategies and recall. *Reading Research Quarterly, 28*(2), 3-24.

Wang, Z., & Adesope, O. (2014). Effects of seductive details on multimedia learning. *Journal of Studies in Education, 4*(3), 32-44.

Wang, Z., & Adesope, O. (2016) Exploring the effects of seductive details with the 4-phase model of interest. *Learning and Motivation, 55*, 65-77.

Weingarten, R. (2014). International education comparisons: How American education reform is the new status quo. *New England Journal of Public Policy, 26*, 1-10.

Wiley, J. (2003). Cognitive and educational implications of visually-rich media: Images and imagination. In M. Hocks & M. Kendrick (Eds.), *Eloquent images: Writing visually in new media* (pp. 201-218). Cambridge, MA: MIT Press.

Williams, E. J. (1949). Experimental designs balanced for the estimation of residual effects of treatments. *Australian Journal of Chemistry, 2*(2), 149-168.

Wright, P., Milroy, R., & Lickorish, A. (1999). Static and animated graphics in learning from interactive texts. *European Journal of Psychology of Education, 14*(20), 203-224.

Yoo, A., & Catrambone, R. (2016, September). The influence of situational interest on learning outcomes for science videos. In *Proceedings of the Human Factors and Ergonomics Society Annual Meeting* (Vol. 60, No. 1, pp. 1404-1408). Los Angeles, CA: SAGE Publications.

Zhang, W., & Luck, S. J. (2009). Sudden death and gradual decay in visual working memory. *Psychological Science, 20*(4), 423-428.

Video Clip References

Bianchi, B., Dezaki, O., & Rudish, R. (Directors), & Kling, W., Cohen, H. R., & Maliani, F. (Writers). (1984, June 27). Episode 1: Peril in the Pits [Television series episode]. In *Rainbow Brite*. United States & Japan: DIC Entertainment & Tokyo Movie Shinsha.

Bird, B., Walker, J., Lasseter, J., Lucroy, J., Lin, P., Jimenez, A., Nelson, C. T. (2005). *The Incredibles*. United States: Walt Disney Pictures & Pixar Animation Studios.

Clements, R., & Musker, J. (Directors). (1992). *Aladdin* [Motion picture]. United States: Walt Disney Feature Animation.

Cosgrove, B., & Hall, M. (Producers), & Alfonso, C., Randall, C., & Scoble, K. (Directors). (1989, January 17). Episode 19: A Family Reunion [Television series episode]. In *Count Duckula*. United Kingdom: Cosgrove Hall & Thames.

Disney, W. (Producer), & Geronimi, C., Jackson, W., & Luske, H. (Directors). (1951). *Alice in Wonderland* [Motion picture on DVD]. United States: Walt Disney Productions.

Flemming, V. (Director). (1939). *The Wizard of Oz* [Motion picture]. United States: MGM.

Hollander, N. (Writer), Reyna, G. (Director), & Speilberg, S. (Producer). (1993, June 28). Episode 28: Mesozoic Mindy [Television series episode]. In *Animaniacs*. United States: Warner Bros.

Lounsbery, J., & Reitherman, W. (Directors). (1977). *The Many Adventures of Winnie the Pooh* [Motion picture]. United States: Walt Disney Productions.

Platt, K. (Writer), & Hanna, W., & Barbera, J. (Directors). (1961, December 27). Episode 14: The Tycoon [Television series episode]. In *Top Cat*. United States: Hanna-Barbera Productions.

Scheimer, L. (Producer). (1987, September 14). Episode 1: The Disappearance of Thirty-Thirty

[Television series episode]. In *Bravestarr*. United States: Filmation.

Schumann, J. (Writer), & Jean-Marie, O. (Director). (1985, October 26). Season 3: Episode 7: Ben Dinky [Television series episode]. In *The Littles*. United States: ABC Entertainment & DIC Entertainment.

Stanton, A. & Unkrich, L. (Directors). (2003). *Finding Nemo* [Motion picture]. United States: Walt Disney Pictures and Pixar Animation.

APPENDIX

Appendix A

Teacher Informed Consent Form

Teacher Consent Form

Dear Teacher,

My name is Jonah Ruddy, and I am a graduate student in the School Psychology Ph.D. program at the

University of Tennessee. I would like to conduct research in your classroom during the 2017 Fall semester under the supervision of my advisor, Dr. Christopher H. Skinner, a professor at the University of Tennessee. The purpose of this study is to examine the effect of multimedia, specifically short video clips, on student learning and to determine whether student familiarity with the media enhances learning and retention. I have obtained the relevant school, district, and university approvals to contact you for participation in this research.

If you agree for your classroom to participate, I will give you consent forms to send home with your students. Before participating in the study, students who received permission to participate will be read an assent form and asked to indicate their willingness to participate. They will be told that they can stop participating at any time.

Each student will study a Power Point psychology lesson using a lap top, which includes several short video clips, during class. These activities will be under the direction and supervision of UT school psychology graduate students. These video clips are taken from cartoons and films that are rated for viewing by all audiences. Upon completion of the Power Point lesson, the students will be asked to complete a short assessment containing 28 items and a survey about the videos. Two weeks later, the students will be asked to take another follow-up assessment of 28 items. The study will require that the participants spend approximately 45-60 minutes participating in these initial activities and 30 minutes on the follow-up day as arranged by you. Data will be collected by trained school psychology graduate student researchers working with the students.

The possible risks associated with participation in this research include students becoming fatigued or bored while viewing the lesson and completing assessment forms. To minimize these risks, we will be working with the students for as short period of time as possible. While we plan on sharing our research findings and discussing our psychological research methods with your psychology class, your students will not benefit directly from participating in this research; however, the findings of this study will add to the understanding of reading and thus potentially contribute to the

development of methods which enhance the education of children.

Your name will not be recorded on any study materials. Student participants' names will not be recorded on the data forms; rather, students will be assigned code numbers so they cannot be identified. Participation in this study is voluntary, which means that you do not have to participate and can stop at any time without penalty. Your students may also choose to stop participating at any time. Although the results of our research may be shared with others through professional publications or presentation, your name or the names of your students will never be revealed.

Enclosed is a copy of this letter for your records. If you agree to participate in this research, please complete the section below on one copy of this letter and return it to me. Your signature indicates that you have read and understand the information above, that you willingly agree for your classroom to participate, and that you may withdraw at any time and discontinue participation without penalty. If you have any questions about this study or consent form, feel free to contact me, Jonah Ruddy, at jruddy@vols.utk.edu or (865) 548-3753, or my advisor, Chris Skinner, at cskinne1@utk.edu or (865) 974-8403. If you have questions about your rights as a participant, please contact the University of Tennessee IRB Compliance Officer at utkirb@utk.edu or (865) 974-7697.

Thank you for your time and consideration, Jonah Ruddy, M.S. University of Tennessee, Department Educational Psychology and Counseling Knoxville, TN 37996 (865) 548-3753

TEACHER CONSENT

I have read the above information. I have received a copy of this form. I agree to participate in this study.

Participant's Name (printed)

_____

Participant's Signature_____

Date _____

IRB NUMBER: UTK IRB-16-03360-XP

IRB APPROVAL DATE: 12/19/2016

IRB EXPIRATION DATE: 12/18/2017

Appendix B

Parent Informed Consent Form

The Effect of Familiarity on Learning with Video Clips

Parental Consent Form

Dear Parent,

My name is Jonah Ruddy, and I am a graduate student in the School Psychology doctoral program at the University of Tennessee. I am currently working on a research project designed to investigate the role of multimedia in educational lessons, and I am seeking your consent for your son or daughter to participate in this research. This research will be supervised by my advisor, Dr. Christopher H. Skinner, a professor at the University of Tennessee.

As a regular part of instruction, your son or daughter will study a Power Point psychology lesson using a lap top, which includes several short video clips, during his/her Psychology class. These activities will be under the direction and supervision of UT school psychology graduate students. These video clips are taken from cartoons and films that are rated for viewing by all audiences. The day after completion of the Power Point lesson, your child will be asked to complete a short assessment containing 28 items and a survey about the videos. Two weeks later, your son or daughter will be asked to take another follow-up assessment of 28 items.

If you agree to allow your child to participate, I will use the results of the survey and of the two assessments for my research. While we plan on sharing our research findings and discussing our psychological research methods with your child's psychology class, your child will not benefit directly from participating in this research; however, the findings of this study will add to the understanding of reading and thus potentially contribute to the development of methods which enhance the education of children.

There are no foreseeable risks involved in this research other than possible breach of confidentiality, which we have built in protections against. Your child's name will not be written on his/her performance data, and all data will

be stored securely and will be made available only to persons conducting the study. Although the results of our research may be shared with others through professional publications and presentations, your child's name will never be revealed.

If you have any questions about this study or consent form, feel free to contact me, Jonah Ruddy, at jruddy@vols.utk.edu or (865) 548-3753, or my advisor, Chris Skinner, at cskinne1@utk.edu or (865) 974-8403. If you have questions about your child's rights as a participant, please contact the University of Tennessee IRB Compliance Officer at utkirb@utk.edu or (865) 974-7697. If you agree to allow your child to participate in this research, please sign the form in the space provided and return the form to your child's teacher.

Your child's participation in this study is voluntary; you and/or your child may decline to participate without penalty. If you decide to participate, you may withdraw from the study at any time without penalty or loss of benefits to which you are otherwise entitled, by notifying me or your child's teacher.

Thank you for your and your child's time and consideration,

Jonah Ruddy University of Tennessee, Educational Psychology and Counseling
Knoxville, TN 37996 (865) 548-3753 jruddy@vols.utk.edu

CONSENT FOR STUDENT PARTICIPATION

I have read the above information. I have received a copy of this form. I agree to allow my child to participate in this research.

Child's Name (printed): _____

Parent's Name (printed): _____

Signature: _____ Date: _____

Parent or Legal Guardian

IRB NUMBER: UTK IRB-16-03360-XP

IRB APPROVAL DATE: 12/19/2016

IRB EXPIRATION DATE: 12/18/2017

Appendix C

Participant Informed Assent Form

The Effect of Familiarity on Learning with Video Clips Student Assent Form

My name is Jonah Ruddy, and I am a graduate student in the Ph.D. School Psychology Program at the University of Tennessee. I am researching how students learn with short video clips and would like to have your help. Today in class, you will be asked to view a psychology Power Point lesson on a laptop. Tomorrow, you will be asked to answer questions about what you have learned and to fill out a short survey about video clips you may see as part of the lesson. Two weeks after completing the set of questions, I will ask you to take another short test about what you have learned today.

If you agree to participate, I will use your survey and your answers to the questions as data for my research. You can quit the study at any time by letting me or your teacher know that it is not OK for me to use your information. You will not be penalized for quitting the study. How well you do on this task will not affect your grades, and your name will not be used so no one will know what your answers are.

If you agree to participate please mark the space next to "yes" and write your name on the line below. If you do not wish to participate, please turn in a blank form.

Thank you for your help. Sincerely, Jonah Ruddy

Yes, I agree that Jonah Ruddy may use my answers about what I have learned, and my survey results, for his research.

Name (printed): _____

Signature: _____

Date: _____

IRB NUMBER: UTK IRB-16-03360-XP

IRB APPROVAL DATE: 12/19/2016

IRB EXPIRATION DATE: 12/18/2017

Appendix D

Participant Informed Consent Form

The Effect of Familiarity on Learning with Video Clips Study Informed Consent Form

My name is Jonah Ruddy, and I am a graduate student in the School Psychology doctoral program at the University of Tennessee. I am currently working on a research project designed to investigate the role of multimedia in educational lessons, and I am seeking your consent to participate in this research. This research will be supervised by my advisor, Dr. Christopher H. Skinner, a professor at the University of Tennessee.

As a regular part of instruction, you will study a Power Point psychology lesson using a lap top, which includes several short video clips, during your Psychology class. These activities will be under the direction and supervision of UT school psychology graduate students. These video clips are taken from cartoons and films that are rated for viewing by all audiences. The day after completion of the Power Point lesson, you will be asked to complete a short assessment containing 28 items and a survey about the videos. Two weeks later, you will be asked to take another follow-up assessment of 28 items.

If you agree to allow to participate, I will use the results of the survey and of the two assessments for my research. While we plan on sharing our research findings and discussing our psychological research methods with your class, you will not benefit directly from participating in this research; however, the findings of this study will add to the understanding of learning and thus potentially contribute to the development of methods which enhance the education of children.

There are no foreseeable risks involved in this research other than possible breach of confidentiality, which we have built in protections against. Your name will not be written on your performance data, and all data will be stored securely and will be made available only to persons conducting the study. Although the results of our research may be shared with others through professional publications and presentations, your name will never be revealed. How well you do on this task will not affect your class grades.

Your participation in this study is voluntary; you may decline to participate

without penalty. If you decide to participate, you may withdraw from the study at any time without penalty or loss of benefits to which you are otherwise entitled, by notifying me or your teacher.

If you have any questions about this study or consent form, feel free to contact me, Jonah Ruddy, at jruddy@vols.utk.edu or (865) 548-3753, or my advisor, Chris Skinner, at cskinne1@utk.edu or (865) 974-8403. If you have questions about your rights as a participant, please contact the University of Tennessee IRB Compliance Officer at utkirb@utk.edu or (865) 974-7697. If you agree to participate in this research, please sign the form in the space provided.

I have read the above information. I have received a copy of this form. Yes, I agree that Jonah Ruddy may use my answers about what I have learned, and my survey results, for his research.

Name (printed): _____

Signature: _____ Date: _____

IRB NUMBER: UTK IRB-16-03360-XP IRB APPROVAL DATE: 04/11/2017 IRB EXPIRATION DATE: 12/18/2017

Appendix E

Treatment Power Point Lesson

Personality Traits & Attribution Theory

Attribution Theory

- How do people tend to explain the actions of themselves and others?
- Fritz Heider (1958) proposed an explanation for this behavior in his work *The Psychology of Interpersonal Relationships.*
- The ideas in this book laid the foundation for the development of **Attribution Theory**.

Attribution Theory

- Heider's (1958) work on **Attribution Theory** proposes that:
  - Every person is a naïve, intuitive psychologist who constructs causal theories regarding behavior.
  - People look for explanations to attribute to the behavior of others because they believe there are motives behind their own behavior.
  - People construct causal theories in an attempt to understand, predict, and exert control on the environment.

Attribution Theory

- Key aspects of Heider's (1958) **Attribution Theory** include:
  - **Actor-Observer Effect**: Individual attributions about behavior depend on whether or not the individual was performing or observing the behavior.
    - Individuals tend to attribute their own actions to *external factors*
    - The actions of others are typically attributed to *internal factors*
    - For example,
      - If John is late to school, he attributes his tardiness to the heavy traffic and rainy weather.
      - On the other hand, John blames Kim's lateness on her being disorganized and lazy.

Attribution Theory

- **Situational Attribution:** A person's behavior is attributed to *external* factors in the environment
  - Often used to describe causes of one's own behaviors
  - Examples: social pressure, time of day, rewards/punishments
    - I decided to go to the dance because everyone else was going. All of my friends wanted me to be there.

Attribution Theory Variables

- Insert one of the following according to randomized, counterbalancing method:
  - No Video Slide
  - Unfamiliar Video Slide "Bravestarr"
  - Familiar Video Slide "Wizard of Oz"
- Remove this slide from presentation before data collection

Attribution Theory

- This video clip provides an example of **dispositional attribution** in a person attributes behaviors to disposition factors.
- Please watch it carefully.

Video Clip Attached Here

Attribution Theory

- **Dispositional Attribution:** A person's behavior is attributed to *internal* factors, or dispositions
  - Often used to describe the causes of someone else's behavior
  - Examples: beliefs, attitudes, personalities
    - Makayla doesn't want to come to the school dance with us because she's boring and anti-social.

Personality Traits

- Personality is a factor commonly used in dispositional attribution.
  - For example, Lee is always kind to everyone because he has such a happy personality.
- Personality is commonly described using **traits**.
- **Traits** define how a person will behave in certain situations.

Personality Traits

- Personality traits are often seen through consistent behaviors across similar or related settings and situations.
  - These traits demonstrate **cross-situational consistency**.
  - These traits also exhibit **stability** by being displayed regularly over time.

Personality Traits

- Mischel (1968) argued that personality traits are not as consistent as believed.
  - He noted that behaviors depends on situational (external) factors more than dispositional (internal) factors.
  - He cited studies demonstrating inconsistencies in behaviors across situations.
- Epstein (1983) argued that traits do not predict behaviors in individual situations.
  - He believed traits indicate classes of behaviors that can occur over a variety of situations.
  - He conducted a study supporting the idea that traits show behavioral trends over time.

The Five-Factor Model of Personality

- **The Five-Factor Model of Personality (FFM)** was developed by McCrae and Costa, 1999).
- The FFM describes personality according to a person's performance of five measurable personality traits.
- The five traits can described according to a spectrum indicating a range of personality characteristics.

The Five-Factor Model of Personality

- The FFM traits are based on an analysis of the relation between trait words in the English language.
- Studies in other languages have shown that similar factors emerge in other languages.
- This finding suggests that the FFM traits characterize universal human traits.
- Openness received the weakest support for universality.

The Five-Factor Model of Personality

- FFM in the following factors, or traits, of personality:
  - **O**penness to Experience
  - **C**onscientiousness
  - **E**xtraversion
  - **A**greeableness
  - **N**euroticism
  - These factors can be remembered through the acronym: **OCEAN**

Openness to Experience Variables

- Insert one of the following according to randomized, counterbalancing method:
  - No Video Slide
  - Unfamiliar Video Slide "Animaniacs"
  - Familiar Video Slide "Alice in Wonderland"
- Remove this slide from presentation before data collection

Openness to Experience

- This video clip demonstrates an individual with a personality that is high trait in **openness to experience**.
- Please watch it carefully.

Video Clip Attached Here

Openness to Experience

- **Openness to Experience** describes a general appreciation for art, emotion, adventure, unusual ideas, imagination, curiosity, and variety of experience.
- Openness to Experience is alternately labeled culture, intelligence, or openness.
- Openness to Experience is often high in very creative people.
- High trait Openness to Experience is correlated with…
  - Active intelligence
  - Education
  - Number of career changes
  - Aesthetic interests and sensitivity
  - Intellectual absorption
  - Broad values

Openness to Experience

High Trait	Low Trait
• Fantasy	• Facts
• Love of Art and Aesthetics	• Not Interested in the Arts
• Awareness and Expression of Feelings	• Less Awareness and Limited Expression of Feelings
• Enjoys Trying New Things	• Enjoys Familiar Things
• Challenges Authority and Convention	• Supports Conventional Approaches and Tradition
• Curious	• Uncurious
• Wide Range of Interests	• Limited Range of Interests

Conscientiousness Variables

- Insert one of the following according to randomized, counterbalancing method:
  - No Video Slide
  - Unfamiliar Video Slide "The Littles"
  - Familiar Video Slide "The Mini Adventures of Winnie the Pooh"
- Remove this slide from presentation before data collection

Conscientiousness

- This video clip demonstrates an individual with a personality that is low trait in **conscientiousness**.
- Please watch it carefully.

Video Clip Attached Here

Conscientiousness

- **Conscientiousness** describes an individual's level of organization, persistence, and motivation in goal-directed behavior.
- High trait Conscientiousness is related to success across jobs and situations.
  - High trait Conscientiousness in college level individuals predicts job success years in the future
- High trait Conscientiousness is related to good scores on integrity tests.

Conscientiousness

High Trait	Low Trait
• Hard-Working	• Lazy
• Makes Decisions Deliberately	• Makes Decisions Impulsively
• Reliable	• Unreliable
• Well-Organized	• Disorganized
• Strives for High Achievement	• Unconcerned with Achievement
• Self-Disciplined	• Undisciplined
• Frugal	• Self-Indulgent

Extraversion Variables

- Insert one of the following according to randomized, counterbalancing method:
  - No Video Slide
  - Unfamiliar Video Slide "Top Cat"
  - Familiar Video Slide "Aladdin"
- Remove this slide from presentation before data collection

Extraversion

- This video clip demonstrates an individual with a personality that is high trait in **extraversion**.
- Please watch it carefully.

Video Clip Attached Here

Extraversion

- **Extraversion** is describes the quantity and intensity of interpersonal interactions, activity level, and positive emotions.
- Individuals high trait in Extraversion are often:
  - More resistant to distraction and cognitive interference
  - Perform better on tasks requiring divided attention.
- Individuals low trait in Extraversion are often quiet and less engaged in social world.
  - This is not due to shyness or depression.

Extraversion

High Trait	Low Trait
• Enjoys Group Activities	• Enjoys Solitary Activities
• Friendly and Reaches Out	• Distant and Reserved
• Prefers to Lead and Take Charge	• Prefers to Let Others Lead
• Energetic and Needs Action	• Relaxed and Slower Paced
• Thrill-Seeking and Easily Bored	• Contented and Avoids Risks
• Displays Many Positive Emotions (Can Hide Depression)	• Displays Less Positive Emotions (Not Depressed)
• Talkative	• Quiet

Agreeableness Variables

- Insert one of the following according to randomized, counterbalancing method:
  - No Video Slide
  - Unfamiliar Video Slide "Rainbow Brite"
  - Familiar Video Slide "The Incredibles"
- Remove this slide from presentation before data collection

Agreeableness

- This video clip demonstrates an individual with a personality that is low trait in **agreeableness**.
- Please watch it carefully.

Video Clip Attached Here

Agreeableness

- **Agreeableness** describes a person's tendency toward compassion, cooperation, and trusts in feelings, thoughts, and actions toward others.
- Measures of Agreeableness also include altruism, affection, humaneness, sincerity
- High trait Agreeableness is related to good parenting in mothers.
- Individuals low trait in Agreeableness are often mistrustful of others and have difficulty getting along with others.

Agreeableness

High Trait	Low Trait
• Trusting of Others	• Mistrustful of Others
• Soft-Hearted and Lenient	• Unforgiving and Critical
• Helpful and Altruistic	• Uncooperative and Selfish
• Good-natured and Friendly	• Aloof and Unsociable
• Honest and Straightforward	• Dishonest and Manipulative
• Humble	• Prideful
• Sympathetic and Concerned	• Unsympathetic and Callous

Neuroticism Variables

- Insert one of the following according to randomized, counterbalancing method:
  - No Video Slide
  - Unfamiliar Video Slide "Count Duckula"
  - Familiar Video Slide "Finding Nemo"
- Remove this slide from presentation before data collection

Neuroticism

- This video clip demonstrates an individual with a personality that is high trait in **neuroticism**.
- Please watch it carefully.

Video Clip Attached Here

Neuroticism

- **Neuroticism** describes an individual's level of healthy emotional adjustment and stability, or tendency to experience negative (unpleasant) feelings.
- Individuals with high trait Neuroticism often have more bad feelings and psychological distress due to:
  - Creating more stressful situations in their own lives.
  - Reacting more strongly negatively to stressful events.
  - Projecting bad feelings even without stressors.
- Individuals with high trait Neuroticism frequently have more psychosomatic symptoms, irritation, anger, and nervousness.
- Individuals with low trait Neuroticism are often calm, emotionally stable, and free from persistent negative feelings.

Neuroticism

High Trait	**Low Trait**
• Tense and Nervous	• Relaxed and Fearless
• Temperamental	• Even-tempered
• Feel Insecure and Inadequate	• Feel Self-Assured and Capable
• Susceptible to Strong Cravings	• Able to Resist Urges
• Panics and Cracks Under Stress	• Poised and Cool Under Pressure
• Irritable and Quick to Anger	• Patient and Tranquil
• Hypochondriac	• Sensible about Health

Criticisms of Five-Factor Model of Personality

- The model is theory-driven rather than determined by empirical inevitability.
- The FFM traits have repeatedly been found to be too broad and correlate with each other.
- There are many aspects of personality that cannot be captured with a single-word term and not enough clarity over what the factors actually mean.
- Some personality traits found to be independent of the FFM traits:
  - Religion/Spirituality
  - Conceit/Snobbery
  - Humor/Wit
  - Sexuality

Appendix F

Treatment Posttest Before Counterbalancing

Please read each of the following items carefully. Select one response that provides the best answer to question. Participation and all responses are voluntary.

1. Demonstrating a willingness to try something new and appreciating cultural differences is associated with which of the following traits:

    a. Extraversion

    b. Agreeableness

    c. Conscientiousness

    d. Openness to Experience

2. Having a high rating in the Openness to Experience trait is correlated with:

    a. a lifelong devotion to a career.

    b. accepting established ideas.

    c. having an active intelligence.

    d. being resistant to distraction.

3. Phillip and his girlfriend, Layla, are making plans for Saturday night. Layla saw an advertisement for a new Vietnamese restaurant in town. She asked Philip if he wanted to try it out because it offered a type of food neither had even eaten before. Philip thought about it for a few minutes before declining. He tells Layla that he doesn't want to waste money on something that he doesn't know about and may not even like. He proposes they grab dinner at the diner they go to frequently.

    Based on this vignette, Phillip's personality can be described as low trait in:

    a. Neuroticism

    b. Openness to Experience

    c. Agreeableness

    d. Extraversion

4. José is having trouble staying awake in his government class because he is easily bored when his teacher, Mr. Brown, stands in the front of the room and lectures for the entire class period. He can't wait for next period to start so he can go to Ms. Watkin's chemistry class. José really likes learning about new scientific discoveries and trying out new things in lab.

   Based on this vignette, José's personality can be described as high trait in:
   a. Openness to Experience

   b. Conscientiousness

   c. Extraversion

   d. Agreeableness

5. Angelo is a student who has a personality that scores high in the Conscientiousness trait. Which of the following statements most accurately reflects how this trait may impact Angelo's life?

   a. He will perform better on tasks requiring divided attention.

   b. He will have difficulty getting along with others.

   c. He is likely to be success in his career after graduation.

   d. He will be emotionally stable and suffer less from negative emotions.

6. A person who scores low in the Conscientiousness trait will most likely be described as:

   a. Self-Disciplined

   b. Disorganized

   c. Mistrustful

   d. Sensible

7. Tasha is eager to get a promotion at her job, and, because she doesn't want to fail, she has set up a plan. Each morning, she arrives a little early and prepares for the day, and she reviews how her day went every evening when gets home. Tasha knows that attendance is very important to her boss, so she makes sure she maintains a healthy lifestyle and never misses work. She also volunteers for extra work and stays late to get assignments done.

   Based on this vignette, Tasha's personality can be described as high trait in:

a. Extraversion

b. Neuroticism

c. Conscientiousness

d. Agreeableness

8. Hunter' has a major project due on Monday that counts for a large portion of his grade. Despite being given the assignment several weeks ago, he has put off working on it because it is March Madness season, and he doesn't want to miss a game. Saturday morning, Hunter takes out his backpack and looks for the directions. His bag is a mess, and he can't find the instruction sheet among all the other papers. He shrugs his shoulders and decides it's too much effort. He decides to head out to watch a movie at the theater instead.

   Based on this vignette, Hunter's personality can be described as low trait in:

   a. Agreeableness

   b. Openness to Experience

   c. Neuroticism

   d. Conscientiousness

9. A person who generally seems happy, loves exciting challenges, and gets along well with other people has a personality that is:

   a. High trait in Openness to Experience

   b. Low trait in Neuroticism

   c. Low trait in Conscientiousness

   d. High trait in Extraversion

10. Fred works as a manager in a busy restaurant. This job requires that he be able to focus and resist distractions, and he must be good at doing things that require him to pay attention to more than one thing at a time. These abilities are correlated with having a personality that is high in:

    a. Neuroticism

    b. Conscientiousness

c. Extraversion

d. Agreeableness

11. Maria is on a school field trip with her history class. After going on a tour of a museum, the class heads to an amusement park for the rest of the day. Maria quietly follows along as her two friends, Wendy and Latrell, go from ride to ride. When the trio reach the line for the brand new rollercoaster, Maria tells her friends that she will pass on this one. Wendy and Latrell encourage her to go along, but she insists that she will be happy waiting on them. She goes to a nearby bench and watches as they zoom past on the tracks.

    Based on this vignette, Maria's personality can be described as low trait in:

    a. Extraversion

    b. Conscientiousness

    c. Openness to Experience

    d. Neuroticism

12. Aaron watched Naomi move through the party with a big smile on her face. She stopped to talk to everyone and seemed to light up the room as she walked around. When she made it to Aaron's side of the room, she ran over to him and gave him a big hug. She grabbed his hand and told him, "Come on! We need to dance. Standing around is so boring!"

    Based on this vignette, Naomi's personality can be described as high trait in:

    a. Openness to Experience

    b. Agreeableness

    c. Neuroticism

    d. Extraversion

13. Demonstrating a willingness to believe in the other people and be compassionate to those less fortunate are characteristics associated with which of the following traits:

    a. Conscientiousness

    b. Agreeableness

    c. Extraversion

d. Openness to Experience

14. Being rated high in which of the following personality traits is correlated with good parenting in mothers?

    a. Extraversion

    b. Conscientiousness

    c. Neuroticism

    d. Agreeableness

15. Peyton is very competitive. Winning is very important to him, and he loves to coming out on top. He enjoys telling and showing all of his friends about how good he is at whatever he tries. While playing a high school basketball game, he took charge and tried make all of big plays because he didn't count on his teammates to play up to his level. When a player on the other team tripped and fell, Peyton laughed and told him he should learn how to walk before trying to play with the big dog. After losing the game, Peyton blamed his team and gathered them together to tell them what they could do next time to succeed. He said that they really needed to watch and learn from him.

    Based on this vignette, Peyton's personality can be described as low trait in:

    a. Agreeableness

    b. Neuroticism

    c. Conscientiousness

    d. Extraversion

16. Jackson couldn't believe how hard his grandmother worked at her age. She spent her mornings volunteering at a daycare for low income children, and, in the afternoons, she cooked and served meals at a homeless shelter. She also read to children at the library on Saturday's, and she somehow still had time to always have fresh baked cookies and a hug ready for him when he came over to visit. She told him that he should always remember the good in others and help out those who have fallen on hard times.

    Based on this vignette, Jackson's grandmother's personality can be described as high trait in:

    a. Extraversion

    b. Agreeableness

c. Openness to Experience

d. Neuroticism

17. A person who experiences psychological distress due to how they create and react to stressful situations in their lives has a personality that is:

    a. Low trait in Openness to Experience

    b. High trait in Neuroticism

    c. Low trait in Extraversion

    d. High trait in Conscientiousness

18. Keisha always seems like she has a level head, and she never seems to get too upset when things don't go her way. She would most likely be consider low in what personality trait?

    a. Neuroticism

    b. Agreeableness

    c. Openness to Experience

    d. Extraversion

19. Tomiko is working with her group to prepare for a class presentation. She is worried that her peers may not do their part and she will earn a poor grade. While at the library, she felt like neither her classmates nor she were moving quickly enough. She told the group that they had to work harder or they were going to fail the project. One of her partners, Sam, told her to that she looked like she needed to take a break and relax for a minute. In response, Tomiko slammed down her book and angrily told him that he should take things more seriously.

    Based on this vignette, Tomiko's personality can be described as high trait in:

    a. Agreeableness

    b. Extraversion

    c. Neuroticism

    d. Conscientiousness

20. Ralph seemed really cut out for being a fighter pilot. Flying jets in the Air Force was a dream come true, and, while it was exhilarating every time he took off, he never let it get

to his head. His commander's commended him for never hesitating to accept dangerous missions, and the other pilots appreciated how he remained calm and in control in every situation. He never got angry and saw any mistakes he made as opportunities to learn.

Based on this vignette, Ralph's personality can be described as low trait in:

a. Openness to Experience

b. Conscientiousness

c. Extraversion

d. Neuroticism

21. According to attribution theory, when describing the causes of someone else's actions, people are most like to engage in:

a. Intuitive Attribution

b. Situational Attribution

c. Cross-Situational Attribution

d. Dispositional Attribution

22. Dispositional attributions are used to describe the cause of a behavior in terms of:

a. internal factors

b. observed factors

c. external factors

d. stable factors

23. Gavin and his sister Sarah are supposed to meet in front of the movie theater at 8 o'clock to see the brand new super hero movie. Sarah gets stuck in a bad traffic jam, and her phone battery isn't charged, so she can't call her brother. Gavin watches the clock as 8 o'clock approaches and passes without any sign of his sister. He gets frustrated and says to himself, "This is just like Sarah to be late. She is so irresponsible and doesn't care about that he is waiting on her."

Based on this vignette, Gavin is engaging in what type of attribution?

a. Factorial

b. Dispositional

c. External

d. Situational

24. Lee was a high achieving and popular student who graduated as his senior class valedictorian. When giving his speech during his class graduation, he spent a lot of time talking about the opportunities presented in his school, the supportive teachers, and the sense of community amongst the students. At the end of his talk, he took time to thank his adoptive parents. He stated that if they had not given him a loving home and an environment to succeed, he did not think he would be standing before everyone as a successful young man.

    Based on this vignette, Lee is engaging in what type of attribution?

    a. Internal

    b. Dispositional

    c. Situational

    d. Factorial

25. Which psychologist first developed the foundational ideas for attribution theory?

    a. Paul T. Costa, Jr.

    b. Walter Mischel

    c. Fritz Heider

    d. Robert R. McCrae

26. One criticism of the Five-Factor Model of personality is:

    a. the factors are based upon strong empirical evidence.

    b. the FFM traits are found to be too broad.

    c. studies have found similar factors in other languages.

    d. the FFM traits indicate a spectrum of personality characteristics.

27. Personality traits are used to describe:

    a. the way a person will behave in different situations

b. the way a person will think about different situations

c. the way a person will feel in different situations

d. the way a person will perceive different situations

28. The tendency for individual attributions about behavior to depend on whether or not a person was doing something or trying to understand why someone else was doing something is described as:

a. Cross-Situational Effect

b. Personality Stability

c. Situational Factors

d. Actor-Observer Effect

Appendix G

Posttest Answer Sheet

1. d. (Openness to Experience)
2. c. (Openness to Experience)
3. b. (Openness to Experience)
4. a. (Openness to Experience)
5. c. (Conscientiousness)
6. b. (Conscientiousness)
7. c. (Conscientiousness)
8. d. (Conscientiousness)
9. d. (Extraversion)
10. c. (Extraversion)
11. a. (Extraversion)
12. d. (Extraversion)
13. b. (Agreeableness)
14. d. (Agreeableness)
15. a. (Agreeableness)
16. b. (Agreeableness)
17. b (Neuroticism)
18. a (Neuroticism)
19. c (Neuroticism)
20. d (Neuroticism
21. d (Dispositional Attribution)
22. a (Dispositional Attribution)
23. b (Dispositional Attribution)
24. c (Dispositional Attribution)
25. c (Control)
26. b (Control)
27. a (Control)
28. d (Control)

Appendix H

Video Familiarity Survey Form

Please write how many times you have seen the following movies or cartoon series before the lesson today in the spaces below, or check the box if you have never seen this video before today.

Also, indicate how many times you have read or viewed materials that are related to the subject, such as books, short stories, or comics. For example, if you have read the book *Alice's Adventures in Wonderland* by Lewis Carroll, you will mark it below.

Participation and all responses are voluntary.

Name	**Number of times I have previously viewed this video:**	**I have never viewed this video:**	**Number of times I have seen related materials:**
Bravestarr	_____	❑	_____
Wizard of Oz	_____	❑	_____
Animaniacs	_____	❑	_____
Alice in Wonderland	_____	❑	_____
The Littles	_____	❑	_____
The Adventures of Winnie the Pooh	_____	❑	_____
Top Cat	_____	❑	_____
Aladdin	_____	❑	_____
Rainbow Brite	_____	❑	_____
The Incredibles	_____	❑	_____
Count Duckula	_____	❑	_____
Finding Nemo	_____	❑	_____

Appendix I

Treatment Delivery Script

1. As students enter the classroom and take seats, politely ask them to not touch the laptops at their desks. Monitor the students to prevent tampering with equipment.

2. Greet student and introduce the study:

"Hello, we are graduate students studying school psychology at the University of Tennessee. We are researching how students learn using multimedia and video clips. Your teacher gave you permission forms for your parents to sign and has agreed to allow us to give you a lesson today on dispositional attribution and personality traits as part of your regular instruction. Everyone in the class will take part using the laptops and headphones we have placed at your desks. Tomorrow and two weeks after that, you will complete a multiple choice learning post-test. You will also complete a short survey tomorrow."

3. Hand out participant assent forms and say:

"Everyone in class will be taking part in our activities, but we will only use your answers in our study if your parent, or legal guardian, agrees and if you also give your permission. If you agree to take part in our study, please sign the assent form we are passing out now. If you do not wish to take part, don't sign the form and turn in the blank sheet when we collect them. If you have a signed permission form that you have not turned in to your teacher, please turn it in with your assent form. Participating is completely voluntary and will not affect your class grade in any way. You may also withdraw from participating in the study at any time without penalty. You will still take part in the lesson and post-lesson activities because it is part of regular classroom instruction."

4. Allow students several minutes to read over and sign assent forms, then collect the documents from all students.

5. After all forms are collected say:

"You will now watch a narrated PowerPoint lesson on the laptop at your desk. The PowerPoint is on a timer, and the slides will change on their own. Please do not touch laptop except to change the volume of your headphones after beginning the presentation. Before you start, we will come around and ask for your name and write down your laptop number. After collecting your information, the researcher will start your lesson. If you need any assistance during the lesson, please raise your hand and one of us will come to your desk. Please do not talk or disturb others during the lesson. When your lesson is completed, please remained seated and quiet until everyone has finished."

6. Approach each student and ask for their name. Record their name next to the laptop and PowerPoint lesson version number on the treatment delivery record sheet. After recording the information, begin the students lesson.

7. Monitor students and assist students as needed.

8. After all lessons are complete, say:

“Please leave your headphones next to the laptop on your desk. Thank you for watching the lesson and helping with this important research. We will return tomorrow for the next part of our study. We hope you have a great day.”

9. Collect laptops and headphones.

Appendix J

Treatment Delivery Procedural Checklist

	Procedural Integrity- Treatment Delivery Checklist	✔
1.	A. Place laptop and headphones at each student desk.	
	B. Load PowerPoint lesson onto laptop per counterbalancing design.	
	C. Decrease PowerPoint window size.	
	D. Ensure headphones are plugged in and volume set at a medium level.	
	E. Record laptop and lesson version number on treatment delivery record sheet.	
2.	A. Instruct students entering class to not touch study materials.	
	B. Monitor students to ensure materials are not tampered with.	
3.	A. Greet students and introduce study.	
	B. Explain assent.	
	C. Hand-out assent forms.	
	D. Allow students time to read and sign assent forms.	
	F. Collect all assent forms (signed and blank) from students.	
4.	A. Introduce PowerPoint lesson.	
	B. Give PowerPoint lesson instructions.	
	C. Record student names on treatment delivery record sheet next to laptop and lesson version number.	
	D. Begin student PowerPoint lesson.	
	F. Monitor students for problems and lesson completion.	
	G. Record students leaving class room on treatment delivery record sheet.	
5.	A. After all lessons finished, thank student for participation!	
	B. Collect study materials.	

Appendix K

Treatment Delivery Record Sheet

Laptop Number	Lesson Version	Student Name	Participant Number	Lesson Incomplete

Appendix L

Posttest and Survey Administration Script

1. Greet student and introduce post-test and survey:

"Hello, we want to thank you once again for helping us with this important research. Today you will be taking a multiple-choice lesson post-test and completing a survey. Just like yesterday, everyone in class will be taking part, but we will only use your answers in our study if you and your parent or legal guardian gave us permission. Remember, participating is completely voluntary and will not affect your class grade in any way. You may withdraw from participating in the study at any time without penalty. You will still take the post-test and survey because it is part of regular classroom instruction."

2. Hold up a copy of the next-day post-test and say:

"We will give each of you a paper copy of the post-test. It is multiple-choice, and you may use a pen or pencil to complete it. Please read each item carefully and circle the best response for each item. If you wish to change your answer, erase or mark through your original choice and circle a new one."

3. Hold up a copy of the Video Familiarity Survey:

"You will also complete a video familiarity survey. On the survey, you will see a list of movie or cartoons that you may have seen in your lesson yesterday. If you have seen any of the movie or cartoons listed, please write the estimated number of times you have seen it in the space provided. If you have never seen the movie or cartoon, check the box indicating you have never viewed it. The survey also asks if you have ever seen any other media associated with the subject of the video. This can be other episodes, movies, plays, books, magazines, short stories, board games, or even video games. Please write the estimated times you have seen other media in this space, whether you have or have not watched the original video. Are there any questions?"

4. Answer student questions as needed.

5. After answering student questions, say:

"We will now hand out the post-tests and surveys. Please work quietly and do not disturb others. If you need assistance, please raise your hand, and one of us will come to you. When you have completed both tasks, please raise your hand, and we will come to you to collect the materials. If you have completed your post-test and survey, please remain seated quietly at your desk until all post-tests and surveys are completed and turned in."

6. Hand out post-tests and surveys to all students.

7. Monitor students as they work and respond to any raised hands.

8. When a student raises their hand for completion of both post-test and survey. Approach the student and collect both forms. Ask the student their name, and, referring to the assigned participant number on the treatment delivery record sheet, write their participant number in the assigned space at the top of each document.

9. After all post-tests and surveys are completed and collected, say:

"Thank you for helping us again today. We will return in two weeks for the final part of the study. Have a great day!"

Appendix M

Post-Test and Survey Administration Procedural Checklist

	Procedural Integrity- Post-Test & Survey Administration Checklist	✔
1.	A. Greet students and reintroduce activities.	
	B. Remind students about assent and voluntary withdrawal from study.	
2.	A. Show students the post-test packet.	
	B. Provide instructions for completing post-test	
3.	A. Show students Video Familiarity Survey.	
	B. Provide instructions for completing Video Familiarity Survey.	
	C. Answer student questions.	
4.	A. Instruct students to raise their hand for assistance.	
	B. Instruct students to raise their hand to turn in materials when complete.	
	C. Instruct students to work quietly and to remain quiet and seated when finished.	
	D. Hand out a post-test and Video Familiarity Survey to each student.	
	F. Monitor students for problems and material completion.	
5.	A. Collect post-test and Video Familiarity Survey from students when completed.	
	B. Ask students for their names when collecting materials.	
	C. Consult treatment delivery record sheet for student participation number.	
	D. Record student participation number in designated spot on post-test and Video Familiarity Survey forms.	
6.	Upon collection of all post-tests and Video Familiarity Survey forms, thank students for their participation.	

Appendix N

Two-Week Post-Test Administration Script

1. Greet student and introduce post-test:

"Hello, we want to thank you once again for helping us with this important research. Today you will be taking a second multiple-choice lesson post-test. Just like before, everyone in class will be taking part, but we will only use your answers in our study if you and your parent or legal guardian gave us permission. Remember, participating is completely voluntary and will not affect your class grade in any way. You may withdraw from participating in the study at any time without penalty. You will still take the second post-test because it is part of regular classroom instruction."

2. Hold up a copy of the next-day post-test and say:

"We will give each of you a paper copy of the post-test. It is multiple-choice, and you may use a pen or pencil to complete it. Please read each item carefully and circle the best response for each item. If you wish to change your answer, erase or mark through your original choice and circle a new one. Are there any questions"

3. Answer student questions as needed.

4. After answering student questions, say:

"We will now hand out the post-tests. Please work quietly and do not disturb others. If you need assistance, please raise your hand, and one of us will come to you. When you have completed the post-test, please raise your hand, and we will come to you to collect it. If you have completed your post-test, please remain seated quietly at your desk until all post-tests are completed and turned in."

5. Hand out two-week post-tests to all students.

6. Monitor students as they work and respond to any raised hands.

7. When a student raises their hand for completion of the post-test. Approach the student and collect the document. Ask the student their name, and, referring to the assigned participant number on the treatment delivery record sheet, write their participant number in the assigned space at the top of the document.

8. After all post-tests and surveys are completed and collected, say:

"Thank you for helping us again today. We will return to share with you the results of our study. Have a great day!"

Appendix O

Two-Week Post-Test Administration Procedural Checklist

	Procedural Integrity- Two-Week Post-Test Administration Checklist	✔
1.	A. Greet students and reintroduce activities.	
	B. Remind students about assent and voluntary withdrawal from study.	
2.	A. Show students the two-week post-test packet.	
	B. Provide instructions for completing two-week post-test	
	Answer student questions.	
4.	A. Instruct students to raise their hand for assistance.	
	B. Instruct students to raise their hand to turn in materials when complete.	
	C. Instruct students to work quietly and to remain quiet and seated when finished.	
	D. Hand out a two-week post-test to each student.	
	F. Monitor students for problems and material completion.	
5.	A. Collect two-week post-test from students when completed.	
	B. Ask students for their names when collecting materials.	
	C. Consult treatment delivery record sheet for student participation number.	
	D. Record student participation number in designated spot on two-week post-test.	
6.	Upon collection of all two-week post-tests, thank students for their participation.	

VITA

Jonah Ruddy was born on a United States Air Force base in Bitburg, Germany to Daniel Ruddy and Cathy Lemons. He is one of four brothers and spent his childhood living in states across the country. Jonah is married to Julie Ruddy and is the father of Tristan Ruddy. He graduated high school in 1997 from Oak Ridge High School in Oak Ridge, Tennessee before earning his bachelor of arts degree in psychology in 2003 at the University of Tennessee, Knoxville. Following graduation, he worked in a residential program for teens with emotional and substance abuse disorders and in the admissions department of an acute psychiatric hospital. Seizing upon an opportunity to earn a transitional teaching license, Jonah began a career as a special educations teacher and earned a master of science degree in special education from the University of Tennessee in 2011. A desire to further develop his understanding of learning, assessment, and intervention inspired Jonah to return to the University of Tennessee in 2013 to pursue a doctoral degree in school psychology. He accepted an assistantship and worked for four years as a graduate teaching associate for the Education Psychology 401: Applied Educational Psychology course. Following graduation in 2018, Jonah plans to become a licensed psychologist and continue his work in the study and delivery of school psychology services.