IMPACT OF VIDEO PRESENTATION FEATURES ON INSTRUCTIONAL ACHIEVEMENT AND INTRINSIC MOTIVATION IN SECONDARY SCHOOL LEARNERS

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This study analyzed instructional achievement and intrinsic motivation among 21st century secondary students utilizing a video lecture incorporating both student reaction cutaway images and immediate content interaction within the lecture. Respondents (n = 155) were from multiple classes and grade levels at a suburban Texas high school. Four groups of students viewed the identical lecture with differing video and content interaction treatments. Students responded to a pretest/posttest survey to assess academic achievement in addition to an intrinsic motivation instrument to assess student interest.

Group one (the control group) viewed the 12 minute lecture without enhancement. A second group viewed the identical lecture with student reaction shots inserted in the video. Another group viewed the lecture with content question intervention inserted into the video. The final group saw the lecture with the student reaction shots and content question intervention combined in the video.

A repeated measures multivariate analysis of variance (MANOVA) was used to compare results from a 14 item pretest/posttest. Combined, the groups showed no significance (p = .069) indicating no associations were identified by
the experiment. Although no association was identified, this may be a reflection of the generic nature of the video lecture and the lack of association with the experiment and actual classroom content within their courses. Students also completed the Intrinsic Motivation Instrument which was analyzed using a MANOVA. Although no significant findings were present in either group viewing the student reaction or the content question interaction treatments individually, the group viewing the combined treatment showed significance in three scales: Interest/Enjoyment ($p = .007$), Perceived Competence ($p = .027$) and Effort/Importance ($p = .035$). Recommendations for refinement of the current experiment as well as future studies are provided.
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CHAPTER 1

INTRODUCTION

Description of Problem

Twenty-first century students possess significant positive qualities and are afforded seemingly unlimited opportunities that were not available in the recent past. They also present unique and more complex challenges that public school systems were forced to address in past generations. Not only are today’s teachers faced with teaching their subjects, they must also deal with more distractions, less attention, and conflicting motivation.

High school teachers have noticed that things are different with today’s students. “I’ve had to change my teaching a lot recently, and I still wonder how much they’re learning” (Healy, 1990, p. 13). “I feel like kids have one foot out the door on whatever they’re doing—they’re incredibly easily distracted” (Healy, 1990, p. 14).

This leads to an important question. Are students not as smart as in past years? Mean SAT scores have remained flat or shown a slight decline in recent years, so the academic capabilities of these students remain equivalent (College Board, 2011). Regardless, something about today’s high school students has changed.

There is one thing you know for sure: These kids are different. They study, work, write, and interact with each other in ways that are very different
from the ways that you did growing up. They read blogs rather than newspapers. They often meet each other online before they meet in person. They probably don’t even know what a library card looks like, much less have one; and if they do, they’ve probably never used it. They get their music online—often for free, illegally—rather than buying it in record stores. They’re more likely to send an instant message (IM) than to pick up the telephone to arrange a date later in the afternoon. They adopt and pal around with virtual Neopets online instead of pound puppies. And they’re connected to one another by a common culture. Major aspects of their lives—social interactions, friendships, civic activities—are mediated by digital technologies. And they’ve never known any other way of life. (Palfrey & Gasser, 2008, p. 2)

A recent Kaiser Foundation study found that young people 8 to 18 years old watch television or videos an average of four hours daily while averaging an additional fifty minutes every day playing video games (Small & Vorgon, 2008). While some of the productions viewed are amateur in origin, the rapid-fire, graphic-laden, professional techniques used in network programming and advertising are the standard against which students view educational videos.

In other research regarding today’s youth, Yahoo Finance (2012) reported, “In order to keep Digital Natives engaged, content creators and marketers will need to think differently” (para 3).

However, the infrastructure of public education has remained fundamentally unchanged since its creation in the “era when more than 90% of young people still lived on farms or in rural areas” (Kelly, McCain, & Jukes, 2009, p. 3).

This is why engaging today’s students remains a constant concern for educators in a system designed for a different era (Bellanca & Brandt, 2010;
Jukes, McCain, & Crockett, 2010; Kelly et al., 2009; Small & Vorgon, 2008; Strom & Strom, 2009; Tapscott, 2008).

**Purpose of the Study**

The current study addresses a multi-faceted question of the potential use of video instruction to reach and facilitate learning for today’s high school students. The inclusion of audience reaction scenes, student interaction, and combinations of the two are evaluated as to their ability to improve recall, student motivation, and interest.

The primary question of interest for the current study is: Among high school students, is there any association between instructional achievement and the use of video with audience reaction scenes, video with student interaction, and/or video with audience reaction scenes and student interaction.

**Rationale**

Remember the interest the *Titanic* rekindled as the 100th anniversary of its sinking approached? In the days before the anniversary, a *Wall Street Journal* article addressed a myth about the disaster. The ship was fitted with lifeboats for less than half of the passengers not because of aesthetics or costs as claimed in some books or films. Rather, testimony revealed that *Titanic* carried 25% more lifeboats than maritime laws required. The regulations had not been modernized since being written in a different era for significantly smaller ships (Berg, 2012).

Similarly, numerous books litter the bookshelf—*Teaching the Digital Generation, Born Digital, Adolescents in the Internet Age, grown up digital,*
In just the past decade, “the United States has fallen further behind on international assessments of student learning” (Darling-Hammond & McCloskey, 2012, p. 1). “In 2006, the U.S. ranked 35th among the top 40 countries in mathematics and 31st in science, a decline in both raw scores and rankings from 3 years earlier (Institute of Education Sciences, 2007)” (as cited in Darling-Hammond & McCloskey, 2012, p. 1).

This gives credibility to the theory that students and their environment have changed, but are schools prepared to adapt as well? “The learning styles of today’s digital kids are significantly different than those for whom our high schools were originally designed” (Kelly, et al., 2009, p. 9). “In fact, they are so different from us that we can no longer use either our 20th century knowledge or our training as a guide to what is best for them educationally” (Prensky, 2006, p. 9).

The problem is clear. Even though student engagement is an acknowledged key component in effective learning, students are still dropping out of school because it’s “boring” (Haag, 2012, p. 1B; Marzano & Pickering, 2011).
Medina (2008) identifies the dilemma, “We don’t pay attention to boring things” (p. 71).

An essential element to effective communication is an overlapping area of commonality so that the message being transmitted may be understood (Schramm, 1973). Teachers must continue to evolve, just as business leaders, public speakers, and countless other professionals have learned, and adapt to the current audience.

If teenagers enjoy using technology and media, would not teachers be more effective to respect, and possibly embrace, this motivation? Indeed, teachers and students will both grow through reciprocal learning (Strom & Strom, 2009).

Hobbs (2011) summarizes the current environment, “Make no mistake about it: using popular culture, mass media, and digital media motivates and engages students. And students need to be motivated and engaged—genuine learning simply doesn’t happen without it” (p. 6).

**Video Instruction**

Studies have shown that video can be an effective tool for learning (Schmidt & Anderson, 2007; West, Farmer, & Wolff, 1991). In fact, today’s students may prefer to watch a video online or on their phone, giving them a sense of one-to-one communication rather than listen to a lecture in a live setting. Sal Khan, creator of hundreds of video-based lessons, said, “I’ve gotten
a lot of feedback. It really does feel like I’m sitting next to the person and we’re looking at the paper together” (Gupta & Cetta, 2012).

A report from the U.S. Department of Education (Means, Toyama, Murphy, Bakia, & Jones, 2010) “suggests that online delivery of material leads to improvements in student outcomes relative to live delivery, with hybrid live-plus-Internet delivery having the largest benefits of all” (Figlio, Rush, & Yin, 2010, p. 3).

Lecture capture can also be an effective use of video instruction. Students may replay the recordings at their convenience to better understand difficult concepts, review for exams, or stay up-to-date while absent (Gosper et al., 2007; Odhabi & Nicks-McCaleb, 2011; Toppin, 2011; Wieling & Hofman, 2010).

Research has shown both high student perceptions of positive learning experiences using this technology, as well as higher scores (Day, Burn, & Gerdes, 2009; Goldbert & McKhann, 2000; Gosper et al., 2007; McElroy, 2006; Soong, Chan, Cheers, & Hu, 2006).

In contrast to the lecture review, the pre-lesson or the flip model of instruction has received recent attention. This process moves fact gathering and lectures online for students to study before coming to class, which allows class time to be spent on hands-on learning, with more robust discussions, and in-depth activities (Sparks, 2011). The flip model expands the time for collaboration which, along with the video, appeals to today’s students (Gupta & Cetta, 2012).
Response Systems

Dewey (1916) wrote that people learn by doing and learning should be an active experience. In this context, “doing” in a classroom setting may be as simple as holding up colored cards (Kelhum, Carr, & Dozier, 2001). Electronic versions of these response systems—known as clickers, classroom response systems, personal response systems or two dozen other labels—help maintain student attention, provide the opportunity for immediate remediation, and allow full interaction with the instructor (Heward, 1978; Kay & LeSage, 2009). Online classes may be programmed to allow for similar benefits.

Recent studies indicate that students consider these systems useful for their own understanding of subject matter and enjoy using them (Abrahamson, 1999; Judson & Sawada, 2002). But “beyond discovering that students both enjoy and value the use of an electronic response system, the issue of instructional achievement remains open” (Judson & Sawada, 2002, p. 175). Limited studies in the high school setting have returned similar results (Barnes, 2008).

Fies and Marshall (2006) agree, “Missing from current CRS [classroom response systems] research reports are tightly controlled comparisons in which the only difference is the use, or lack of use, of a CRS” (p. 106).

Summary

Today’s students are bred to be more media savvy, with shorter attention spans, than students in past generations. To effectively teach high school
students, teachers must employ tools and techniques that appeal to their environmentally-influenced minds.

The purpose of the present study is to examine both the signals in the video presentation and the attention triggered by the response system to ascertain the effect on current high school students. The goal is to simply determine the best presentation method of the medium when consumed by today’s high school students. If it is confirmed that student perceptions, attention and/or learning are increased by including a few easily-inserted audience reaction clips, or strategically inserted questions, would not we all benefit by including these elements in high school lessons?

Conceptual Framework

Media Comparisons

A century has passed since Thorndike (1912) wrote that instructional media should be used in the classroom. Whether media can influence learning has not received much debate as most agree with Gagné (1965) who stated “most instructional functions can be performed by most media” (p. 364). Schramm (1977) reached a similar conclusion stating, “We have plentiful evidence that people learn from the media, but very little evidence as to which medium, in a given situation, can bring about the most learning” (p. 43).

Over the years, there have been dozens of studies comparing student learning from one medium to another. The majority has found that most students learn comparably no matter the media (Clark, 1983, 1994; Cobb, 1997;
Schramm, 1977). The studies, enough to fill its own book, have “started to go round in circles” (Cobb, 1997, p. 21).

Since the discussion seems unproductive, others suggest the question should be altered (Briggs, 1977). Morrison (1994) wrote, “It seems more productive to consider the effectiveness of the whole unit of instruction rather than the individual components” (p. 42).

Jonassen, Campbell and Davidson (1994) warned, “The debate between Kozma and Clark, which focuses on the relative importance of media attributes vs. instructional methods, is the wrong issue to debate” (p. 31). They added, “Clark believes that learning is situated in the instructional methods that manipulate learner processing. Kozma accommodates the role of context in learning and knowledge construction but still focuses only on context delivered through the media, ignoring media within the learning context” (p. 32). They conclude by stating, “The more important debate is not about the relative efficacy of instructional components as much as it is the role of learner and the context of learning” (p. 32).

The present study concurs with the more recent articles on media study in that it seeks no comparison between the effectiveness of video instruction and other media but seeks to find a correlation between the high school learner and video instruction.
Several studies have concluded that visual attention is associated, either positively or negatively, through use of formal features (Alwitt, Anderson, Lorch, & Levin, 1980; Anderson & Lorch, 1983; Campbell, Wright, & Huston, 1987; Watt & Welch, 1982; Williams, 1981). Some of the features associated with continual viewing are visual effects, cuts, pans, and visual movement (Anderson, Alwitt, Lorch, & Levin, 1979).

Huston and Wright (1983) found that children make feature-content associations based upon their experiences with the medium to alert them to upcoming content. These associations act as clues about how much mental processing effort to exert, which influences storage and recall of content. Salomon (1979) provided evidence that comprehension is affected by the use of familiar formal features.

Baggaley and Duck (1976) conducted a series of experiments employing video instruction. Each experiment compared two cameras recording exactly the same presentation, but with slightly differing perspectives. When a speaker’s notes were included in the framing, the audience found the speaker “more confusing” (p. 88) than the same presentation framed without the notes. When the speaker was photographed in front of an electronically generated background scene, he was found to be “more reliable” (p. 90) than when he gave the same lecture in front of a blank background. Another study captured a speaker looking directly into the camera while the other viewed the speaker from a 45-degree
angle as though engaged in a discussion. All questions produced more favorable ratings of the angled view, even though sometimes not statistically significant.

The most significant results were obtained from a study using audience reaction shots intercut with the presentation. One group viewed a presentation with students engaged and attentive. The second saw the same students, but this time expressing disinterest and doodling. "By far the most significant finding in this respect is that in the negative tape the lecturer was seen as more confusing, more shallow and more inexpert" (Baggaley & Duck, 1976, p. 95).

So will the cutaways involving positive student reactions constitute a video feature that will increase attention? Huston et al. (1981) found it does, "Form may be of interest to audiences independently of content and may communicate information beyond that explicitly contained in content messages" (p. 33).

Baggaley and Duck (1976) agreed stating, "visual cues quite irrelevant to a performance may unwittingly affect judgments of it" (p. 86). The concluded, "the simple visual imagery of a television production may actually dominate its verbal content, overriding audience reactions to it in several ways" (p. 105).

And how important is perception? Consider the Dr. Fox study. A professional actor was coached to present an elaborate lecture, including a question and answer session, to a group of faculty and graduate students. Armed with an impressive vita, he was highly evaluated and fully believable by those that heard him speak (Naftulin, Ware, & Donnelly, 1973).
Response Studies


These ranged from promoting greater student engagement (16 studies), increasing understanding of complex subject matter (11 studies), increasing interest and enjoyment of class (7 studies), promoting discussion and interactivity (6 studies), helping students gauge their own level of understanding (5 studies), teachers having better awareness of student difficulties (4 studies), extending material to be covered beyond class time (2 studies), improving quality of questions asked (1 study), and overcoming shyness (1 study) (Abrahamson, 2006; Roschelle et al., 2004).

Two medical education experiments looked specifically at achievement and found positive results. In these experiments, Pradhan, Sparano, and Ananth (2005) tested two groups of residents. One group received a typical lecture while the second group heard the same lecture utilizing a response system. A pre-test/post-test was assessed and the improvement from the interactive students was almost 20% greater than the lecture-only group. The total number of students in both groups was 17. Schackow and Loya (2004, p. 503) used similar methodology and found a similar significant difference. Their conclusion stated,

At least two plausible explanations for these results exist: (1) improved retention occurs with active participation in the lecture process and (2) improved retention occurs when key learning points are highlighted prior to testing.
Summary

The present study examines the concepts of video instruction, its appeal and instructional value to current high school students. Secondly, response questions were interspersed within the presentations to increase active attention and participation in the lesson while increasing subject retention.

Definition of Terms, Limitations, and Delimitations

Definition of Terms

Digital Natives/Digital Immigrants

Digital natives refer to today’s students. “They are native speakers of technology, fluent in the digital language of computers, video games, and the Internet” (Prensky, 2006, p. 9). Those not born into the digital world are referred to as digital immigrants. “We have adopted many aspects if the technology but just like those who learn another language later in life, we retain an ‘accent’ because we still have one foot in the past” (Prensky, 2006, p. 9).

Engagement

Student engagement is “the attention, interest, investment and effort students expend in the work of learning” (Marks, 2000, p. 155).

Formal Features

Formal features of television are attributes or characteristics of the medium such as animation, eye contact, high action, scene variability, camera
Zooms, cuts and dissolves, special visual effects, music, sound effects. Items, which are independent of the program content (Zettl, 2005).

Motivation

“To be motivated means to be moved to do something. A person who feels no impetus or inspiration to act is thus characterized as unmotivated, whereas someone who is energized or activated toward an end is considered motivated” (Ryan & Deci, 2000, p. 54).

“Intrinsic motivation is defined as the doing of an activity for its inherent satisfactions rather and for some separable consequence” (Ryan & Deci, 2000, p. 56).

“Extrinsic motivation is a construct that pertains whenever an activity is done in order to attain some separable outcome” (Ryan & Deci, 2000, p. 60).

Peer Pressure

Peer pressure has been defined as “when people your own age encourage you to do something or keep from doing something else, no matter if you personally want to or not” (Brown, Clasen, & Eicher, 1986, p. 522).

Television versus Video

The terms television and video are used interchangeably in the manuscript. Merriam-Webster (2012) lists several definitions for television, one of which is “television as a means of communication” (para 3b). Video is defined simply as “television” (para 1). The choice of term appears to be chronology-based. More recent writings use video, while older works cite television. With
either term, the reference is to the visual content and characteristics of the communication piece rather than the physical device.

**Limitations**

The video recording is a lecture presented by a member of the faculty at the high school being studied. While no member of the respondent group was a student in this teacher’s classroom, it should be assumed that some of the population may be aware of the teacher’s identity. Likewise, some of the students appearing in the video may be familiar to the respondents; however, none of the students involved are from the same class as the respondents.

Many of the respondents are minors so parental permission was required before inclusion into the study. It is unknown how many parents denied permission but this could affect the bias of the respondents.

The current study relies on some self-report data, which may not provide completely accurate data. Bias may appear since self-report responses “depend on participants to truthfully and accurately report on their attitudes and characteristics” (Doyle, 2004, p.3). This does not always happen. “For example, some respondents may deliberately answer questions incorrectly or flippantly” (Doyle, 2004, p. 3).

**Delimitations**

The current study is restricted only to video instruction with audience reaction clips and student interaction. The interaction was via computer
response. Respondents were assigned to each treatment by computer-generated random groupings.
CHAPTER 2

LITERATURE REVIEW

Communicating with 21st Century Students

Student’s Interest in Video

To be effective at most things, we adapt our behavior to the context. Whether it is climate, language, culture, or any number of other areas, we act, dress, and speak according to our surroundings. This is evidenced by a student’s nonschool world, which provides the context, or surroundings, that shape them; a world that is filled with new technologies, new tools and their new normal (Valkenburg, 2004). Today’s kids “are using media and technology from before breakfast until bedtime and beyond” (Hobbs, 2011, p. 7). “The socialization, learning, health, and lifestyle of today’s teenagers are distinctive because of their access to the Internet, cell phones, computers, wireless organizers, iPods, and satellite television” (Strom & Strom, 2009, p. xv). We are in a “new era, which might be called the age of personal or participatory media” (Kluth, 2006, p. 3).

The course from childhood, through adolescence on into adulthood that once was an ostensibly distinct process, is now a blur. Culture critics and child psychologists have observed that the “phenomenon of childhood is disappearing” (p. 4) rather children are being treated as small adults (Valkenburg, 2004). Consider the effect Sesame Street had on how kids thought in the past, and then
try to imagine what the visual bombardment of simultaneous images, text and sounds is having on today’s students (Jukes et al., 2010). “What used to be simply a generation gap that separated young people’s values, music and habits from those of their parents has now become a huge divide resulting in two separate cultures” (Small & Vorgon, 2008, p. 3).

A Pew Internet & American Life Project found that 93% of American teens use the Internet and 38% of American teens typically create and share their own artwork, photos, stories or videos online (Pew Research Center, 2011). “The old media model was: there is one source of truth. The new media model is: there are multiple sources of truth, and we will sort it out” (Kluth, 2006, p. 5).

One example of our changing environment is the fact that YouTube didn’t exist until 2005. Today, an hour of video is uploaded to YouTube every second in the day (Grossman, 2012, p. 40).

But is this a problem? Tapscott said the current environment is an advantage. “While there is much controversy, the early evidence suggests that the digital immersion has a tangible, positive impact… The Net Gen mind seems to be incredibly flexible, adaptable and multimedia savvy” (Tapscott, 2008, p. 98).

Prensky introduced the digital natives debate a decade ago. He proposed that young people’s actual cognitive process has been altered by the environment and other researchers agree (Fenley, 2010; Prensky, 2001). In fact, with just one generation of exposure to current digital stimuli, research shows young people’s brains are actually neurologically wired differently than previous
generations (Jukes et al., 2010; Small & Vorgon, 2008). Prensky (2001) stated, “It is now clear that as a result of this ubiquitous environment and the sheer volume of their interaction with it, today’s students think and process information fundamentally differently from their predecessors” (p. 1). Kelly et al. (2009) agreed, “[Students] actually think differently than older people who did not grow up in the digital environment” (p. 5).

Some have countered this belief, asserting digital natives arguments are based on “sweeping generalizations” (Brumberger, 2011, p. 20) and “have been subjected to little critical scrutiny” (Bennett, Maton, & Kervin, 2008, p. 776). While Kennedy et al. (2009) agree that while the technology use among teens is high, “they don’t necessarily want or expect to use these technologies to support some activities, including learning” (p. 5).

There can be no disagreement that today’s environment forces young people to deal with myriad visual stimuli at a rapid-fire pace, unparalleled in history (Healy, 1990; Lemke, 2010). Teens are sophisticated audiences, dealing with a sensory-rich world full of color, sound graphics, and video (Butler, 2010). “This is especially the case in terms of visual information: kids are more visually oriented” (Kelly et al., 2009, p. 16). Weigel, Straughn, and Gardner (2010) reported, “Students today are increasingly ‘keyed to the visual!’” (p. 10), while Coats (2007) argued they are “the most visual of all learning cohorts” (p. 126). Tapscott (2008) simply called them “visual experts” (p. 106).
We are undergoing a historic shift to receiving our information in digital forms instead of print. Vander Ark predicted the evolution will continue into education. “The technology revolution transformed business and entertainment and will have an equally profound impact on learning….The learning race, not the arms race, will define the future” (Vander Ark, 2012, p. 16).

Times and students have changed (Prensky, 2006). “The learning styles of today’s digital kids are significantly different than those for whom our high schools were originally designed” (Kelly et al., 2009, p. 9).

It is obvious that dramatic changes have transformed current high school students and while one might expect schools to have been equally transformed, many schools still operate under the traditional model. Some have even argued “our schools are obsolete” (Vander Ark, 2012, p. 2). Prensky (2006) added, “they are so different from us that we can no longer use either our 20th century knowledge or our training as a guide to what is best for them educationally” (p. 9).

“Educators have slid into the 21st century—and into the digital age—still doing a great many things the old way.” (Prensky, 2006, p. 9). Teachers who do not consider the tastes and attitudes of today’s teens will be acting on outdated impressions (Strom & Strom, 2009).

*Shoot for the Target*

Professionals in every field constantly analyze the audience. Public speakers never begin a presentation without researching and crafting their
message for a particular audience. Retailers carefully analyze what products to stock and how they should be displayed in an attempt to gain the upmost response from their target audience. Even young people, almost always, use manners never previously demonstrated when meeting the parents of their friends.

In almost every profession and instance of personal communication, we attempt to fit into our surroundings, but can that be said of the institution of public education? We know that “teenagers enjoy using tools of technology” (Strom & Strom, 2009, p. xvi). If this motivation were respected, schools would be more effective. (Strom & Strom, 2009). Today’s students are not the same as those who sat through lectures and followed basic instructions in past generations. New kinds of learners are emerging.

In his book concerning news consumption among under-40 audiences, David Mindich wrote:

> Journalists need to inform their audience. If their information is boring, they will lose readers and viewers. However, if they pander to audience tastes, they may have an audience but nothing worthwhile to communicate...Most journalists—indeed most media workers—seek a balance between informing and interesting an audience. Exploring the tension between the two, which is also a tension between an audience’s needs and wants, is important if we want to know why young people follow—or don’t follow—the news (Mindich, 2005, p. 41).

It is not difficult to compare teachers to journalists, who try to grab an audience’s attention and communicate a message. And if teachers truly want to transfer information, should not significant interest be given to the best way the
students want to receive that information? Mindich issued a warning, “news outlets that ignore ‘want’ do so at their own peril” (2005, p. 47).

Teachers should always consider the audience and the conditioning of that audience when preparing any instructional material. Well-designed instruction, aids the transfer of knowledge (Perkins & Salomon, 1988). One of the many issues facing teachers is how to reach today’s students.

Highly motivated learners will learn, regardless of the quality of the learning experience. Similarly, unmotivated learners are a challenge even for the best teachers. But the more you can consider your learners’ attitudes and motivations, the better you can tailor the learning experience. (Dirksen, 2012, p. 28)

“What we see, and how we see it, and what it means to us is focused, concentrated, and conditioned by our cultural connections” (Bisplinghoff, 1994, p. 341). Our “reality,” (p. 341) according to Bisplinghoff (1994), is learned by “growing up in a particular culture and absorbing its rules…”

All communication, including learning, is based on more than an individual’s perceptions at the time that communication is taking place. Perception can be very subjective, and it is constantly changing. We rely on our senses to provide us with data; we rely on our experiences, thoughts, and values to organize, interpret, and explain what we see, hear, taste, touch, and smell. (Stern & Robinson, 1994, p. 32)

Strom and Strom (2009) found schools are not addressing the civilization of today’s students. “Many [students] claim a disconnect between life online after school hours and methods of learning used in classrooms” (p. 70).

*Communication*

Obviously, students should not be given undue authority, however if teachers and students share the same building for dozens of hours each week,
should not an effective level of communication be present? Just like traveling to a different culture, communication between two divergent parties may require deliberation.

Laswell was quite possibly the first to present the basic elements of communication in his famous sentence: “Who says what in which channel to whom with what effect” (Laswell, 1948, p. 37)?

Figure 1. Laswell’s model of communication Adapted from “Communication Models,” by F. Wisely, in Visual Literacy: A Spectrum of Visual Learning by D. Moore and F. Dwyer, 1994, p. 89. Copyright 1994 by Educational Technology Publications.

Shannon and Weaver (1949) introduced their mathematical model (Figure 2) around the same time. Their model, focused on the field of telecommunications, is primarily directed at the channels of communication between the sender and the receiver. They introduced the “noise source” as a reason for failed communication—meaning “the message arriving at the destination is not the exact one sent from the information source” (Wisely, 1994, p. 89).
Figure 2. Shannon and Weaver’s model of communication (Wisely, 1994, p. 89).

Schramm continued the evolution of this concept when he identified a model of communication (Figure 3) that targets an overlapping area essential to communication. Each person consults a well-filled “life space” (Schramm, 1973, p. 182) with stored experiences and existing knowledge structures against which he assimilates and interprets the signals that come to him before deciding upon his appropriate response (Salomon, 1997).

Figure 3. Shramm’s model of communication (Wisely, 1994, p. 90).

Schramm’s theory has produced other versions by subsequent scholars. Stuart Hall (1980) described his similarly using an encoding/decoding illustration. After the author has created (encoded) a message, it must be decoded before it may be put to use. Since the coding and decoding may not be perfectly symmetrical, because of culture differences between the sender and receiver,
degrees of understanding and misunderstanding in the communicative exchange may occur (Gillespie, 2005).

Dwyer (1978) agreed, calling the communication process often unreliable. Since individuals “do not share common experiences, they cannot possess identical meanings” for what is being communicated (p. 2).

Clearly, with the sophistication of today’s student and the constant barrage of media fighting for his attention, teachers must seek every opportunity to pierce the clutter to contact the student. In today’s classroom, the overlapping segments of the life spaces or the lack of symmetry in the coding and decoding between most teachers and students will continue to grow smaller (Strom & Strom, 2009). Strom and Strom’s illustration of the past, present, and future shared experiences is illuminating.
Studies of media influence on learning began a century ago when Edward Thorndike (1912) suggested pictures, among many other things, may improve education and instructional media and therefore should be incorporated in the classroom. During the same era, correspondence courses began to flourish and researchers opened the long and laborious inquiry to determine the superlative
media for education. In those studies, researchers compared student outcomes for lessons that are delivered through two different media, searching for the superior method of teaching effectiveness (Conger, 2005).

Gagné (1965) summarized the findings from early studies stating, “most instructional functions can be performed by most media” (p. 364). Schramm (1977) reached a similar conclusion stating, “we have plentiful evidence that people learn from the media, but very little evidence as to which medium, in a given situation, can bring about the most learning” (p. 43).

In 1974, Olson wrote

Perhaps the function of the new media is not primarily that of providing more effective means for conveying the kinds of information evolved in the last five hundred years of book or literate culture, but rather that of using the new media as a means of exploring and representing our experience in ways that parallel those involved in that literate culture (p. 8).

A decade later, the “gloves came off” when Richard Clark (1983) published the argument that media are “mere vehicles that deliver instruction but do not influence student achievement any more than the truck that delivers our groceries causes changes in our nutrition” (p. 445). Even in studies that show learning has taken place; Clark’s position was that the medium itself had no effect on the outcome. If there are differences in learning outcomes, they appear because the instruction itself was changed to suit the medium (Clark, 1983). He does not classify attributes as variables in media theory “because they are neither necessary or unique to a particular medium” (Kozma, 1994, p. 13).
Kozma (1991) countered Clark’s argument by reporting that some students will learn regardless of the delivery device, but “others will be able to take advantage of a particular medium’s characteristics to help construct knowledge” (p. 205). Television, he said, “differs in several ways from books that may affect cognitive structures and processes” (p. 189). Kozma took the holistic approach that media and method have an “integral relationship; both are part of the design” (p. 205).

In 1994, Kozma reframed the question, “the appropriate question is not do but will media influence learning” (p. 7)?

If there is no relationship between media and learning it may be because we have not yet made one. If we do not understand the potential relationship between media and learning, quite likely one will not be made. And finally, if we preclude consideration of a relationship in our theory and research by conceptualizing media as “mere vehicles,” we are likely to never understand the potential for such a relationship (Kozma, 1994, p. 7).

Specifically, to understand the role of media in learning we must ground a theory of media in the cognitive and social process by which knowledge is constructed, we must define media in ways that are compatible and complementary with these processes, we must conduct research on the mechanisms by which characteristics of media might interact with and influence these processes, and we must design our interventions in ways that embed media in these processes (Kozma, 1994, p. 8).

Clark (1994) replied simply, “When a study demonstrates that media attributes are sufficient to cause learning, the study has failed to control for instructional method and is therefore confounded” (p. 25). Clark believed that media comparison studies are a non-argument since a valid research approach is impossible given that the lesson has to be changed because of the media and therefore has to be a variable. Others suggested that comparing media should
not be done with such a narrow view because the lesson should be adapted to the media. Ludwig von Bertalanffy (1965) stated, “If the meaning of Goethe’s *Faust*, or Van Gogh’s landscapes, or Bach’s *Art of the Fugue* could be transmitted in discursive terms, their authors should and would not have bothered to write poems, paint, or compose, but would rather have written scientific treatises” (p. 41).

In fact, this particular issue has provided fodder to educational researchers so frequently that a book, *The No Significant Difference Phenomenon*, (Russell, 2001) was compiled on the topic. The book spans 89 pages simply listing the vital information from each study with a brief summary quote. The collection shows that most studies have found no significant difference in student outcomes when the independent variable was the method of course delivery. (Russell, 2001, 2012). Other studies simply found that most students learn comparably no matter the media (Clark, 1983, 1994; Cobb, 1997; Schramm, 1977).

At the onset of the media argument, Salomon and Gardner (1986) warned to avoid the sins of the past and made clear their opinion of the Clark versus Kozma debate.

It is a well-known observation that each new medium of communication begins its life by first adopting the contents and formats of the media it is likely to replace or modify. A similar pattern apparently exists among researchers who often welcome a new medium, technology, or instructional innovation by posing some of the questions addressed at its predecessor, even when those questions have already proved to be unanswerable, naïve, or uninstructive. Some of the current research on computers in education is in danger of falling into this category. It tends to
move into the same cul de sacs, to be based on similarly naïve assumptions and to yield the same uninstructive findings as did much of the past research on television and instruction (e.g., Clark, 1985) (p. 13).

Over the years, two camps emerged. One interpretation held that the use of technology to deliver courses did not harm—meaning face-to-face learning had no inherent advantage over distance education course delivery. The other interpretation was that technology did not help—thus if a course could be delivered without technology, there was no need for technology use at all (Conger, 2005).

While the Clark/Kozma argument “started to go round in circles,” (Cobb, 1997, p. 21) alternative topics in media studies gained more attention. Morrison (1994) suggested that efforts would be “more productive to consider the effectiveness of the whole unit of instruction rather than the individual components” (p. 42). This echoed Briggs (1977) who proposed that researchers should compare the final version of instruction with an alternate form if available to determine its effectiveness.

Salomon, Perkins, and Globerson (1991) wrote the debate should focus on the effects of learning with technology instead of the effects of technology. Jonassen et al. (1994) agreed, “This debate should focus less on media attributes vs. instructional methods and more on the role of media in supporting, not controlling the learning process” (p. 31).
Cobb (1997) took the direct approach, “There are clearly many media for any instructional job, but this does not mean they all do it at the same level of efficiency—whether economic, logistic, social, or cognitive” (p. 33).

And Gavriel Salomon (1997) stated that each media brings a unique experience.

Indeed, daily observations suggest that each form of representation is uniquely capable of selecting, packaging, transmitting, and conveying its own information in its own way, thereby affording a unique experience. Viewing Meryl Streep in the film Out of Africa is a rather different experience from reading the novel, which provides an entirely different experience from, say, listening to an African storyteller or actually wandering through Kenya’s open spaces (p. 378).

Likewise, television scholar Herbert Zettl (2005) found little differentiation between content and medium.

The well-known communication scholar Marshall McLuhan (1994) proclaimed more than four decades ago that ‘the medium is the message’. With this insightful overstatement, he meant that the medium, such as television or film, occupies an important position not only in distributing the message but also in shaping it.

Despite overwhelming evidence of how important the media are in shaping the message, many prominent communication researchers still remain more interested in analyzing the content of the literal message than in the combined effect of the message and the medium as a structural agent. In their effort to keep anything from contaminating their examination of mass-communicated content, they consider the various media as merely neutral channels through which the all-important messages are distributed (Zettl, 2005, p. 11).

Does instructional technology produce a significant difference in learning outcomes? Little has been learned recently to alter the writings of past scholars.

“A significant number of criticisms related to media research have complicated data interpretation and frustrated any attempts to derive broad
generalizations useful to practitioners in their classroom use of media” (Dwyer, 1978, p. 59).

In 1977 Schramm wrote, “How a medium is used may therefore be more important than the choice of media” (p. 273).

While Salomon (1979) lamented, “After more than a half century of research, our conceptions of media are still fuzzy, and our understanding of their unique potentialities is still inadequate” (p. 4).

“Technology can make education more productive, individual, and powerful, making learning more immediate; give instruction a more scientific base; and make access to education more equal” (To improve learning, 1970, p. 7). “Yet it is an indictment of our present state of knowledge that we know neither how to assess the psychological effects of these technologies nor how to adapt them to the purpose of education” (Olson, 1974, p. 6).

**Visual Attention**

The brain processes visual messages in three ways. Mental messages are those that you experience from inside your mind—thoughts, dreams, fantasies. Direct messages are those that are seen because of your experiences without media intervention. Mediated messages are those which are viewed through some type of print or screen medium such as television, movies, or computers. Messages require a strong impression for an image to be remembered, but if viewed and thought about enough, an image will become permanently stored in visual memory (Lester, 2006).
Viewers are bombarded by such a vast amount of possibilities in every view, selecting an item for one’s focus is necessary. But focus is not enough to store a message. Meaning must be associated with what you see, before your mind has any chance of storing this information for long-term retrieval (Lester, 2006).

Bloomer (1990) identified nine mental activities that can affect visual perception: memory, projection, expectation, selectivity, habituation, salience, dissonance, culture and words. Memory is our link with all the images we have ever seen and should be considered the most important mental activity involved in accurate visual perception. Projection allows some individuals to see recognizable forms in the clouds. Expectation would deal with items that do not “belong,” or fit, into a scene. Most of what people see in a complicated visual experience is not consciously processed. The mind discards most information and selects significant details on which to focus. As a defense mechanism against overstimulation, the mind tends to ignore stimuli that are part of a person’s everyday, habitual activities. Salience means stimulus will be noticed more if it has meaning for the viewer. Trying to do too many things at once will create dissonance for the viewer and cause some areas to be minimized to focus on others. An example of dissonance would be the version of CNN Headline News introduced in 2001. It had layers of stock quotes, weather reports, headlines, and advertising logos all in addition to the traditional newscaster and the moving images and graphics of the traditional newscast. For many, this
created dissonance but many viewers praised the “newer, hipper look” (Lester, 2006, p. 62). Culture is the signs and meanings of the way a particular group of people live. And although we see with our eyes, our conscious thoughts are framed as words. “One of the strongest forms of communication is when words and images are combined in equal proportions” (Lester, 2006, p. 64).

Of all the senses, some consider the visual as the most important (Berger, 1972; Rose, 2007). “Of the five major senses of the human being, vision and audition are the most developed and critical” (Singer, 1980, p. 36).

Equally important, students of visual culture not only consider how visuals look, but how they are looked at (Rose, 2007; Sturken & Cartwright, 2001). As Berger (1972) wrote, “We never look just at one thing; we are always looking at the relation between things and ourselves” (p. 9). Audience studies have been accused of investing too much attention to the formal qualities of the visual image while not fully addressing the ways actual audiences made sense of it (Moorely, 1980; Rose, 2007).

But even if attention is increased, will that also increase information acquisition (Campbell et al., 1987)? How much of a message an audience recalls and how to improve understanding of the message is a significant consideration in the field of visual design. Most creators assume their works contain clear messages which impact their audience. But research shows various features affect the degree of impact (Rose, 2007). If the viewer does not understand the terms employed, follow the logic of the argument, finds the
concepts too alien or difficult, or is confused by the narrative, the communication is not effective and the viewer fails to take the meaning as the creators intend (Hall, 1980). And it must be remembered that audiences filter, through their own understandings and experiences, the messages they consume (Moores, 1993).

Humans have an incredible capacity to store and retrieve massive amounts of information; though it is also true that processing capacity at any given moment is limited. This is one of the reasons, signaling important information or otherwise gaining attention is important (Singer, 1980).

While some portray attention as being passive with little cognitive processing and incidental learning, others assert that formal features act as guides in understanding content that is attention-worthy (Anderson & Lorch, 1983; Campbell et al., 1987).

Several television studies have concluded that visual attention is associated, either positively or negatively, through use of formal features (Alwitt et al., 1980; Anderson & Lorch, 1983; Campbell et al., 1987; Watt & Welch, 1982; Williams, 1981). Some of the features positively associated with continual viewing are visual effects, pans, and visual movement. Other features lead the viewer to disengage visually while still continuing to monitor the presentation on a superficial level (Anderson et al., 1979). The disengagement in the midst of monitoring indicates that the meaningfulness or comprehensibility of the presentation guides the viewer’s visual attention (Anderson, Lorch, Field, &
Sanders, 1981). Williams (1981) found that children are not mesmerized by television, but they actively monitor it.

Specifically, they monitor the content for material they are likely to be able to comprehend, and when an appropriate cue occurs, they attend to the screen. Once viewing, they continue to attend until they cannot comprehend the material, or it becomes redundant or uninteresting, at which point they look away (Williams, 1981, p. 185).

Upon further study, Anderson and Lorch (1983) hypothesized that through extensive viewing experience; children come to associate the triggering effects between the formal features typically used in television with the likelihood that the subsequent content will be meaningful.

While the distinction between form and function may be overlooked by some, Huston, et al. (1981) found conceptual differences. They identified forms as attributes which apply to a wide range of “program types, content themes, story plots, and narrative structures” (p. 32). Formal features of television—animation, eye contact, high action, scene variability, camera zooms, cuts and dissolves, special visual effects, music, sound effects—are independent of the program content.

Huston and Wright (1983) determined that children make feature-content associations based upon their experiences with the medium to alert them to upcoming content. These associations act as clues about how much mental processing effort to exert, which influences storage and recall of content. Salomon (1979) provided evidence that comprehension is affected by the use of familiar formal features.
In Richard Mayer’s (2009) writings, he referred to this as the signaling principle. On the desire to focus the learner’s cognitive processing he said, “The solution is to insert cues that direct the learner’s attention toward the essential material, which is a technique that can be called signaling” (p. 109). He concluded, “People learn better from a multimedia message when the text is signaled rather than nonsignaled” (p. 113). Singer calls this the orientation reflex.

Another basic mechanism for processing information grows out of our ability to focus our attention on a specific and delimited area of the environment. This can, of course, be sight or sound, or some combination of both, excluding, however, a great many other sources of stimulation that may be occurring simultaneously (Singer, 1980, p. 37).

All viewers follow these cues according to Schmitt, Anderson, and Collins (1999) who found the formal features of cuts and movement “are positively related to looking regardless of content type, age, or sex of viewer” (p. 1164).

Formal features are used as clues to future content and how much effort the viewer should exert (Campbell et al., 1987). Salomon (1983) determined the amount of mental effort invested (AIME) is affected by the viewer’s perception, based upon the symbol systems of the medium, of what effort the material deserves, and the likely payoff of more or less effort (Van Evra, 2004).

This technique of alerting the viewer to important elements of the presentation has been more successful than efforts to appeal to the viewer’s emotions or overall arousal (Wetzel, Radtke, & Stern, 1994). “Although form exists primarily to serve content in production, form may be of interest to
audiences independently of content and may communicate information beyond that explicitly contained in content messages” (Huston et al., 1981, p. 33).

Salomon (1983) stated “It appears that even a change of labels…can affect students’ perceptions of how worthwhile the expenditure of effort is in processing presented material” (p. 48). In this specific case, he was addressing a television program on PBS compared to a commercial network show, but the correlation is clearly applicable to this comparison between video that appeals to teachers versus video that appeals to students.

*Perception Matters*

Salomon’s study (1983) also found that learning “greatly depends on the way in which sources of information are perceived, for these perceptions influence the mental effort expended in the learning process” (p. 42). His study found that perceptions play a “far more important role than is usually assumed” (p. 43). This is more commonly referred to as a bias where people, who have a strong expectation concerning the lesson, or any stimulus, may discount it and fail to examine its merits (Nisbett & Ross, 1980).

In common practice, students sometimes discount a lesson’s value and never attend to the teacher. Students may rationalize, “this teacher’s tests are all made from the review sheets” so they won’t listen to the lecture at all. Or they may have heard, “if you just read the summary to the chapters, you’ll be fine.” So they skim the chapters and pay attention to the summary. Other biases may be more subtle, but while “perceivers certainly go beyond the information they are
given,…it seems unlikely that they generally invent the information itself”
(Mischel, 1979, p. 748)! “Peoples’ perceptions of a source or task come from
somewhere, thus are not pure fabrications of their own minds” (Salomon, p. 46).
“Exposure to the ‘busy’ forms of today’s television, particularly MTV and its like,
may cultivate a preference for a quick-paced, erratic, even chaotic way of
handling information” (Salomon G. , 1997, p. 384).

Investigators who have studied aggressive behavior and television viewing
have identified arousal, or “level of involvement,” to explain learning from
emotional arousal, where the content is the agent of arousal, and the form model,
where characteristics independent of the content make the connection. “The
viewer’s arousal, attention, or involvement with television may be as important as
the content of the material viewed in determining whether learning takes place”
(Williams, 1981, p. 182). Cohen and Salomon’s (1979) study agreed that the
content is important, but learning is influenced by a person’s motivation, or how
he “wants to perceive…the information” (p. 161).

Another aspect of communication concerns the non-verbal actions of the
speaker or subject. Burgoon (1978) estimated that nonverbal language directs
as much as 65 percent of meaning in social interchange. Patterson (1983) noted
16 nonverbal actions typically used in communication. Some of the indentified
actions include, body orientation, hand movement, object or self-manipulation
(tapping fingers), movement and position, and gaze (Sewell, 1994).
Studies show systematic and positive relations between the way a source of information is initially perceived and the amount of effort students report investing in a particular subsequent presentation of material from that source (Salomon, 1983).

Baggaley and Duck (1976) found it is more important to be skilled in the “art of self-projection” (p. 80) than to be expert in the subject matter. More importantly, “it follows that anyone skilled in the latter art [self-projection] may give the impression that he is expert in the former sense also, and may acquit the role of ‘subject specialist’ better than the genuine article” (p. 80).

The influence of self-projection can be clearly seen in the Dr. Fox Lecture. “A professional actor who looked distinguished and sounded authoritative” (p. 631), was given a distinguished background, and presented to a group of “highly trained educators” (p. 631). He was coached on a scientific article to “present his topic and conduct his question and answer period with an excessive use of double talk, neologisms, non sequiturs, and contradictory statements. All this was to be interspersed with parenthetical humor and meaningless references to unrelated topics” (Naftulin et al., 1973, p. 631).

“The results of Dr. Fox studies have been interpreted to mean that an enthusiastic lecturer can entice or seduce favorable evaluations, even though the lecture may be devoid of meaningful content” (Marsh, 1987, p. 331).


**Video as a Learning Tool**

Research has proven that *Sesame Street*, the longest running and most analyzed television program with an academic curriculum has short-term positive effects on vocabulary and school readiness, which in turn prove to have long-term consequences. Numerous studies have also found similar positive effects from many other curriculum-based programming. “Television that is designed to teach does so, with long-term positive consequences” (Schmidt & Anderson, 2007, p. 67).

Federal Communication Commissioner Nicholas Johnson is credited with the statement, “All television is educational television, the only question is, What is it teaching.” (Liebert, 1973, p. 170)

The goal of a teacher is to help students recall, understand and apply the material. Toward this end, many methods and technologies have been incorporated to keep students more interested and engaged, and to improve their learning experience (Cleveland, 2011). Teachers are currently using video, graphics and animation not only for their convenience and attention-grabbing qualities; it also appeals to students with a variety of learning styles while providing the opportunity for conceptual understanding through visualization (Fralinger & Owens, 2009). Visualization has been identified as a powerful cognitive strategy to facilitate learning (West et al., 1991).

The value of visuals in improving instructional presentations were characterized by Francis Dwyer (1978) in the following list.
Increase learner interest, motivation, curiosity, and concentration

Provide important instructional feedback
  o Provide remedial instruction
  o Present to the learner the opportunity to perceive an object, process, or situation from a variety of vantage points
  o Facilitate the retention of information acquisition
  o Span linguistic barriers
  o Foster generalizations of responses to new situations
  o Stimulate discussion and raise questions
  o Increase reliability of communication, making learning more precise and complete
  o Bring into the classroom inaccessible processes, events, situations, materials, and phase changes in either space or time
  o Provide greater flexibility and variety in the organization of instruction
  o Illustrate, clarify, and reinforce oral and printed communication—qualitative relationships, specific details, abstract concepts, spatial relationships
  o Summarize the important points in a lesson
  o Isolate specific instructional characteristics
  o Sharpen powers of observation
  o Guide learners to think carefully and make conclusions
  o Present relationships, locations of parts, etc.
Facilitate discrimination and identification of relevant cues

Overcome time and distance

Introduce, organize, and present new information

Emphasize and reinforce aural and printed instruction

Function to integrate facts, skills, and judgments (p. 12)

In a 2008 study, Cleveland incorporated videos into Microsoft® Office PowerPoint® lectures. She found that 94% of the students believed using the videos improved or somewhat improved the overall class experience. Choi and Johnson (2005) found that students perceived the use of video instruction increased their retention.

Armstrong, Idriss, and Kim (2011) studied patients who viewed online video compared to the same instruction provided to a second group in a printed format. Results revealed the video instruction was considered a “significantly greater improvement in the knowledge scores…more useful and appealing” (p. 273) than the printed format. “More importantly, video group participants reported greater…adherence” (p. 273) to what they learned.

Several experiments involving video instruction were performed by Baggaley and Duck (1976). All had two cameras recording exactly the same presentation, but with slightly differing perspectives. When the speaker’s notes were shown, the audience determined the speaker to be “significantly less fair and more confusing” (p. 88). When an electronically generated background appeared to place the speaker in a subject-appropriate location rather than a
plain background setting, the interest in the speaker was unaffected, but the speaker “was construed as significantly more honest, more profound, more reliable, and more fair than when seen against the plain background” (p. 90).

Another study captured a speaker looking directly into the camera and another view from a 45-degree angle as though engaged in a discussion. In the angled view, “significantly higher ratings of the performer’s reliability and expertise were obtained” (p. 92). In fact, all questions produced more favorable ratings of the angled view, even though sometimes not statistically significant.

The most significant results were obtained from a study using audience reaction shots intercut with the presentation. One group saw students engaged and attentive. The second saw the same students, but this time expressing disinterest and doodling. “By far the most significant finding in this respect is that in the negative tape the lecturer was seen as more confusing, more shallow and more inexpert.” (Baggaley & Duck, 1976, p. 95). “The effect seems to be specific to items relating to the lecturer’s ability, competence and effectiveness, rather than to personal characteristics of general attractiveness” (Duck & Baggaley, 1975, p. 84).

“We can learn something from a source of information, given that it carries some potentially useful information, if we perceive it to warrant the investment of effort needed for the learning to take place” (Salomon G., p. 42).
Uses of Classroom Technology

Lecture Capture

Every day, students attempt to capture class content for later review, sometimes with audio recorders, but typically using paper and pen. The most obvious problem with this procedure is that students write about 20 words per minute, while the average lecturer speaks 120 words per minute (McClure, 2008; Toppin, 2011). Other challenges include:

- the communication of difficult...concepts, maintaining students' attention span, the difficulties of catering for individual students’ needs in a large classroom environment, different paces of student learning, lack in fluency in spoken and/or written English, and students losing continuity due to missed classes. As a result, only a small percentage of students are usually able to grasp the key concepts at the time of the live lecture delivery, while the remaining students are left to develop this critical understanding in their own time, with whatever assistance they can find and comprehend (Ambikairajah, Epps, Sheng, & Celler, 2006, p. 20).

Video recording a class lecture addresses several of these issues. Primarily, lecture videos may be replayed to better understand concepts covered in class or take more complete notes; they are an aid when preparing for exams; and students who are absent may use the videos to remain current with classwork (Gosper, et al., 2007; Odhabi & Nicks-McCaleb, 2011; Toppin, 2011; Wieling & Hofman, 2010).

The trend toward lecture capture in the university community “has been gaining momentum in recent years, but that momentum is being outpaced by student demand” (Nagel, 2008, para 1). Brown said, “Lecture capture has found an important and permanent place in education” (McClure, 2008, para 4).
While some schools have classrooms setup to automatically record lectures, and others have video professionals produce the recordings, a recent study showed faculty could perform the task equally well (Chandra, 2011; Lampi, Kopf, Benz, & Effelsberg, 2008). “Our experience showed that faculty captured videos are as effective as videos captured by videographers or by using automated mechanisms” (Chandra, 2011, p. 273).

Years ago, lecturers recorded an audio track to accompany PowerPoint presentations for student use, a precursor to current video capture, but today’s students prefer to see a lecturer explaining concepts on video rather than the still images with a soundtrack (Ambikairajah et al., 2003). Moreover, “the video provides a face with expressions, gestures and a human voice to what is usually ‘faceless’ online content, which according to the social-cue hypothesis stimulates students’ interest and communication, and therefore influences learning in a positive manner (Dewey, 1913; Rutter, 1984)” (as cited in Soong et al., 2006, p. 790).

Lecture capture research shows students perceive this technology leads to positive influences on their learning experiences (Gosper et al., 2007; McElroy, 2006; Soong et al., 2006). Studies have also found higher student scores when using video (Day, Burn, & Gerdes, 2009; Goldbert & McKhann, 2000). Toppin (2011) found video capture “has tremendous potential for improving student performance” (p. 391).
**Supplemental Instruction**

A more recent approach is the use of video recordings before a lesson has been discussed in the classroom—the “flip model.” Day and Foley (2006) believe, “The most beneficial way to use Web lectures is *in addition* to normal classroom time and reading assignments, as a way to *augment*, not replace the classroom experience” (p. 422) allowing for more meaningful in-class activities.

This study found the group that viewed a video before class, compared to the traditional in-class lecture section, scored higher by over eight percent. Class time, equivalent to the length of the videos, was cancelled in the video recordings section to prevent additional learning. Obviously, in practice, this technique may allow even greater gains (Day & Foley, 2006).

In a 2008 study, West Point students were surveyed on their use of video instruction to supplement a general chemistry course. Sixty percent indicated they had used the videos before class as a preparation tool, 36% had used videos after class for review, and 78% acknowledged they watched the videos to prepare prior to a test (Franciszkowicz, 2008).

**Response Systems**

“Two thousand four hundred years ago, the Greek philosopher Socrates realized that people understand more by answering a question, than be being told an answer” (Abrahamson, 1999, para 4). A century ago, Dewey (1916) concurred when he wrote people learn by doing and learning should be an active experience.
Response systems—known as audience response systems, classroom response systems, personal response systems, or 23 other labels—allow teachers, both in large classroom settings and online, to escape the typical lecture and maintain student attention (Kay & LeSage, 2009).

The earliest systems of this type consisted of simple response-cards or signs (Marmolejo, Wilder, & Bradley, 2004). Some instructors used colored cards, while others used labels on the cards, ex. True/False, or A, B, C, D. (Kelhum et al., 2001). This technique ensured active student responses, the opportunity for immediate remediation, and full interaction with the instructor (Heward, 1978).

Technological advances have allowed many schools to transition to electronic response systems. While these may vary in architecture and hardware, most systems currently in use are similar. Response systems, often in a large lecture hall, allow students to immediately respond to an instructor’s questions through an electronic sending device (Judson & Sawada, 2002). The questions presented during a lecture prompt responses from students. “By providing immediate feedback to students, either from individual electronic feedback integrated into the system or through the instructor, student responses [are] confirmed each step of the way” (Judson & Sawada, 2002, p. 170).

The first known electronic response system was installed in a Stanford University lecture hall in 1966, followed two years later at Cornell University. The military was also an early adopter of response systems (Abrahamson, 2006).
Early studies on the effect of response systems on student achievement showed no difference over students in classrooms without the technology, but did indicate overwhelming endorsement from the students (Graham, Tripp, Seawright, & Joeckell III, 2007; Judson & Sawada, 2002).

More recent evidence indicates students consider the systems useful for their own understanding of subject matter and enjoy using them (Abrahamson, 1999; Judson & Sawada, 2002). But “beyond discovering that students both enjoy and value the use of an electronic response system, the issue of academic achievement remains open” (Judson & Sawada, 2002, p. 175).

Roschelle et al. (2004) summarized 26 studies in math, chemistry and the humanities.

These range from promoting greater student engagement (16 studies), increasing understanding of complex subject matter (11 studies), increasing interest and enjoyment of class (7 studies), promoting discussion and interactivity (6 studies), helping students gauge their own level of understanding (5 studies), teachers having better awareness of student difficulties (4 studies), extending material to be covered beyond class time (2 studies), improving quality of questions asked (1 study), and overcoming shyness (1 study) (Abrahamson, 2006).

There have been a few recent studies in search of achievement results that are generally positive but “these studies tend to focus on the process of interactive engagement, sometimes facilitated by an audience response system, and do not place the equipment at the focal point of the study” (Judson & Sawada, 2006, pp. 32-33).

More typically, current studies show a “value for teaching and learning,” but do not measure achievement (Hinde & Hunt, 2006, p. 142). Conclusions
include improved concentration and greater enjoyment, improvements in attendance, greater engagement and lecture response, and greater participation (Hinde & Hunt, 2006). Limited studies in the high school environment have returned similar results (Barnes, 2008).

Bartsch and Murphy (2011) are direct in their assessment that “a majority of the papers on ECRSs [electronic classroom response systems] either are conjectures, case studies with little empirical evidence, or measurements of student attitudes” (p. 26). Fies and Marshall (2006) agree, “Missing from current CRS [classroom response systems] research reports are tightly controlled comparisons in which the only difference is the use, or lack of use, of a CRS” (p. 106). In fact, De Gagne (2011) reviewed 15 studies conducted since 2003, but only labeled one as experimental. The remaining were surveys or comparisons.

Based on several studies, a 2009 article by Kay and LeSage concluded that use of a response system increases student performance. However, the methods cited raise questions. El-Rady compared a test given in a general education course one semester, with the identical exam the following semester after implementing a response system. The test scores were approximately 10% higher (El-Rady, 2006). A similar study noted a 2.23% increase in the number of students receiving a course grade of C or better when compared to grades in the same course taught a previous semester without the use of a response system (Kaleta & Joosten, 2007).
Some recent studies have shown increased performance using tighter controls. Morling, McAuliffe, Cohen and DiLorenzo compared four sections of introductory psychology. Two sections used clickers and two did not. They found that the use of clickers “resulted in a small, positive effect on exam performance” (2008, p. 47).

Two medical education studies have similarly linked positive student achievement to the use of response systems. Pradhan et al. (2005) tested two groups of residents. One group received a typical lecture while the second group heard the same lecture utilizing a response system. A pre-test/post-test was assessed and the improvement from the interactive students was almost 20% greater than the lecture-only group. The total number of students in both groups was 17. Schackow and Loya (2004) used similar methodology and found a similar significant difference. Their conclusion stated, “At least two plausible explanations for these results exist: (1) improved retention occurs with active participation in the lecture process and (2) improved retention occurs when key learning points are highlighted prior to testing” (Schackow & Loya, 2004, p. 503).

Bloom’s Taxonomy Revised

In the late 1940s, Benjamin Bloom initiated the concept of classifying statements of intended educational results into a framework. This framework could then be used by faculty across universities to exchange items which would measure the same objectives. The original taxonomy provided six categories of mental activity “from simple to complex and from concrete to abstract”
(Krathwohl, 2002, p. 213). It was also assumed each step was a prerequisite to the next, more complex, level.

In 2001, Anderson and Krathwohl published a revision of the taxonomy and created a two-dimensional table illustrating intersections of the knowledge and cognitive process dimensions.

Table 1

The Taxonomy Table

<table>
<thead>
<tr>
<th></th>
<th>Remember</th>
<th>Understand</th>
<th>Apply</th>
<th>Analyze</th>
<th>Evaluate</th>
<th>Create</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factual Knowledge</td>
<td>A1</td>
<td>A2</td>
<td>A3</td>
<td>A4</td>
<td>A5</td>
<td>A6</td>
</tr>
<tr>
<td>Conceptual Knowledge</td>
<td>B1</td>
<td>B2</td>
<td>B3</td>
<td>B4</td>
<td>B5</td>
<td>B6</td>
</tr>
<tr>
<td>Procedural Knowledge</td>
<td>C1</td>
<td>C2</td>
<td>C3</td>
<td>C4</td>
<td>C5</td>
<td>C6</td>
</tr>
<tr>
<td>Meta-cognitive Knowledge</td>
<td>D1</td>
<td>D2</td>
<td>D3</td>
<td>D4</td>
<td>D5</td>
<td>D6</td>
</tr>
</tbody>
</table>

(Elieson, 2012)

Using the table to classify objectives, instructional units, and assessments provides a visual representation of the effectiveness of the item being assessed. Using this instrument allows instructors to evaluate and improve the instructional process (Krathwohl, 2002).

Student Engagement in the 21st Century

One expects positive perception to be followed by increased engagement but is there a correlation between effort and learning? And if they are associated, how can this effort be enhanced?
“Student engagement has long been recognized as the core of effective schooling” (Marzano & Pickering, 2011, p. 3). But do typical modes of teaching interest today’s students? Clearly, poor attention inhibits learning, given that the presentation and the received version of the presentation differ, restricting an accurate transfer of knowledge (Dwyer, 1978).

Schramm identified “one of the teacher’s responsibilities is to feed the pupil’s motivation” (Schramm, 1973, p. 47). Most would agree that motivating and engaging students has been recognized as an integral part of a successful school (Dewey, 1956; National research council, 2004).

In 1977, Sorenson and Hallinan reported that student effort was a factor that identified a significant variation in student achievement. “We have identified three basic concepts—ability, effort and opportunities for learning” (p. 276). This is not a surprise, since educators and psychologists have “long been aware of the importance of effort for educational attainment” (De Fraja, Oliveira, & Zanchi, 2010, p. 577).

Several studies have linked the amount of student effort with academic achievement (Finn & Rock, 1997; Marks, 2000; Natriello & McDill, 1986). Stewart (2008) studied a national sample of high school sophomores and concluded student effort had a substantially greater influence on student achievement than school characteristics.
However, as Akerlof and Kranton found in 2002, studies in student engagement have overlooked the role of “the student as the primary decision maker” (p. 1172).

While lack of student engagement was not born with digital natives, the dwindling shared experiences with today’s students (see Figure 4.) pose more significant challenges to addressing this goal.

Lack of motivation has been a recognized problem for decades. Deci and Ryan (1985) report, “For most children there are significant portions of the academic curriculum that are not spontaneously compelling or inherently interesting and most children do not appear to be intrinsically motivated for [requirements] that are expected of them by the schools” (p. 245).

“Many [students] claim a disconnect between life online after school hours and methods of learning used in classrooms” (Strom & Strom, 2009, p. 70).

“Schools that continue to teach to an Industrial Age way of life will be dismissed outright by their clientele of 21st-century digital kids” (Kelly et al., 2009, p. 21). However, schools that incorporate the technology of today’s teens will be adapting to the students’ experience base (Williams & Williams, 2011).

“Whether we like it or not, this media culture is our students’ culture” (National Council for the Social Studies, 2009, para 6). “Make no mistake about it: using popular culture, mass media, and digital media motivates and engages students. And students need to be motivated and engaged—genuine learning simply doesn’t happen without it” (Hobbs, 2011, p. 6).
Students are used to their surroundings. Being blasted with multiple stimuli simultaneously is “normal” for today’s teenagers. Likewise, lessons and media that do not meet their “normal” will be downgraded in their view (Dewey, 1916).


We all develop habitual ways of seeing and hearing that allow us to identify which images warrant our limited attention amid the visual chaos of everyday life and to ignore everything else. Using selective seeing, we screen out most of the sensations that reach our eyes and ears so that we are not overwhelmed by our surroundings. “We also choose to look at things we like to see and are especially interested in and ignore those that mean little to us” (Zettl, 2005, p. 6).

The key for student engagement is to create learning that appeals to 21st century kids.
Peer Influence

Peer pressure is typically perceived as having a negative influence but it certainly may trigger positive effects as well.

Actually, research indicates that peer pressure to engage in deviant activities—drinking, drug use, or cheating—is relatively uncommon. Instead, adolescents are most often influenced not by what their peers actually do or say, but by how they think their peers will react to a potential action (Burns & Darling, 2002, p. 4).

This exogenous effect demonstrates how a group’s characteristics may influence decision-making (Edelman, 2010).

An example of an endogenous effect, when one’s actions affect another’s, is explained by Deutsch and Gerard (1955)

From birth on, we learn that the perceptions and judgments of others are frequently reliable sources of evidence about reality. Hence it is to be expected that if the perceptions by two or more people of the same objective situation are discrepant, each will tend to re-examine his own view and that of the others to see if they can be reconciled (p. 635).

Studies have shown a significant association between positive peer influence and academic achievement (De Fraja et al., 2010; Nichols & White, 2001). “As adolescents associate with friends who value education and are committed to academic pursuits, they create attachments to school and conform to the ideals associated with it” (Stewart, 2008, p. 197). But the research may lack specificity.

Although a large number of studies have examined peer pressure and peer conformity, few studies have evaluated the degree to which peer pressure or peer conformity are related to or are different from more general tendencies to conform to authority (Santor, Messervey, & Kusumakar, 2000, p. 164).
Studies have shown and described peer influence, but have not addressed in what way the effects are achieved (Edelman, 2010). Classen and Brown (1985) agreed, "most research has focused on the product rather than the process of peer influence" (p. 464).

Other studies have measured peer influence as simply association between grades of a student’s academic achievement and that of his friends' (Ide, Parkerson, Haertel, & Walberg, 1981). “It seems doubtful, however, that such correlations adequately measure peer pressure” (Classen & Brown, 1985, p. 453).

**Immediate Feedback**

Many early studies in the field of psychology considered performance changes when learners were provided with feedback that affirmed or corrected a response (e.g., (Thorndike, 1927). Early feedback served to reinforce positive responses while it weakened incorrect answers through nonreinforcement; however it had no means to provide corrective information (Brosvic, Epstein, Cook, & Dihoff, 2005). There have been numerous studies that proved the learning advantages provided by corrective feedback (Butler, Karpicke, & Roediger, 2007, 2008; Lhyle & Kulhavy, 1987; Metcalfe, Kornell, & Finn, 2009). The benefits for feedback seem obvious.

If an error is allowed to stand uncorrected, it may be rehearsed, consolidated, and strengthened and may be more likely to recur than if it were immediately corrected. If feedback is given immediately, the correct answer rather than an error can then be rehearsed and consolidated (Metcalf et al., 2009, p. 1077).
There are however, differing viewpoints on the preferable time frame to provide corrective feedback (Robin, 1978).

Proponents of immediate feedback recommend the correction of errant responses and the acquisition of the correct response before exiting a test problem or test session (Epsein et al, 2001). In comparison, proponents of delayed feedback recommend the imposition of a delay of 24 to 48 hours to facilitate the forgetting of errant responses and the acquisition of correct responses in the absence of the interference that immediate feedback on an item-by-item basis generates (Brosvic et al., 2005, p. 402; Kulhavy & Stock, 1989).

Dihoff, Brosvic, Epstein, & Cook (2004) and Brosvic et al (2005) conducted a series of experiments and found significantly higher scores for students provided with immediate feedback over delayed feedback, and both showed gains over the control group receiving no feedback. “A consistent finding across our studies is the failure to support the delay-reaction effect” (Dihoff et al., 2004, p. 229).

In 2009, Metcalf et al. voiced a concern with studies showing delayed feedback superiority when they pointed out a discrepancy between the “time after feedback” in the studies. They noted the time between initial test and final test had remained constant, with the feedback moving from immediately after the initial test to immediately before the final test. They asserted the time after feedback should remain constant in the studies.

The Dihoff and Brosvic studies were conducted using an Immediate Feedback Assessment Technique form, a Scantron-like design with scratch-off hidden answers for periodic testing. This form allows students to continually search for the correct answer, until they ultimately scratch off the solution.
Generally in today’s high schools, feedback is achieved through remote control devices referred to as “clickers” or learning management systems, ubiquitous in higher education, but becoming popular in K-12 learning. Both would primarily be used for immediate feedback.

Beyond correcting errors, another benefit should not be overlooked. Butler et al. (2008) found feedback also reinforces correct answers. When students have low confidence in their answers, even if the answers are correct, feedback can address the metacognitive error.

For example, students answering multiple questions may not have the same level of confidence in every answer, leading to the possibility of some low-confidence correct responses and some high-confidence incorrect responses (Butler et al., 2008; Butterfield & Metcalfe, 2006; Roediger, Wheeler, & Rajaram, 1993).

Butler, et al. (2008) demonstrated, “that correct responses benefitted from feedback, and this positive effect of feedback was greatest for low-confidence correct responses. Thus, feedback also helps learners correct the metacognitive error that occurs when they are correct on an initial test but lack confidence in their response (p. 925).

Summary

This study originated with an idea that seemed simple. Video use is growing in education and if educators could economically create videos that are more appealing to today’s students, should not that be their goal?

There has been little recent study on the effects of media in education. That may be attributed to the “lack of significant difference” debate over the
years. There is also a void of information on learning with television or video (Huston, Bickham, Lee, & Wright, 2007).

It seems appropriate to revisit Baggaley and Duck’s experiments and determine what effect video techniques may have on today’s high school students.
CHAPTER 3

METHODOLOGY

Data Source

This study was conducted in a suburban Dallas-Fort Worth, Texas, middle-class high school. The school is classified in Texas as a 5A high school with 2288 students at the time of the study. Of the total student population, 48.1% of the students were female and 51.9% were male. The student ethnicity was 70.0% White, 15.4% Hispanic, 5.5% Black, 1.6% Asian, 0.6% American Indian, with 6.9% unclassified (Midlothian High School, 2012).

Students were recruited from all grade levels and multiple sections to produce 155 valid responses. Six responses were excluded due to either a missing pretest or posttest. Thirteen responses were excluded for non-participation.

I am a current faculty member at the school.

Research Questions

Two key research questions were evaluated in this study. Each instrument contains a Part A to assess instructional achievement and a Part B to assess intrinsic motivation.
Video with Audience Feedback

Research Question 1a: Among suburban Texas high school students, is instructional achievement associated with a video lecture that includes audience reaction scenes?

Research Question 1b: Among suburban Texas high school students, is intrinsic motivation associated with a video lecture that includes audience reaction scenes?

Video with Content Question Interaction

Research Question 2a: Among suburban Texas high school students, is instructional achievement associated with a video lecture that includes content question interaction?

Research Question 2b: Among suburban Texas high school students, is intrinsic motivation associated with a video lecture that includes content question interaction?

Video with Audience Feedback and Content Question Interaction

Research Question 3a: Among suburban Texas high school students, is instructional achievement associated with a video lecture that includes audience feedback scenes and content question interaction?

Research Question 3b: Among suburban Texas high school students, is intrinsic motivation associated with a video lecture that includes audience feedback scenes and content question interaction?
Hypotheses

The current study uses the following null and research hypotheses for each of the three conditions studied. The research hypotheses reflect the expectations of achievement or positive motivation while the null hypotheses represent the status quo which will remain in the event statistical analyses fail to confirm associations of magnitude.

Hypotheses 1a—Null

Among suburban Texas high school students, there is no association between instructional achievement and a video lecture that includes audience reaction scenes.

Hypotheses 1a—Research

Among suburban Texas high school students, there is positive instructional achievement associated with a video lecture that includes audience reaction scenes.

Hypotheses 1b—Null

Among suburban Texas high school students, there is no association between student motivation and a video lecture that includes audience reaction scenes.

Hypotheses 1b—Research

Among suburban Texas high school students, there is positive student motivation associated with a video lecture that includes audience reaction scenes.
Hypotheses 2a—Null
Among suburban Texas high school students, there is no association between instructional achievement and a video lecture that includes content question interaction.

Hypotheses 2a—Research
Among suburban Texas high school students, there is positive instructional achievement associated with a video lecture that includes content question interaction.

Hypotheses 2b—Null
Among suburban Texas high school students, there is no association between student motivation and a video lecture that includes content question interaction.

Hypotheses 2b—Research
Among suburban Texas high school students, there is positive student motivation associated with a video lecture that includes content question interaction.

Hypotheses 3a—Null
Among suburban Texas high school students, there is no association between instructional achievement and a video lecture that includes audience reaction scenes and content question interaction.
Hypotheses 3a—Research

Among suburban Texas high school students, there is positive instructional achievement associated with a video lecture that includes audience reaction scenes and content question interaction.

Hypotheses 3b—Null

Among suburban Texas high school students, there is no association between student motivation and a video lecture that includes audience reaction scenes and content question interaction.

Hypotheses 3b—Research

Among suburban Texas high school students, there is positive student motivation associated with a video lecture that includes audience reaction scenes and content question interaction.

Research Design

Pretest/Posttest

The pretest/posttest consisted of 14 questions with multiple choice and true/false answers. All questions fell within the remember and understand cognitive process dimension on the taxonomy table and measured either factual knowledge or conceptual knowledge.

Intrinsic Motivation Inventory

Deci and Ryan (1985) state, “When highly intrinsically motivated, organisms will be extremely interested in what they are doing and experience a
sense of flow” (p. 34). Flow is described as “that peculiar, dynamic, holistic sensation of total involvement with the activity itself” (p. 29). Despite how important intrinsic motivation is to the educational process, Deci and Ryan (1985) noted how often educators and parents alike ignore the subject.

The Intrinsic Motivation Inventory (IMI) is a multidimensional instrument designed to assess participants’ subjective experience related to motivation using seven subscales: Interest/Enjoyment, Perceived Competence, Effort/Importance, Value/Usefulness, Pressure/Tension, Perceived Choice and Relatedness. It has been employed in reading, learning, writing, puzzle tasks and sport research studies (McAuley, Duncan, & Tammen, 1989).

Past research indicates that the order and number of items within each subscale has negligible effects while the “inclusion or exclusion of specific subscales appears to have no impact on the others” (Intrinsic Motivation Inventory, 2012, para 2). In fact, all seven subscales have rarely been used in a single study (McAuley et al., 1989).

IMI items may be modified slightly to fit a wide variety of activities. Thus “this activity” may be modified to “this lesson” “without effecting its reliability or validity” (Intrinsic Motivation Inventory, 2012, para 3). McAuley et al. (1989) found strong support for IMI’s validity and reliability.

The current study used four subscales: Interest/Enjoyment, Perceived Competence, Effort/Importance, and Pressure/Tension utilizing 21 items. “The
Interest/Enjoyment subscale is considered the self-report measure of intrinsic motivation” (Intrinsic Motivation Inventory, 2012, para 1). The perceived competence scale is “theorized to be [a] positive predictor of both self-report and behavioral measures of intrinsic motivation” (Intrinsic Motivation Inventory, 2012, para 1). The effort/importance scale represents a variable that is relevant to some motivation questions while pressure/tension represents a negative predictor of motivation (Intrinsic Motivation Inventory, 2012).

The respondents scored the items on a scale from 1 to 7, with 1 representing not at all true while 7 represents very true. (R) items are reverse scored with the response subtracted from eight and used as the item score.

The study also gathered additional items for further research.

**Administration**

The study was conducted in a school computer lab over a three-day period. Students took the pre-test in the first session and returned two days later for the experimental lesson and posttest. Students received no feedback scores upon completion of the pretest or post-test.

A 12-minute lecture from a high school government course was recorded and used as the basic recording for this experiment.
The experimental lessons were:

Group 1 viewed the video lecture without student reaction cutaways and without student interaction.

Group 2 viewed the same video lecture with student reaction cutaways included showing students taking notes and listening intently to the lecture. Five cutaways were included during the video presentation. The lecture itself did not stop during the video cutaways but continued on the audio channel.

Group 3 viewed the same video lecture without student reaction cutaways but the lecture was broken into three videos. At the conclusion of the first video, students were instructed to complete a three-question multiple choice or true/false quiz. Upon completion of the quiz, correct answer feedback was provided. Students were then instructed to watch the second video. After
viewing was completed, a similar quiz with feedback was provided. Students were asked to view the third video.

Group 4 viewed the same video lecture as Group 2 including student reaction cutaways. In addition, the lecture was broken into three videos just as Group 3 experienced. At the conclusion of the first video, students were instructed to complete a three-question multiple choice or true/false quiz. Upon completion of the quiz, correct answer feedback was provided. Students were then instructed to watch the second video. After viewing the second video, a similar quiz with feedback was provided. Students were instructed to view the last video.

Students were advised they could go back and review the video as needed before indicating they were ready to proceed. Upon completion of the video instruction, a post-test was administered. Once the post-test had been accessed, students could no longer view any of the previous instruction.

The school utilizes Blackboard Learn as a course management system and the participating students were enrolled in a course specifically for this experiment through Blackboard. This allowed Blackboard to randomly assign students to one of the four experimental groups. This also allowed the pre-test and post-test questions and the Intrinsic Motivation Inventory questions to be randomly ordered for each student.
Although enrolled in the experimental course, students were not allowed access until a password was provided once they were prepared to begin the study. The password was changed daily to prevent early access to the study.

![Figure 6. Visual representation of the research groups.](image)

The study is a quantitative 2x2 design as illustrated in Figure 6. The expected outcome was for one or more of the experimental groups to show substantially larger scores than the control group.

The pre-test/post-test instrument consisted of 14 questions with multiple choice or true/false answers. The Blackboard Learn™ learning management
system was able to match the Pretest score with the posttest score from each student.

A repeated measures multivariate analysis of variance (MANOVA) provided inferential data to check for significant differences of accomplishment between different instructional units.

A multivariate analysis of variance (MANOVA) provided inferential data to check for significant difference of motivation between different instructional units.

The study consisted of three dependent variables:

1. A video lecture capture recording including student reaction cutaways
2. A video lecture capture recording including student interaction
3. A video lecture capture recording including student reaction cutaways and student interaction

The study examined the learning experiences for each group as they related to two independent variables:

1. The actual instructional achievement
2. The learners’ motivation to learn
CHAPTER 4

RESULTS

Data Analysis

Data from each of the four research groups was gathered via the Blackboard Learning Management System, then compiled and analyzed using SPSS 20.0 statistical software. Significance was determined using $p < .05$, utilizing a two-tailed analysis. Partial eta squared was used to determine effect sizes. “Eta squared is the proportion of total variance explained by a variable, whereas partial eta squared is the proportion of variance that a variable explains that is not explained by other variables” (Field, 2009, p. 791). Cohen’s $d$ was determined for the motivation survey results to confirm the effect size results.

Intrinsic Motivation Inventory

Multi-item scales are preferable for measuring psychological attributes since “measurement error averages out when individual scores are summed to obtain a total score” (Nunnally & Bernstein, 1994). This experiment used four scales in the Intrinsic Motivation Inventory, each scale consisting of multiple items. As seen in Table 2, the Interest/Enjoyment, Effort/Importance, and Pressure/Tension scales each contained 5 questions while the Perceived Competence scale contained 6 questions. Internal consistency between the items in each scale was measured using Cronbach’s alpha reliability coefficient.
The typical range for alpha is between 0 and 1, with .70 generally considered to be acceptable (Nunnally & Bernstein, 1994).

Cronbach’s alpha results show all scales had alpha above .822. Interest/Enjoyment reported α=.887, Perceived Competence was α=.839, Effort/Importance was α=.858, and Pressure/Tension was α=.822.

Table 2

<table>
<thead>
<tr>
<th>Scale of Intrinsic Motivation Inventory</th>
<th>α</th>
<th>Number of items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest/Enjoyment</td>
<td>.887</td>
<td>5</td>
</tr>
<tr>
<td>Perceived Competence</td>
<td>.839</td>
<td>6</td>
</tr>
<tr>
<td>Effort/Importance</td>
<td>.858</td>
<td>5</td>
</tr>
<tr>
<td>Pressure/Tension</td>
<td>.822</td>
<td>5</td>
</tr>
</tbody>
</table>

Since the sample sizes are unequal, the robustness of the data must be guaranteed. Within-group covariance matrices were evaluated using Box’s test of equality of covariance matrices at \( p = .219 \). As this does not meet the level of significance \( p < .001 \), no violations of assumptions were found (Tabachnick & Fidell, 2001). Results were also checked for outliers, skewness and kurtosis and all were found to be normal.

It should be remembered that while the entire scale is used to measure motivation the pressure/tension subscale is “theorized to be a negative predictor” (Intrinsic Motivation Inventory, 2012) of motivation. In this study, the
Pressure/Tension score was consistently low across all groups, indicating no disassociation with motivation.

Hypothesis Testing

*Test of Hypothesis 1a: Association of Instructional Achievement and a Video with Audience Reaction Scenes*

A repeated measures multivariate analysis of variance (MANOVA) was used to test against the null and research hypotheses. All groups were compared using Wilks’ lambda which compares the means of the pretest and the posttest to determine significance identified by the treatments. Combined, the groups showed no significance ($p = .069$) indicating no associations were identified by the experiment. Effect size ($\eta_p^2 = .046$) was determined using a partial eta squared calculation. Using Cohen guideline values for interpretation of $\eta_p^2$ for studies incorporating the same number of groups and variables, a small effect size would be reflected by a $\eta_p^2$ of .02 and a medium effect size would show a $\eta_p^2$ of .14 (Steyn & Ellis, 2009).

Descriptive statistics showed a mean increase in score for the video with audience reaction group to be (0.95), while the control group improved (1.21).

Conclusion Regarding Hypothesis 1a

Because significant ($p < .05$) associations were not found between a video with audience reaction scenes and instructional achievement, the research hypothesis of association could not be confirmed so the null hypothesis is
accepted. No positive association between audience reaction scenes and individual achievement could be identified.

*Test of Hypothesis 1b: Association of Intrinsic Motivation and a Video with Audience Reaction Scenes*

To test against the null and research hypotheses, data from each group was compiled and analyzed using a multivariate analysis of variance (MANOVA). The video cutaway group ($n = 45$) was compared to the control group ($n = 42$) using four scales. All four scales showed no significance: Interest/Enjoyment ($p = .078$), Perceived Competence ($p = .738$), Effort/Importance ($p = .107$) and Pressure/Tension ($p = .230$).

![Figure 7. Visual comparison of the audience reaction group to the control group.](image)

Effect sizes are computed to determine the “degree to which the phenomenon is present in the population” (Cohen, 1988). Effect size was determined using a partial eta squared calculation. Calculations for the first three
subscales in the motivation instrument showed a small to medium effect, while the Pressure/Tension subscale registered a small effect. The subscales were: Interest/Enjoyment ($\eta_p^2 = .072$), Perceived Competence ($\eta_p^2 = .052$), Effort/Importance ($\eta_p^2 = .055$) and Pressure/Tension ($\eta_p^2 = .028$). Utilizing Cohen Guideline Values for Interpretation of $\eta_p^2$ in studies incorporating the same number of groups and variables, a small effect size would be reflected by a $\eta_p^2$ of .02 and a medium effect size would show a $\eta_p^2$ of .14 (Steyn & Ellis, 2009).

In addition, Cohen’s $d$, the most commonly used effect size estimate (Effect Size and Clinical/Practical Significance, 2012) was utilized to confirm the effect size using the Effect Size Calculator from the University of Colorado at Colorado Springs (Becker, 2000). Cohen’s $d$ indicated a medium effect (see figure 4) in both the Interest/Enjoyment Scale ($d = .543$) and the Effort/Importance Scale ($d = .523$). The Pressure/Tension Scale ($d = .420$) registered a small to medium effect while the Perceived Competence Scale ($d = .204$) showed a small effect. Cohen generalized that $d = .02$ indicated a small effect, $d = .05$ showed a medium effect and $d = .08$ signified a large effect (Cohen, 1988).
"Cohen later developed more precise guidelines for interpreting effect size" (Effect Size and Clinical/Practical Significance, 2012). Effect size may be viewed as the location where the treated subjects would stand among the control group. The $d = .543$ would position the experimental group mean at the $71^{st}$ percentile of the control group. Another interpretation would be to view the uniqueness or nonoverlap of the two groups. In this scenario, the $d = .543$ would represent a nonoverlap of 35.5 percent between the two group distributions.

Table 4.

Interpretation of Cohen’s $d$ for Effect Sizes

<table>
<thead>
<tr>
<th>Original Standard</th>
<th>Effect Size</th>
<th>Percentile Standing</th>
<th>Percent of Nonoverlap</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0</td>
<td>97.7</td>
<td></td>
<td>81.1%</td>
</tr>
<tr>
<td>1.9</td>
<td>97.1</td>
<td></td>
<td>79.4%</td>
</tr>
<tr>
<td>1.8</td>
<td>96.4</td>
<td></td>
<td>77.4%</td>
</tr>
<tr>
<td>1.7</td>
<td>95.5</td>
<td></td>
<td>75.4%</td>
</tr>
<tr>
<td>1.6</td>
<td>94.5</td>
<td></td>
<td>73.1%</td>
</tr>
<tr>
<td>1.5</td>
<td>93.3</td>
<td></td>
<td>10.7%</td>
</tr>
<tr>
<td>1.4</td>
<td>91.9</td>
<td></td>
<td>68.1%</td>
</tr>
<tr>
<td>1.3</td>
<td>90</td>
<td></td>
<td>65.3%</td>
</tr>
<tr>
<td>1.2</td>
<td>88</td>
<td></td>
<td>62.2%</td>
</tr>
<tr>
<td>1.1</td>
<td>86</td>
<td></td>
<td>58.9%</td>
</tr>
</tbody>
</table>
Table 4 (continued)

<table>
<thead>
<tr>
<th>Original Standard</th>
<th>Effect Size</th>
<th>Percentile Standing</th>
<th>Percent of Nonoverlap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large</td>
<td>1.0</td>
<td>84</td>
<td>55.4%</td>
</tr>
<tr>
<td></td>
<td>0.9</td>
<td>82</td>
<td>51.6%</td>
</tr>
<tr>
<td></td>
<td>0.8</td>
<td>79</td>
<td>47.4%</td>
</tr>
<tr>
<td></td>
<td>0.7</td>
<td>76</td>
<td>43.0%</td>
</tr>
<tr>
<td></td>
<td>0.6</td>
<td>73</td>
<td>38.2%</td>
</tr>
<tr>
<td>Medium</td>
<td>0.5</td>
<td>69</td>
<td>33.0%</td>
</tr>
<tr>
<td></td>
<td>0.4</td>
<td>66</td>
<td>27.4%</td>
</tr>
<tr>
<td></td>
<td>0.3</td>
<td>62</td>
<td>21.3%</td>
</tr>
<tr>
<td>Small</td>
<td>0.2</td>
<td>58</td>
<td>14.7%</td>
</tr>
<tr>
<td></td>
<td>0.1</td>
<td>54</td>
<td>7.7%</td>
</tr>
<tr>
<td></td>
<td>0.0</td>
<td>50</td>
<td>0%</td>
</tr>
</tbody>
</table>

(Effect Size and Clinical/Practical Significance, 2012)

Conclusion Regarding Hypothesis 1b

Because significant ($p < .05$) associations were not found between audience reaction scenes and intrinsic motivation, the research hypothesis of association could not be confirmed so the null hypothesis is accepted. No positive association between audience reaction scenes and intrinsic motivation could be identified.
Test of Hypothesis 2a: Association of Instructional Achievement and Content Question Interaction

A repeated measures multivariate analysis of variance (MANOVA) was used to test against the null and research hypotheses. All groups were compared using Wilks’ lambda, “the criterion of choice” (Tabachnick & Fidell, 2001, p. 348), which compares the means of the pretest and the posttest to recognize significance identified by the treatments. The study found a combined effect of $p = .069$ indicating the findings failed to conclude that any significant associations were identified by the experiment. Effect size ($\eta^2_p = .046$) was determined using a partial eta squared calculation. Consulting Cohen Guideline Values for Interpretation of $\eta^2_p$ for studies incorporating the same number of groups and variables, a small effect size would be reflected by a $\eta^2_p$ of .02 and a medium effect size would show a $\eta^2_p$ of .14 (Steyn & Ellis, 2009).

Descriptive statistics showed a mean increase in score for the video with content question interaction group to be (0.97), while the control group improved (1.21).

Conclusion Regarding Hypothesis 2a

Because significant ($p < .05$) associations were not found between content question interaction and instructional achievement, the research hypothesis of association could not be confirmed so the null hypothesis is accepted. No positive association between content question interaction and individual achievement could be identified.
Test of Hypothesis 2b: Association of Intrinsic Motivation and Content Question Interaction

To test against the null and research hypotheses, data from each group was compiled and analyzed using a multivariate analysis of variance (MANOVA). The video content question interaction group \((n = 31)\) was compared to the control group \((n = 42)\) using four scales. All four scales showed no significance: Interest/Enjoyment \((p = .250)\), Perceived Competence \((p = .572)\), Effort/Importance \((p = .673)\) and Pressure/Tension \((p = .512)\).

Effect size was determined using a partial eta squared calculation. Calculations for the first three subscales in the motivation instrument showed a small to medium effect, while the Pressure/Tension subscale registered a small effect. The subscales were: Interest/Enjoyment \((\eta^2_p = .072)\), Perceived
Competence ($\eta^2_p = .052$), Effort/Importance ($\eta^2_p = .055$) and Pressure/Tension ($\eta^2_p = .028$). Using Cohen Guideline Values for Interpretation of $\eta^2_p$ for studies incorporating the same number of groups and variables, a small effect size would be reflected by a $\eta^2_p$ of .02 and a medium effect size would show a $\eta^2_p$ of .14 (Steyn & Ellis, 2009).

Cohen’s $d$ showed a low medium effect in the Interest/Enjoyment Scale ($d = .418$), and a 66 percentile standing (see Table 4). The Perceived Competence Scale ($d = .313$), the Effort/Importance Scale ($d = .253$), and the Pressure/Tension Scale ($d = .420$) all registered small to medium effects (Cohen, 1988).

Table 5

<table>
<thead>
<tr>
<th></th>
<th>Control $\bar{X}$</th>
<th>Content Ques. Interaction $\bar{X}$</th>
<th>$\alpha$</th>
<th>$\eta^2_p$</th>
<th>$d$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest/Enjoyment</td>
<td>3.192857</td>
<td>3.832258</td>
<td>.250</td>
<td>.072</td>
<td>.418</td>
</tr>
<tr>
<td>Perceived Competence</td>
<td>4.150794</td>
<td>4.526882</td>
<td>.572</td>
<td>.052</td>
<td>.313</td>
</tr>
<tr>
<td>Effort/Importance</td>
<td>3.919048</td>
<td>4.270968</td>
<td>.673</td>
<td>.055</td>
<td>.253</td>
</tr>
<tr>
<td>Pressure/Tension</td>
<td>2.650000</td>
<td>2.225806</td>
<td>.512</td>
<td>.028</td>
<td>.167</td>
</tr>
</tbody>
</table>

Conclusion Regarding Hypothesis 2b

Because significant ($p < .05$) associations were not found between content question interaction and intrinsic motivation, the research hypothesis of association could not be confirmed so the null hypothesis is accepted. No
positive association between content question interaction and intrinsic motivation could be identified.

*Test of Hypothesis 3a: Association of Instructional Achievement and a Video with Audience Reaction Scenes and Content Question Interaction*

A repeated measures multivariate analysis of variance (MANOVA) was used to test against the null and research hypotheses. All groups were compared using Wilks’ lambda which compares the means of the pretest and the posttest to recognize significance identified by the treatments. Combined, the groups showed no significance \( p = .069 \) indicating that no associations were identified by the experiment. The study found a combined effect of \( p = .069 \) indicating the findings failed to conclude that any significant associations were identified by the experiment. Effect size \( (\eta^2_p = .046) \) was determined using a partial eta squared calculation.

Descriptive statistics showed a mean increase in score for the video with audience reaction scenes and content question interaction group to be (1.19), while the control group improved (1.21).

**Conclusion Regarding Hypothesis 3a**

Because significant \( (p < .05) \) associations were not found between combined audience reaction scenes and content question interaction and instructional achievement, the research hypothesis of association could not be confirmed so the null hypothesis is accepted. No positive association between
combined audience reaction scenes and content question interaction and individual achievement could be identified.

*Test of Hypothesis 3b: Association of Intrinsic Motivation and a Video with Audience Reaction Scenes Content Question Interaction*

To test against the null and research hypotheses, data from each group was compiled and analyzed using a multivariate analysis of variance (MANOVA). The video cutaway group (n = 37) was compared to the control group (n = 42) using four scales. Three scales showed significance: Interest/Enjoyment ($p = .007$), Perceived Competence ($p = .027$) and Effort/Importance ($p = .035$). The forth scale, Pressure/Tension ($p = .384$), showed no significance. Since the pressure/tension scale is used as a “negative predictor of intrinsic motivation” (Intrinsic Motivation Inventory, 2012, para 1), lack of significance on this scale was disregarded.
Effect size was determined using a partial eta squared calculation. Calculations for the first three subscales in the motivation instrument showed a small to medium effect, while the Pressure/Tension subscale registered a small effect. The subscales were: Interest/Enjoyment ($\eta^2_p = .072$), Perceived Competence ($\eta^2_p = .052$), Effort/Importance ($\eta^2_p = .055$) and Pressure/Tension ($\eta^2_p = .028$). Utilizing Cohen Guideline Values for Interpretation of $\eta^2_p$ for studies incorporating the same number of groups and variables, a small effect size would be reflected by a $\eta^2_p$ of .02 and a medium effect size would show a $\eta^2_p$ of .14 (Steyn & Ellis, 2009).

Cohen’s $d$ confirmed a medium effect in both the Interest/Enjoyment Scale ($d = .543$) and the Effort/Importance Scale ($d = .523$). Both these scales register in the 69 percentile standing with a nonoverlap of 33 percent (See Table 4).
Pressure/Tension Scale \( (d = .420) \) registered a small to medium effect while the Perceived Competence Scale \( (d = .204) \) showed a small effect. Cohen generalized that \( d = .02 \) indicated a small effect, \( d = .05 \) showed a medium effect and \( d = .08 \) signified a large effect (Cohen, 1988).

Table 6

<table>
<thead>
<tr>
<th>Scale Comparison of the Combination Audience Reaction and Content Question Interaction Group to the Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
</tr>
<tr>
<td>-------------------</td>
</tr>
<tr>
<td>Interest/Enjoyment</td>
</tr>
<tr>
<td>Perceived Competence</td>
</tr>
<tr>
<td>Effort/Importance</td>
</tr>
<tr>
<td>Pressure/Tension</td>
</tr>
</tbody>
</table>

Conclusion Regarding Hypothesis 3b

Because significant \( (p < .05) \) associations were found between combined audience reaction scenes with content question interaction and intrinsic motivation, the research hypothesis of association is confirmed and the null hypothesis is rejected. There is positive association between combined audience reaction scenes with content question interaction and intrinsic motivation.

Summary of Findings

The purpose of this study was to find a correlation in current suburban high school instructional achievement and/or motivation and audience reaction
scenes in a video presentation and/or content question interaction in the presentation. The experiment found a significant association in student motivation when combining both techniques, while no association between instructional achievement and the treatments could be isolated.

The experiment found no significant instructional achievement utilizing any of the experimental treatments compared to the control group. While limited differences were found between the scores of the experimental groups, it did appear from casual observation that male students appeared to be more focused on the task than female students.

Similarly, no significant differences were found in intrinsic motivation between the control group and either of the single-factor groups utilizing audience reaction scenes or content question interaction. While not enough to signify significance, when comparing both the single factors, audience reaction scenes in the video showed more association than the content question interaction factor.

However, combining the two factors triggered a reaction in the students. Significant differences in intrinsic motivation were found in the group utilizing both the audience reaction scenes and content question interaction in three of the four subscales. The interest/enjoyment ($p = .007$), perceived competence ($p = .027$) and effort/importance ($p = .035$) subscales all measured significant differences.

This finding indicates that students require a significant amount of stimuli before the threshold can be penetrated to attune motivation to attend to the
lesson. If the environment in which the majority of students spend their out-of-school hours is considered, this conclusion is not surprising.

There appeared to be little difference in the pressure/tension response among all groups. Each scored extremely low, with a few outliers. The pressure/tension response low scores indicate that students are quite comfortable with the use of video instruction as well as the immediate response system popularized by handheld clickers.

Findings in this scale may be attributed to the role that video occupies in the lives of today’s teenagers and the comfort level they feel with the medium. Additionally, handheld response systems have been common in classrooms and most students have experienced interrupting the lesson to stop and answer questions.

The major results for the hypotheses listed in Chapter 3 were:

Hypothesis 1: Insufficient evidence was found to accept that video incorporating audience reaction scenes was associated with instructional achievement or intrinsic motivation.

Hypothesis 2: Insufficient evidence was found to accept that video incorporating content question interaction was associated with instructional achievement or intrinsic motivation.

Hypothesis 3: Confirmed that video incorporating both audience reaction scenes and content question interaction was associated with intrinsic motivation. Insufficient evidence was found to accept that video incorporating both audience
reaction scenes and content question interaction was associated with instructional achievement.
CHAPTER 5

SUMMARY, DISCUSSION, AND RECOMMENDATIONS

Summary of Hypothesis Testing

Statistically significant ($p < .05$) association was not found between positive instructional achievement and a video containing audience reaction scenes. Therefore, there was insufficient evidence to conclude Research Hypothesis 1a. In addition, analysis indicated no statistically significant ($p < .05$) association between intrinsic motivation and a video containing audience reaction scenes. Therefore, insufficient evidence was found to accept Research Hypothesis 1b.

Statistically significant ($p < .05$) association was not found between positive instructional achievement and a video with content question interaction, thus Research Hypothesis 2a was unable to be confirmed. In addition, analysis indicated no statistically significant ($p < .05$) association between intrinsic motivation and a content question interaction. Therefore, the experiment failed to confirm Research Hypothesis 2b.

No statistically significant ($p < .05$) association was found between positive instructional achievement and a video containing combined audience reaction scenes with content question interaction. Therefore, the experiment failed to conclude Research Hypothesis 3a.
Analysis determined that statistically significant (interest/enjoyment $p = .007$, perceived competence $p = .027$, effort/importance $p = .035$) associations were found between a video containing combined audience reaction scenes with content question interaction and intrinsic motivation. Null Hypothesis 3b was therefore rejected and the research hypothesis was accepted confirming a positive association between student motivation and a video lecture than includes audience reaction scenes and content question interaction.

It should be noted that the Intrinsic Motivation Inventory’s Pressure/Tension scale was consistently ranked low across all groups indicating high school students are comfortable with computer use, visual instruction and interactive technology. The scale is considered a negative predictor of motivation; therefore low scores indicate high motivation. Even though no significance was found in this scale, the results do not contradict the finding of significance in the combined treatment group.
Table 7

*Summary of Hypothesis Testing*

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Hypothesis</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a. Null. Among suburban Texas high school students, there is no association between instructional achievement and a video lecture that includes audience reaction scenes.</td>
<td>Insufficient Evidence to Accept</td>
<td></td>
</tr>
<tr>
<td>1a. Research. Among suburban Texas high school students, there is positive instructional achievement associated with a video lecture that includes audience reaction scenes.</td>
<td>Fail to Conclude</td>
<td></td>
</tr>
<tr>
<td>1b. Null. Among suburban Texas high school students, there is no association between student motivation and a video lecture that includes audience reaction scenes.</td>
<td>Insufficient Evidence to Accept</td>
<td></td>
</tr>
<tr>
<td>1b. Research. Among suburban Texas high school students, there is positive student motivation associated with a video lecture that includes audience reaction scenes.</td>
<td>Fail to Conclude</td>
<td></td>
</tr>
<tr>
<td>2a. Null. Among suburban Texas high school students, there is no association between instructional achievement and a video lecture that includes content question interaction.</td>
<td>Insufficient Evidence to Accept</td>
<td></td>
</tr>
<tr>
<td>2a. Research. Among suburban Texas high school students, there is positive instructional achievement associated with a video lecture that includes content question interaction.</td>
<td>Fail to Conclude</td>
<td></td>
</tr>
</tbody>
</table>
### Table 7 (continued)

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Hypothesis</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>2b. Null. Among suburban Texas high school students, there is no association between student motivation and a video lecture that includes content question interaction.</td>
<td></td>
<td>Insufficient Evidence to Accept</td>
</tr>
<tr>
<td>2b. Research. Among suburban Texas high school students, there is positive student motivation associated with a video lecture that includes content question interaction.</td>
<td></td>
<td>Fail to Conclude</td>
</tr>
<tr>
<td>3a. Null. Among suburban Texas high school students, there is no association between instructional achievement and a video lecture that includes audience reaction scenes and content question interaction</td>
<td></td>
<td>Insufficient Evidence to Accept</td>
</tr>
<tr>
<td>3a. Research. Among suburban Texas high school students, there is positive instructional achievement associated with a video lecture that includes audience reaction scenes and content question interaction.</td>
<td></td>
<td>Fail to Conclude</td>
</tr>
<tr>
<td>3b. Null. Among suburban Texas high school students, there is no association between student motivation and a video lecture that includes audience reaction scenes and content question interaction.</td>
<td></td>
<td>Reject</td>
</tr>
<tr>
<td>3b. Research. Among suburban Texas high school students, there is positive student motivation associated with a video lecture that includes audience reaction scenes and content question interaction.</td>
<td></td>
<td>Accept</td>
</tr>
</tbody>
</table>
From these results we can conclude that individually, neither the visual interaction represented by the student reaction segments, nor the physical interaction and engagement of answering questions with feedback at specific points within the video, are enough to interest high school students to a motivated state for the lesson. However, when used in concert, the two distinct elements of visual interaction and physical interaction with feedback trigger significantly more motivation.

As reported in Chapters 1 and 2, today’s high school students are surrounded by a constant onslaught of rapid-fire visual stimulation (Healy, 1990; Lemke, 2010). “It is now clear that as a result of this ubiquitous environment and the sheer volume of their interaction with it, today’s students think and process information fundamentally differently from their predecessors” (Prensky, 2001, p. 1). Because of the experiences and the environment which today’s students bring to the classroom, classroom teachers must overcome greater obstacles to maintain student attention than in years past. As Medina (2008) observed, “We don’t pay attention to boring things” (p. 71).
Figure 10 represents the results of the four experimental groups. It can clearly be seen that the audience reaction group scored higher in both the interest/enjoyment and the effort/importance groups than the content question interaction group. However it was not until the two experiments were combined that the results reached significance. From these findings, we can conclude that the visual treatment was more important to the results than the interaction treatment. However, again it needs to be stated that these results are expected to climb if the content involved is curriculum related. It is not difficult to imagine that the students failed to take advantage of the immediate feedback since they knew there were no consequences nor rewards associated with the experiment.
Another reason the results may not have been as robust as possible is that the study was conducted during the last two weeks of the school year. In Texas, state testing is conducted approximately five weeks prior to the end of the school year. Teachers are understandably reluctant to allow interruptions in their classes until after testing has been completed. This window was the best timeframe to obtain access to a broad range of students; however it may have contributed to below optimum efforts from the students.

Finally, the study was analyzed using a two-tailed design which looks for results in both the positive and the negative directions. If the assumption that the video incorporating the experiments would not harm the instruction was utilized, the area from which to find positive results would have increased. This would almost certainly have increased the significant findings.

One area which has not been fully addressed is why the combined group scored higher than all other groups. While the audience reaction group did show the most gain of the two individual treatments, it was not until the two were incorporated into one treatment that the current level of significance was breached. Many theories may be considered.

Today’s students are a sophisticated audience. They constantly view multimillion dollar television commercials which tell an entire story in less than one minute. They view sports on television with a dozen cameras and graphics flying in from every corner of the screen, with statistical information in almost every quadrant. They have grown up viewing motion pictures containing actors
interacting effortlessly and believably with alien creatures, natural disasters, and all forms of fantasy. Meanwhile, teachers hope to keep them interested in an almost frozen talking head for fifteen minutes (or longer).

Today’s students live in a saturated world. Students cannot drive down a roadway without passing billboards for every conceivable product. They cannot log into a computer without having popup boxes asking for their personal information or trying to sell them something. Teenagers cannot walk down the hallway at many schools without seeing TV monitors in the hallways alerting them to constantly updated information. They cannot sit down to study without music in their ears and a cellphone nearby constantly buzzing with messages from their friends. Students have become desensitized to much of what is attempting to gain their attention. It is in this environment that educational lessons must attempt to break through the clutter to reach students.

Combined strategy instruction is another concept which may help explain the results. Studies (see Alfassi, 2004) have shown positive results when implementing two strategies when teaching. Combining differing strategies allows teachers to more completely reach students with the strategy most helpful to the individual student while reinforcing the lesson using independent channels. In this case, the results may have increased since both the action of watching the video and the action of taking a brief quiz were two distinct yet reinforcing actions.
Implications of Findings Regarding Instructional Achievement

Even though no scores showed significance among the four experimental groups, beneficial information was gathered in this experiment. As previously reported, study participants did not sample material pertinent to the class in which they were enrolled.

It became clear during the survey process that some students were aware that this experiment had no relationship to the class through which they were participating and their effort would not be measured by their teacher. Through observation, it appeared that some students were not paying close attention and therefore, those responses in the instructional achievement segment of the experiment may not have demonstrated the student’s best effort.

Although students were given the opportunity to review and relearn in all four groups, no one was observed utilizing this opportunity, although this was not specifically monitored. Considering two groups received immediate feedback throughout the lecture, it would seem that at least some students would want to review a segment of the video that they may not have understood properly. Again, the reality that this activity was not part of their classroom responsibilities may have influenced to this lack of review and contributed to lower posttest scores.

It would be desirable to associate the lesson(s) with classroom content prior to further research concerning the validity of different treatments of lecture
capture. Therefore at this time, the results are insufficient to produce any implications regarding instructional achievement.

Implications of Findings Regarding Intrinsic Motivation

Even though student engagement is an acknowledged key component of effective learning, many of today’s students are bored, which leads to lack of attention and effort, which leads to lack of learning (De Fraja et al., 2010; Haag, 2012; Marzano & Pickering, 2011; Medina, 2008).

The findings of this study indicate that more stimulation for students equates to more motivation. Three treatments were created in addition to the typical video presentation for the control group. The video containing audience reaction scenes which should stimulate the students through peer pressure and positive reinforcement was not sufficient to produce a significant positive result. Likewise, a video without the audience reaction scenes but containing content interaction with instructional reinforcement through interruptions of the video to answer questions via the computer was not enough to achieve a significant motivational difference. Both treatments independently were not enough to gain the students’ interest.

However, when the two elements were combined into a video that incorporated audience reaction scenes and content interaction via computer responses, the students were significantly motivated to view the lesson. Since neither the audience reaction scenes nor the content interaction measured
significant motivation independently, it must be assumed that today’s students react favorably to multiple stimuli.

If further studies confirm these findings, the implications seem obvious to educators. As reported in Chapters 1 and 2, today’s students are different than those of generations past. Being surrounded by a constant stream of messages, images, sounds, and interruptions has created a different student than most teachers were trained to teach. Just as significant, these students are expected to be aware of stalkers on the Internet, know not to respond to marketers calling their cell phones, delete messages from overseas strangers promising money, and not be sucked in by the most sophisticated emotion-laden advertisements in their television shows and online videos.

These are the consumers of today’s high schools. They have been trained to tune out things that do not interest them, things that do not stimulate them, and judge all their media with a critical eye. And herein lies the problem, students are acclimated to blockbuster movies, network television and expensive online advertising that seem to have almost limitless tools and budgets with which to fight for the attention of every eyeball possible. In this environment, teachers are trying to keep the attention of their students with limited time, tools and budgets. It is indeed a battle with the odds against educators, before they even begin.

Great advancements have been made in the area of lecture capture in just the past few years. Teachers and institutions have realized that not only do
students benefit from reviewing material covered in class, but many students miss class sessions for school activities and or illness. Also, the proliferation of online learning is penetrating high schools across the country for remediation and advancement, in addition to the virtual secondary campuses now available. Blackboard (2012) recently published a video that states, “By the year 2019, half of the high school courses in America will be delivered online.” Most online classes rely in varying degrees on video presentations.

If the expansion in the use of online education and video instruction in our schools continues, we must also carefully understand today’s audience. A few simple and inexpensive techniques either to help gain and keep student attention and motivation, or not interrupt the same, should prove beneficial in the educational process.

Comparison of Findings to Previous Studies

No studies have been identified which measured instructional achievement based upon the delivery methods of video lecture capture. All published studies have measured user preference rather than pretest/posttest scores.

The videos with audience reaction scenes were modeled after a study by Baggaley and Duck (1976). In their study, a video was integrated with audience reaction scenes showing positive audience feedback—students taking notes, attentive, and impressed. A second video carried the identical lecture, however
the audience reaction scenes were negative---bored and inattentive, unimpressed students.

Baggaley and Duck’s (1976) study measured audience reactions to the lecturer. The audience members did not know the speaker and made judgments based solely on the video presentation. They found “particularly powerful effects upon the perceived interest value and popularity” (p. 95) of the instructor.

Utilizing a semantic differential seven-point scale, the confusing/straightforward scale showed a positive difference ($t = 2.74$), as did the interesting/uninteresting ($t = 2.74$), and the expert/inexpert ($t = 1.92$). The popular/unpopular scale was the greatest indicator showing a ($t = 4.35$) difference. The previous research did not test for instructional achievement.

The current experiment did not incorporate negative audience feedback, instead a video with no feedback at all was utilized, since it is believed that instructors would not publish a video containing students' negative reactions. Also, the typical uses of video instruction in the classroom involve the teacher of record appearing in the presentations so students would presumably have a preconceived opinion of the teacher. For that reason, an instrument that measured student motivation was utilized instead of the previous study which measured ratings of the speaker.

The present study found student interest, as measured by motivation, to be significant when the audience reaction scenes are combined with content
question interaction, however no significance was found with the audience reaction scenes independently.

To mirror the effects of the Baggaley and Duck study, results should have shown significance in both the audience reaction scenes group as well as the group viewing the combined treatment utilizing both audience reaction scenes and content interaction, which did show significance. If the current findings are confirmed in future studies, the conclusion would be that today's students require more stimulation to become interested than past generations.

Likewise, as Fies and Marshall (2006) found, studies in classroom response systems have not examined “tightly controlled comparisons in which the only difference is the use, or lack of use, of a CRS” (p. 106). In 2008, Morling, et al. found a small, positive effect on test scores using classroom response systems but this study compared students in two sections of a course against students in two other sections. Obviously, many variables were uncontrollable.

Similarly, Pradhan et al (2005) found significant positive achievement when a classroom group heard a lecture contrasted to a group hearing the lecture utilizing a response system. Clearly, this study does not involve video lecture capture.

Students in any high school classrooms have utilized some type of content interaction during their educational careers. Classroom clicker systems have been utilized extensively in K-12 over the years. While the current experiment
was accomplished utilizing Blackboard, students still received instantaneous feedback during the learning process.

Recommendations for Future Studies

Additional studies are planned to recreate the experiment incorporating class relevant instruction. As mentioned previously, it is believed that all future studies should be tied specifically to class content with students held responsible for their learning. A grade to most students would be a motivating factor that was lacking in the pretest/posttest portion of the current study.

This would require four lectures to be recorded and prepared so that students may rotate through the sequence of lectures, viewing a differing treatment each time. To obtain valid data, students would be broken into four groups with each group viewing a differing treatment of the same lecture. After all four lectures have been viewed, each student would have experienced each treatment. Then cumulative scores would reflect the differences between the four treatments and a more precise understanding could be made of the relationship between various video presentation techniques and academic achievement.

With the greater use of video instruction continuing to gain momentum, it is hoped that more studies in various ways to enhance student engagement and potentially influence greater learning will once again become commonplace. A lack of recent studies may be attributed to the “grocery truck debate” between Clark (1994) and Kozma (1994), but whatever the reason, video instruction is
flourishing and finding simple, inexpensive techniques that may enhance the presentation should be important to all who utilize this medium.

Investigators may also benefit by replicating other studies by Baggageley and Duck. Although dated, they look at ways that may enhance instruction or simply identify ways that demotivate students. Essentially they examined how “visual cues quite irrelevant to a performance may unwittingly affect judgments of it” (Baggaley & Duck, 1976, p. 86).

A common idea among educators and speakers in general would be that content carries the day so why worry about video techniques at all, but Baggaley and Duck concluded after six differing experiments that “the simple visual imagery of a television production may actually dominate its verbal content, overriding audience reactions to it in several ways” (Baggaley & Duck, 1976, p. 105).

The first study by Baggaley and Duck (1976) concerned the ramifications of framing to include the notes the speaker used compared to a tighter framing showing only the speaker. Two cameras recorded the lecture simultaneously with the speaker addressing the area between the cameras, so the only difference in the videos was the framing. Significant differences were found in both the confusing/straightforward and the fair/unfair scales. If this study was duplicated and the findings are consistent with the earlier study, most lecture capture cameras could easily be manipulated to frame the speaker without notes if necessary. Again, not an overwhelming factor to improve the content, but if it
simply removed the perception that the speaker could be confusing, would not
the little effort this technique would require be worth the result?

Another study by Baggaley and Duck (1976) was borrowed from the
common television and motion picture practice of "keying in" or replacing the
background with another. In the study, they recorded a speaker, again with two
cameras to remove any difference in delivery. One version showed the speaker
in front of a plain studio wall while the second recording electronically replaced
the plain wall with a background relevant to the content. Significant differences
were reached in this study in the reliable/unreliable, and expert/inexpert scales.
To update this experiment for today's situations, one might record the speaker in
a classroom setting compared to a conference room/library setting.

A similar experiment was undertaken more recently in a college classroom
situation. Instructors were recorded giving the same lecture in three different
settings, a college classroom framed to look over the shoulders of students in the
front rows, a studio framed in a head and shoulders, and a studio with a three
quarter framing of the speaker who moved from behind the desk, around, and
eventually sat on the edge of the desk while continuing the presentation.
Students significantly preferred the wider-framed studio recording perceiving the
instructor to be more knowledgeable and accessible (Bland, 2002). Again, if
further studies confirm the significance of the previous two, the effort to record in
one setting instead of another seems insignificant compared to the return of
positive feelings of expertise and reliability that may be generated.
Baggaley and Duck’s (1976) third experiment returned results which may seem surprising. A presentation was recorded with the speaker directly addressing one camera while another camera simultaneously recorded from a 45 degree angle as though the speaker was participating in a discussion. In all results, the 45 degree angle condition drew more favorable responses than in the direct condition. Significance was found in the confusing/straightforward, profound/shallow, interesting/uninteresting, popular/unpopular and expert/inexpert scales. If new studies confirm this finding, why would anyone oppose moving the camera to a position to gain expert, popular, interesting and profound impressions?

All of these techniques could be used by instructors with little expense or effort if procedures can be determined which produce either instructional achievement or significant student preference.

It will also be desirable to obtain an adequate sample to evaluate for gender and grade point average to determine if either factor achieves a significant relationship. Observations during the current experiment indicated that boys were more attentive to the videos than girls. (This experiment did measure for gender, but there was no significant difference.)

The results of this study were evaluated using a two-tailed analysis of the data. As no negative effects were found in any of the treatment groups, a one-tailed analysis of future studies should be considered. There is some disagreement among researchers concerning the acceptability of one-tailed
analyses, but many consider one-tailed tests acceptable if the researcher’s hypothesis is directional (Pillemer, 1991).

Using a single-tailed analysis would look for significance in only one direction instead of the current study which looked in both directions. If only a positive relationship was sought, significance at 0.05 would be achieved if the results are identified in the top 5% of its distribution. The current study looked only in the top 2.5% while also analyzing the bottom 2.5% (Statistical Consulting Group, 2012).

Another study that would be extremely helpful for today’s teachers would be based upon work by Mayer for “adding visualizations to verbal instruction” (Mayer, 2011, p. 441). He writes this is “the promise of multimedia learning” (Mayer, 2009, p. 1). With the increasing use of lecture capture, it appears prudent to determine if the addition of graphics on the screen increases student achievement or interest.

*Regarding Instructional Achievement*

It is important that future studies consider the issue of instructional achievement. This study examined a social studies lesson and drew students from all grade levels and from several classrooms. While presumably all students were enrolled in a social studies class, the specific lesson presented was not associated with any classes from which they participated in the experiment.
Observations drawn during the experiment indicated some students may not have given the lesson their complete attention and effort. Since there was no consequence (grade) associated with the experiment, some appeared more distracted than others. While the experiment was intentionally designed to draw from differing classes so as to obtain responses from all grade levels, the lack of a consequence associate with the effort is believed to have contributed to less robust findings.

While this may indeed have been attributable to the lesson itself or the mode of presentation, to pinpoint the source of these observations, class-related material with class-related significance should be incorporated in future experiments.

*Regarding Intrinsic Motivation*

This portion of the study was designed to address whether altering lesson packaging has an impact on student learners. As discussed, impact may have positive or negative outcomes by alerting the students to be more attentive or by unintentionally causing students to be less engrossed in the presentation. Results indicate that more activity, in the form of both visual action and learner interaction, is positively associated with lesson impact, reflected by the student’s motivation for the lesson.

Future studies should repeat the content packaging used in the current study with lessons that reflect material covered by the course involved rather than a lesson sampled by a random audience. It is also believed that the
Pressure/Tension scale contributes little to the overall findings as most students are quite comfortable with technology so omitting this scale is recommended.

Summary

This experiment returned successful results both by finding significance in one area of the study while also illustrating improvements for the administration of future studies to obtain more robust results. While no significance could be identified between different packaging techniques of the video lesson and instructional achievement, it was determined that a more class-focused presentation should be incorporated in the future. Since it became clear during this study that the generic subject matter of the lesson may affect effort and learning in individual students, further study is warranted using course specific material.

However, when all students are viewing the same material, even with differing packaging, the subject matter should not be a variable concerning the interest or motivation of the students. Therefore the results found in the motivation instrument when viewing the combined treatment of both audience reaction scenes and content interaction is significant. Since this is the first study found to address these issues in recent years, a follow-up study is planned to confirm the findings.

To find significant student achievement in the form of higher scores on a pretest/posttest would be ideal. But to simply find a way to more deeply engage students through motivating factors, or by avoiding demotivating factors, is a
significant achievement as well. Frankly, most producers of instructional videos are teachers themselves who have never been taught or considered the different positive and negative ramifications that visual cues may have on their presentations.

And certainly students deserve to have their likes and dislikes considered, if it is possible with minimal effort and expense. Fair or unfair, classroom videos are more critically viewed by students than in years past and subtly or overtly they are compared to network television presentations.

The use of video in the classroom is growing each year and considering the predictions of the growth of online learning in the future, growth of classroom video will only accelerate in the future (Blackboard, 2012).

Further study is desired, but the current finding that students are more motivated to learn from a lesson presented with both audience reaction scenes and content interaction, than the same lesson without these multiple stimuli should be considered by all who teach through video presentations.
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