

EMPLOYING TEXT MESSAGING AS AN INSTRUCTIONAL TOOL: EFFECTS ON
ACADEMIC ACHIEVEMENT AND SENSE OF CONNECTEDNESS

by

Mary Ellen Sell

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

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ABSTRACT

This quasi-experimental, non-equivalent groups study investigated the effects of instructional text messages on the academic achievement and sense of connectedness of high school students enrolled in economics classes in north Georgia. Previous research on text messaging has shown that it (a) is the preferred method used by adolescents for communication, (b) increases student motivation to learn, (c) allows for ubiquitous learning, and (d) was found to be useful and acceptable by students. The Test of Economic Literacy, Fourth Edition was used to measure academic achievement, and the Classroom Community Scale was used to measure sense of connectedness. Results of the one-way analysis of covariance found a statistically significant difference in academic achievement with students receiving text messages scoring higher on the posttest than students not receiving text messages. Results of the independent samples t-test found no statistically significant difference in sense of connectedness between students who received text messages and students not receiving text messages, however, sense of learning was higher in the students who received the text messages. Further research needs to investigate the effects on academic achievement when sending instructional text messages (a) at different times of the day, (b) to students in special programs, and (c) to elementary and middle school students.

Keywords: academic achievement, sense of connectedness, social media, text messaging

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Dedication

This dissertation is dedicated to my husband, Greg, and my children, James, Sarah, and Eva, for their constant encouragement to work towards completing my personal goal of achieving a doctoral degree in education.

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I would like to express the deepest appreciation to my committee chair, Dr. John C. Bartlett, who has given his time, expertise, and guidance, which has allowed me to complete this dissertation. Without his supervision and direction, this dissertation would not have been possible. I would also like to thank the other committee members, Dr. Monica L. Huband and Dr. Joshua L. Lowe, whose participation demonstrated their concern not only for myself but also for their interest in the advancement of educational technology into classroom today.

In addition, I would like to thank Dr. Rebecca Lunde for helping with the research design of my dissertation, which I could not have done by myself. I thank Liberty University for the educational and spiritual nourishment that has sustained me throughout this journey.

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List of Abbreviations

Classroom Community Scale (CCS)

Institutional Review Board (IRB)

One-Way Analysis of Covariance (ANCOVA)

Probability value (p-value)

Statistical Package for Social Science (SPSS)

Test of Economic Literacy, Fourth Edition (TEL)

CHAPTER ONE: INTRODUCTION

Overview

This chapter outlines the rationale for the necessity of a research study that focuses on examining the effects of using text messages as an instructional tool. Due to its asynchronous nature, text messaging has greatly expanded the ease and amount of communication within society. However, educating students today continues to take place in brick and mortar schools based on industrialized thinking where learning occurs during scheduled blocks of time. This chapter reveals that empirical research investigating the effects of text messaging on academic achievement and senses of connectedness is scarce and states why it is an important topic of study.

Background

In today's world, the use of smartphones by students is manifest, having become near a basic necessity in their everyday lives. The Pew Research Center reported that 46% of smartphone owners said that they could not envision living without their smartphone and 99% of college students said that it is their normal behavior to be on their smartphone (Smith, 2015). Equally important is the fact that adolescents, on average, send and receive over 167 text messages per day (Lister-Landman, Domhoff, & Dubow, 2015) and consistently retain possession of the smartphone throughout the day (Judd, 2014). Due to a constant desire to interact with and be near their smartphone, multitasking behavior in students has increased (Junco & Cotton, 2012). In light of these facts, Preston et al. (2015) stressed that smartphones are pliant tools whose seductive power should be harnessed to help to guide instruction and support learning, and that educational institutions have a responsibility to incorporate smartphone technology. Because smartphones can be seen as "mediating tools in the learning

process [in which] learners, teachers and content interact with each other” (Hu, 2013, p. 46), they have the capacity to be powerful instructional devices as well as expedient vehicles of communication affording ubiquitous learning opportunities (Yang, 2013). Furthermore, smartphones have the ability to increase student options, transfer technological skills, motivate students, provide instant feedback, and track students’ progress (Nisbet & Austin, 2013).

Likewise, research dealing with mobile learning has shown to be beneficial in

- strengthening the link between learners and content;
- creating greater interaction between learners and between learners and teachers (Wang & Shen, 2012);
- improving communication and collaboration;
- aiding in educational achievement;
- allowing for personalized learning, and;
- engaging reluctant learners (Yueh-Min, Yi-Wen, Shu-hsien, & Hsin-Chin, 2014).

The creation of the smartphone has put into place an innovative educational tool that when combined with learning theories and paradigms, has the ability to hasten learning (Wang & Shen, 2012).

Smartphones have the capability to engage learners via text messaging. Text messaging is an integral part of adolescent culture today and is the main method used for communicating. Indeed, Skierkowski and Wood (2012) noted that anxiety increases when students are restricted from texting behavior implying that texting is used to maintain relationships and that texting is fundamental to their self-concept. Rahamat et al. (2013) determined that students who received text messages from teachers felt more motivated and interested in learning because they felt more accepted and appreciated. Lauricella and Kay (2013) concluded that text messaging is a

practical tool for expanding communication among teachers and students. Idrus (2013) found that students see mobile devices as convenient and acceptable when used in learning and argued that students would benefit for “pedagogically articulated text messages” (p. 79). Other studies incorporating text messaging revealed (a) that high school students who received course-related text messages found the messages to be helpful for increasing course interaction (Faure & Orthober, 2011); (b) that text messaging significantly contributed to college students’ learning (Gasaymeh & Aldalalah, 2013), and (c) the existence of a positive relationship between using Twitter for reinforcement of course content and academic performance on tests (Van Vooren & Bess, 2013).

All research must be validated through the construction of a theoretical framework, which acts as the underpinning upon which the study is founded. This study integrated dual coding theory, cognitive load theory, and multimedia message design theory into its design. These theories were selected because they are all associated with technology and the impact of technology on learning. Dual coding theory stresses that lessons designed where combined verbal and nonverbal cues have a profound impact on memory, recall, and cognition and can have an additive effect on learning (Wang & Shen, 2012). Cognitive load theory states that instructional lessons that are sequenced, spaced out, and presented in chunks facilitate learning (Swezzler, 1994). In addition, multimedia message design theory asserts that comprehension increases when text messages include images, signs, and symbols (Mayer, 2003).

The prevalence and accessibility of mobile devices and social media is everywhere and there is a pressing need in education to understand how it can best be utilized for effective instruction (Williams, 2012). Mobile learning improves communication, personalizes learning, is asynchronous, and takes advantage of students’ experiences with digital technology (Huang,

Yang, Yueh-Min, & Hsiao, 2010; Sharples & Rochelle, 2010). In addition to text messaging being their communication of choice, digital natives perceive mobile learning to increase their level of independence, self-direction, motivation, and improved self-esteem (Ciampa, 2013; Hu, 2013).

Problem Statement

The problem is that there is insufficient empirical research examining the effects of instructional text messaging (Gikas & Grant, 2013) on academic achievement and social connectedness (Kinash, Brand, & Mathew, 2012) at the high school level. Text messaging is ubiquitous and the preferred method of communication for high school students today (Gingerich & Lineweaver, 2013), and it is imperative that empirical research be undertaken to promote understanding of the effects of asynchronous text messaging being used as instructional tools (Geng, 2012) on academic achievement (Hawi & Samaha 2016) and on sense of connectedness (Quinn & Oldmeadow, 2013).

Students today are digital natives whose identities are affirmed via their mobile device through social media and text messaging. Even though text messages have become digital natives' primary means of communication, there is scant evidence and little research on the possibilities of using instructional text messages in education to increase academic achievement and sense of connectedness. This study aimed to contribute to the literature and understanding about the effects on high school students' academic achievement and sense of connectedness after receiving instructional text messages relating to an economics course.

Purpose Statement

The purpose of this quasi-experimental study was to determine if sending instructional text messages that used imagery and text to high school students had an effect on their academic

achievement in an economics course as measured by the Test of Economic Literacy, Fourth Edition (TEL) and on their sense of connectedness with the school as measured by the Classroom Community Scale (CCS). The variables for this study consisted of one independent variable and two dependent variables. The independent variable was use of instructional text messaging, and the dependent variables were academic achievement as measured by the TEL and sense of connectedness as measured by the CCS. The participants were high school students enrolled in an economics class, a required course for graduation. There was one control group and one experimental group, with both groups consisting of general high school senior students aged 17 through 19. No gifted students, special education students, or English language learners were included in the study. All students attended a large suburban high school located in an affluent suburban county of a large metropolitan area in the southeastern United States.

This topic was relevant for the time of the experiment because (a) text messaging and social media were setting new boundaries and expectations within educational institutions and also students' social networking circles (Byant, Sanders-Jackson, & Smallwood, 2006), (b) smartphone technology and text messaging were expected and normalized systems for communication within society that has altered the way people think about teaching and learning (Hasan, Ashraf, Abdullah, & Murad, 2016), and (c) it was vital that an understanding be realized of how instructional text messages affect academic achievement and sense of connectedness when students receive them (Wang, Xiao, Callaghan, & Novak, 2010). The aim of this study was to inform teachers about the effects on academic achievement and feelings of connectedness from sending instructional text messages to students.

Significance of the Study

This study contributed to an understanding of how text messages affect high school students' academic achievement and sense of connectedness. It was an important study because even though students' abilities with smartphone technologies and text messaging were steamrolling their amalgamation into educational institutions, it is ultimately individual teachers who make the decisions about which instructional strategies are best suited for the courses they teach. Texting has become an integral part of students' lives; therefore, it was important for the educational community to know if text messaging can be used as an instructional tool to increase academic achievement and if it can be used to increase students' sense of connectedness with their school. This study built on other research that sought to discover how text messaging related to academic achievement, vocabulary acquisition, and sense of connectedness. Because little research existed about the use of text messaging in the field of education mainly due to it being a relatively recent phenomenon, this study aimed to add to that literature by researching the effects of text messaging on academic achievement and sense of connectedness.

Research Questions

The research questions for this study were:

RQ1: Does a difference exist between the mean *academic achievement* scores of high school students who receive instructional text messages and those who do not receive instructional text messages as measured by the Test of Economic Literacy, Fourth Edition while controlling for pretest scores?

RQ2: Does a difference exist between the mean *sense of connectedness* scores of high school students who receive instructional text messages and those who do not receive instructional text messages as measured by the Classroom Community Scale?

Definitions

1. *Academic Achievement* – The level of accomplishment and proficiency a student has achieved in an academic area (Hawi & Samaha, 2016).
2. *Digital Native* – People who were born after 1990 into a world where (a) computers, mobile phones, and smartphones have always existed; (b) information is effortlessly located and speedily obtained; and (c) global communication is instantaneous and commonplace (DeGraff, 2014).
3. *Instructional Message Design* – The synthesis of signs and symbols with text to enhance cognition (Lohr, 2011).
4. *Message Design* – “The way that information is presented to the learner” (Wang et al., 2010, p. 1) in a text message.
5. *Mobile Learning* – A type of learning that occurs at the time and place of the learner by integrating wireless communications systems with the internet to send instructional materials (Suwantarathip & Orawiwatnakul, 2015).
6. *Multimedia Instructional Messages* – The use of messages that combine text, images, and sounds to support learning (Mayer, 2002).
7. *Sense of Connectedness* – The level of a student’s feeling of belonging and acceptance from their school (Burbules, 2016).

CHAPTER TWO: LITERATURE REVIEW

Overview

This literature review opens with a description of the educational system in the United States and discusses the transformation taking place resulting from modern technologies, the role of the teacher in this educational system, the institutional changes that are occurring in schools today as a result of the recent technology, and the continuing importance of students feeling connected to their school in a digital age. A theoretical framework for this study is based on hierarchy of needs theory, ecology of human development theory, behaviorist theory, constructivist theory, activity theory, dual coding theory, cognitive load theory, and multimedia message theory. The related literature discusses the efficacy of using short message service (SMS), or text messaging, as an educational tool to increase academic achievement, society and text messaging, mobile devices as educational tools, and mobile learning in society today. Additionally, the related literature included research studies that discuss texting, teacher and student perceptions of learning, use of mobile devices in the classroom, text messaging and vocabulary acquisition, and other mobile learning devices that utilized text messaging for instructional purposes. A summary is included that ties together the different elements of the related literature and establishes the foundations for the purpose of the study.

In educational settings today, mobile devices are ever-present (Embi & Nordin, 2013), impacting the way students acquire knowledge and rewriting educational pedagogy. Texting has become an integral part of everyday life and when used as an educational tool benefits informal learning, mobile learning, and collaborative learning (Sripriya & Thomas, 2014). Abas, Lim, & Woo (2009) asserted that texting is the most convenient and greatest used application on mobile devices, and Markett, Sanchez, Weber, and Tangney (2006) emphasized that texting has

exceeded all expectations. Additionally, Hu (2013) recommended that mobile devices should be seen as “mediating tools in the learning process [in which] learners, teachers and content interact with each other” (p. 46). Indeed, the invention of mobile devices has put into place innovative educational tools that when combined with learning theories and paradigms, have the ability to hasten learning (Wang & Shen, 2012). In relation to education, mobile devices allow for communication with students, ubiquitous learning, instant feedback, access to instructional games, and student collaboration (Yang, 2013; Lepp, Barkley, & Karpinski, 2014).

Theoretical Framework

There are many learning theories from which to choose when conducting research; however, it is important to include only the specific theories that lay the foundation for an empirical study and discuss how they relate to the study. In this regard, the specific learning theories that this study is based on are hierarchy of needs, ecology of human development theory, behaviorist theory, constructivist theory, activity theory, dual coding theory, cognitive load theory, and multimedia message theory.

Hierarchy of Needs Theory

Maslow (1943) studied human development and developed the theory of human motivation. In this theory, Maslow postulated that a person has five human needs ordered by level of importance in their lives. According to Maslow, these needs relate to each other and can be arranged in a hierarchy because humans are “motivated by the desire to achieve or maintain the various conditions upon which these basic satisfactions rest” (p. 394). Because “man is a perpetually wanting animal” (p. 395), as one need is met and maintained, the next higher need emerges to “dominate the conscious life and serve as the center of organization of behavior, since gratified needs are not active motivators” (p. 395). These basic needs can be categorized as

- physiological needs,
- safety needs,
- love and belonging needs,
- esteem needs, and
- self-actualization needs.

Physiological and safety needs refer to the basic survival needs for food, clothing, and shelter. If these needs are not in place, student anxiety will be high and their ability to learn impeded. Love, belonging, and esteem are psychological needs. These refer to the relationships students have with others as well as their personal accomplishments. It is predominantly within the school system that students establish relationships and achieve success. The final need refers to feeling self-fulfilled. This need is difficult to obtain and rare for young people. This study examined students' sense of connectedness, which relates to the need for belonging by looking at the effects of sending text messages to students that mirror content taught in a high school economics course.

Onchwari, Onchwari and Keengwe (2008) illustrated the relevance of Maslow's theory by describing difficulties encountered by immigrant students in the United States. Onchwari et al. stated that once immigrant students' struggle for their basic needs for food, clothing, and shelter are met, they then "struggle for love and attention from their peers and teachers" (p. 268). Onchwari et al. further stated that, because many immigrants are mostly minorities, this third basic need is harder to obtain in a predominantly white society, leading to feelings of isolation. Table 1 details how Maslow's hierarchy of needs aligns itself with the immigrant child (Onchwari et al., p. 268).

Ecology of Human Development Theory

A student's environment contributes to their development and learning. According to Bronfenbrenner's (1977) ecology of human development theory, immediate and distant systems each having the ability to influence the other determines child development. Child development from an "ecological perspective focuses attention on development as a function of interaction between the developing organism and the enduring environments or contexts in which it lives out its life" (p. 439). In Bronfenbrenner's theory, five systems affect child development, such as microsystem, mesosystem, exosystem, macrosystem, and chronosystem.

The microsystem is the immediate environments of children in which they have a direct, physical participation with their family, school, and religious affiliations (Onchwari et al., 2008). Onchwari et al. (2008) argued that for some minority children, "experiences in the family and at home are poles apart" (p. 271) from experiences at school, and that this can be very confusing for these students. They stated that teachers can help these students by "acknowledging and supporting their cultures and backgrounds" (p. 271). In the mesosystem, mutually supportive interactions between the microsystem occur (Ungar et al., 2013). The exosystem refers to the community factors and social networks that have the potential to influence child development indirectly (Onchwari et al., 2008, Ungar et al. 2013). According to Ungar et al. (2013), minority families that are isolated from social networks show increased rates of conflict within the family, including child abuse. The macrosystem encompasses the "shared values, beliefs, policies, laws, and traditions" (Onchwari et al., 2013, p. 271) among a group of people. The impact of the macrosystem on immigrant students can be seen in policies about bilingual education and the No Child Left Behind legislation (Onchwari et al., 2008). Lastly, the chronosystem refers to the events that occur in a child's life. For immigrant students, this can be seen in their migration to a

new country, having to learn a new language and culture, and in their readjustment process, “for better or worse” (Onchwari et al., 2008, p. 271).

Using Bronfenbrenner’s ecology of human development theory, Onchwari et al. (2008) provided the following list of strategies in an effort to help teachers provide environments that foster and encourage child development:

- Be sensitive to the struggles of low socio-economic students by creating lessons that talk about the challenges that families face in searching for jobs.
- Support parents by directing them to community resources and offer reassurance to their children.
- Learn about students’ diverse cultural backgrounds and teach acceptance of all cultures and ways of life.
- Use varied assessment procedures to understand and reflect on what students know.
- Create opportunities to connect with immigrant students one on one in order to spare them the embarrassment of not being able to communicate clearly in front of their peers.
- Help students to feel like they belong by asking what they would like to learn about in school.
- Teach parents to talk with their child about the concerns, fears, accomplishments and sources of confusion about what went on in their school that day.

Cognitive Load Theory

Cognitive load theory assumes that schema acquisition and automation are essential mechanisms to learning. Because learning often involves interacting schemas learned simultaneously, cognitive demand on the brain is high and that in turn makes learning more

difficult. Cognitive load theory stresses the importance of sequencing learning in successive components, and then the cognitive load will be less, thus increasing learning. According to this theory, it is essential that instructional lessons be designed so that the cognitive load remains low and that lessons be spaced out, or presented in chunks, to help facilitate learning (Swezzler, 1994). In this study, students in the experimental group received text messages that reinforced concepts taught in their economics class and those text messages were spaced out over time to reduce cognitive demand.

Multimedia Message Design Theory

Multimedia message design theory developed by Mayer (2003) is “analogous to the use of building blocks, with the whole picture being composed of smaller but well specified elements such as language, images, signs and symbols” (abstract). Taking this into account, the design of text messages should organize information to match cognitive functioning. Building on multimedia message design theory, Mayer and Moreno (2003) advanced the theory of multimedia learning that aims to overcome cognitive overload. The main tenets of this theory include:

- coherence: taking away extraneous content matter in order to foster lucidity;
- signaling: giving hints to learners on how to process information;
- spatial contiguity: situating text near graphics;
- cognitive redundancy: avoiding using text and spoken words at the same time; and
- temporal contiguity: presenting narration, keywords and animation together.

In this study, the experimental group received text messages that included text and images that conformed to the tenets of multimedia learning theory.

Activity Theory

Activity theory states that “all human activities are mediated by culturally defined or created signs or tools; that is, the ‘subject’ (person) interacts with the ‘object’ (lesson content) through the use of the mediating tools (mobile technology) to achieve the ‘outcome’ (goal)” (Cowan & Butler, 2013, p. 2). Through manipulation of external tools, such as mobile devices, learners can become internally transformed. In this study, students in an experimental group were sent text messages that covered content that was being learned in a high school economics class.

Dual Coding Theory

Dual coding theory, presented by Allan Paivio (1986), uses imagery in order to affect learning by differentiating between two cognitive subsystems. One cognitive system processes images and another cognitive system processes verbal and audio inputs. Any task presented to a learner may require one or both systems of mental processing. These verbal and nonverbal signals work together in order to heighten memory, recall, and cognition and have an additive influence on knowledge acquisition. Mobile devices have the capacity to send and receive media content that combines text, images, and sound. Wang and Shen (2012) informed that learners prefer media content that utilizes text and images. In this study, an experimental group of students, enrolled in a high school economics course, was sent text messages with text and images that had been aligned with content covered in their course.

Behaviorist Theory

Behaviorism, in a nutshell, is the association between a stimulus and a response. In the case of mobile devices, content is delivered to students via mobile phones, such as with text message, and they in turn respond by reading the text message and interacting with text, audio,

and links that are a part of the text message. Since vocabulary is best learned when instruction occurs over time, pushing out spaced text messages “is considered as the major contributor to enhancing vocabulary learning” (Hu, 2013, p. 36). In this study, students in an experimental group were sent text messages that directly related to what was being taught in their economics class. The text message notifications were the stimulus and opening and reading the text message was the response.

Constructivist Theory

Constructivist theory relies on prior and current knowledge to learn and construct new ideas and concepts. The premise behind constructivist learning is that the environment in which people live is constantly changing socially, culturally, and technologically, and through interaction with the environment learners construct new knowledge. Mobile devices afford “tool-mediated social-cultural [activities] in and out of the formal educational settings and [can bridge] the gap between formal and experiential learning” (Hu, 2013, p. 48).

Related Literature

It is the belief of this researcher that human beings were created by God to learn. From the very beginning, God endowed humans with the gifts of creativity and curiosity. In Genesis 2:15 (King James Version [KJV]), God instructed Adam and Eve to grow a garden and make it beautiful. In Genesis 2:16-17 (KJV), God provided Adam and Eve with the ability to think and make decisions. Complimenting these gifts and abilities is the realization that every human being was crafted by God to be unique, allowing for infinite variety in personal qualities, characteristics, and aptitudes (Psalms 139:13, New International Version).

The importance of education to humanity is manifest. In keeping with this, educational systems need to be founded upon the belief that intrinsic motivation is essential to learning, and designed so that relevant and personalized learning can occur (Wimberley, 2014a).

Further, because education is an entirely human experience, compassionate and trusting relationships between teachers and students need to be cultivated and maintained. In 2 Timothy 4:2 (NIV), the apostle Paul encourages teachers to instruct patiently and carefully, exhibit faithfully and daily the principles of Christianity, and reflect clearly and honestly on their lessons.

Defining Teaching and Learning

Learning can be defined as gaining knowledge and skill through study, instruction, or experience. It is commonly linked to memorization and reading. The word learn derives its meaning from

- the Old English word, *leornian*, which means to gain knowledge;
- the Gothic word, *lais*, which means to follow or track; and
- the Old English word, *læst*, which refers to the sole of the foot.

Teaching can be defined as providing instruction or employing any practice that benefits others towards the development of skill or knowledge acquisition. The word teach derives its meaning from the Old English words *tacen* and *tæcan*. The word *tacen*, or token, was interpreted to mean something or someone that represented authenticity or authority, evidence or proof, and any item, idea, or person that represents a group. The word *tæcan* was interpreted to mean to show or explain (Token, n.d.).

A teacher is “a person whose profession instructs others, especially children” (Teacher, n.d.). Interestingly, the term *teacher* did not appear in the English language until the middle of

the 13th century. A possible explanation for the invention of the word *teacher* might be related in part due to the Third Lateran Council (1179) officially mandating “free education for the poor in England” (Tokuhama-Espinosa, 2011, para. 8). It follows that the expectation to provide educational opportunities to a larger segment of the population created opportunities for some people to provide instruction, or to become teachers. Thus, the teaching profession as seen through this historical perspective is a relatively recent phenomenon.

Historical Rationale for Education in the United States

Public education in the United States has always been entrusted with the responsibility of preparing young learners to achieve future success. As a way to guarantee future success, public schools have been tasked with the following five goals:

- defend and indoctrinate democratic values,
- prepare a capable workforce,
- safeguard a global economic advantage,
- eliminate poverty, and
- “teach and train students to perform successfully on tests and assessments” (Liberty University, n.d.a)

Formal education in the United States dictates the amount and type of learning that will occur (Wimberley, 2014a). Having its roots in the Industrial Age, schools typically operate within a specific time frame, using bells as signals to indicate when it is time to shift gears, and taking care of minor children during normal work hours (Myers, 2011). Today, there is a growing demand to reimagine the time-oriented, teacher-centric, interdependent structure of public schools realized during the industrial era into a student-centric, modular structure founded upon personal customization. According to Christensen, Horn, and Johnson (2011), this transformation is

possible due to the combination of recent theories of intelligence with technological innovations in computer-assisted online learning and because schools have historically been successful in adapting to the demands of society. In order for schools to meet the wants and needs demanded by people today, they will need to put into place systems that fulfill the five goals, allow for human interaction, and incorporate personalized learning,

Disruptive Innovation Theory

According to Wimberley (2014a), the reform education movement became a thing of substance within itself after *A Nation at Risk* was published. This seminal publication argued that the decline in America's competitive edge on the world market stemmed from problems residing within an inherently flawed educational system. Christensen et al. (2011) introduced the theory of disruptive innovation which explains how disruptive innovations redefine industries due to their "simplicity, convenience, accessibility, and affordability [and when] complication and high cost are the status quo" (Wimberley, 2014a, slide 2). Further, Christensen et al. differentiated between sustaining innovations and disruptive innovations. Sustaining innovations in education attempt to improve a current system through modifications and support while disruptive innovations attempt to replace a current system by offering alternatives. Moreover, sustaining innovations tend to improve the teaching process but not the learning process.

Disruptive innovation in education is occurring now. The combination of the internet with online education, in which learning is possible any time, any place, portends the demise for maintaining the status quo of today's educational models. Evidence that validates this perception includes the exponential growth for online learning as well as the increase in blended learning environments (Myers, 2011). Perhaps most critical, at this juncture, is to facilitate the transition

from viewing time as a constant to viewing time as a variable, and from teacher-based learning systems to student-based learning systems.

Digital Natives

Digital natives are people who have never known a world that did not include computers, mobile phones, and other smart devices. They have been characterized as creative, social, risk-takers (Benefits of Growing up Digital, n.d.) who are prone to multi-task, be independent, and prefer audio-visual stimuli to textual stimuli. Digital natives have redefined amity by having electronic friends, having invented a language known as *l33t*, and having revolutionized written communication with the modern abbreviations commonly encountered when chatting and texting. Digital natives exist in a world where information can be located quickly and easily, communication with people across the globe is commonplace, and publication of music and visual media can be accomplished without leaving one's house. Wimberley (2014b) noted that in the world of digital natives, even small children use an iPhone to play games, to take pictures and videos, and to post pictures and comments on Facebook.

Digital natives view the world horizontally and place everyone, regardless of race or socioeconomic status on an equal footing. This worldview allows for expansion of democracy and rejection of centralized governance. They are driven by values and are distrustful of traditional institutions. Digital natives:

- easily collaborate with people living around the globe;
- allow values to influence their decisions and life; and
- find solutions that promote equality. (DeGraff, 2014)

Digital natives are at a clear advantage today; they often hear how they were born with technology in their hands and how they understand how to use it. Clearly, their superiority over

digital immigrants is easily seen through the abilities of toddlers to intuitively and easily manipulate smartphones and iPads. While schools today have incorporated technology to be a sustaining innovation, digital natives are rebelling against the current traditional educational systems and are opting for online and blended learning opportunities created for the nonconsumers of traditional education. Their value-laden worldview predicts to increase democratic institutions worldwide and further knowledge by increasing collaboration across national boundaries

Digital Immigrants

Many teachers can be classified as a digital immigrant. Digital immigrants are people who remember a world without computers, mobile phones, and other smart devices. They migrated to the world of technology, learning how to incorporate these technologies into their lives. Digital immigrants view the world vertically, placing people and institutions hierarchically. This worldview is dominated by results and goals to achieve upward mobility. Digital immigrants are inclined to be more aggressive, competitive, and productive. They created the multifarious technologies and systems used by billions of people every day. Digital immigrants know how “to achieve goals quickly, to use focused resources in building things to scale, [and] to revitalize or repurpose existing institutions” (DeGraff, 2014, para. 7). Because digital natives emphasize the importance of values over accomplishments, projects and goals of great magnitude where vertical organization is required will be difficult to realize.

Teaching in the 21st Century

Traditionally speaking, public schools are part of a monolithic value-added linear process in which differentiation is not viable, subject matter is taught chronologically, standardization is the rule, and students are forced to navigate the system. In this educational setting, technology

has been subjugated to exist as supplementary tools so that “the value-added process is not disrupted and a timed system that is easily organized can be managed” (Liberty University, n.d.b). Christensen et al. (2011) categorized public education today as a value-added business model because “students are herded into a classroom at the beginning of the year, value is added to them, and they’re promoted to the next grade at year’s end” (p. 126). However, the creation of online learning slowly disrupts public education.

Teachers are seen as knowledge givers, and schools are seen as places where parents send their students to gain knowledge, to prepare for entrance into the workforce, and to pass qualifying examinations. A teacher’s role in this new reality requires them to be digitally literate as well as able to communicate, collaborate, and adapt. However, in this encroaching technological era, it will not be necessary for a teacher to be a technology guru, but a 21st century teacher will need to know how to access knowledge, understand and use new communication tools, and accommodate for unique learning styles and multiple intelligences. Technology is always changing the way teachers approach instruction. Looking into history, it is easy to see that the invention of the pencil, the typewriter, and the computer did not change a language teacher’s role. It only changed the teacher’s approach on how to instruct a student in writing. Online laboratories for science classes are nothing more than a substitute for the real lab. Both require a teacher to show and explain to students the importance of the experiment.

Despite the transformation occurring within educational systems, the main role of a teacher has never changed. Teachers have always been needed to impart knowledge, whether that knowledge includes showing someone how to throw a spear, or how to multiply, or how to navigate through an online course. Teachers are guides that help others to learn. Teachers have always collaborated with other teachers on how to best instruct their students. Teachers have

always been involved with families and worked diligently to help their students learn. Teachers have always been a role model for students and sometimes their biggest supporter.

Extrinsic Motivation versus Intrinsic Motivation

According to Christensen et al. (2011), “motivation is the catalyzing ingredient for . . . learning” (p. 7). Student achievement enhances when students are intrinsically motivated to learn and their education customized to match the learning styles and preferences. In their book, *Disrupting Class: How Disruptive Innovation Will Change the Way the World Learn*, Christensen et al. articulated how intrinsic motivation and not extrinsic motivation, acted as a catalyst for learning. Whereas extrinsic motivation originates outside of the learner and is characterized by a desire to learn, to earn a grade, or to be promoted, intrinsic motivation originates within the learner and is characterized by an inner desire of someone to learn because they have a true interest to know something. Unfortunately, most schools today operate by motivating students extrinsically and appear powerless and incapable of providing intrinsically motivating content. Without intrinsic motivation, even dynamic and exciting teachers will be able to reach students who are unmotivated and disengaged.

In the atmosphere of today’s educational systems, student disengagement figures prominently. According to Washor and Mojkowski (2014), the number one reason for student disengagement from school is that they have become apathetic to learning. Disengaged students often display:

- disdain for knowledge,
- aversion to complicated and lengthy assignments,
- preference for self-isolation from classmates,
- exclusion from class discussion,

- animosity towards mandatory school attendance, and
- a talent cutting class (Trout, 1997).

Justifications given by students for school disengagement included:

- feeling that nobody at school cared about them,
- suspecting that the schools could not or would not provide what they needed,
- loathing for a school environment seen as personally limiting and restrictive, and
- believing that schools were to blame for lack their lack of success because schools were not teaching them in the way they needed to be taught.

Washor and Mojkowski (2014) stated that the main reason why 1.3 million students drop out of school every year is due to student disengagement. Some disengaged students do not actually drop out and leave school, but they drop out in their minds, mindlessly passing classes and eventually graduating high school. Students who disengaged from school expressed that:

- their teachers and schools do not care about them,
- they have to adjust to restrictive school environment and curriculum but schools do not adjust to meet their needs, and
- schools are not teaching them in the way they need to be taught which led to them failing classes and acting out in school.

School Connectedness

School connectedness has been defined as the “spirit, trust, interaction, and commonality of expectations and goals” (Rovai, 2002, p. 198) that occur within a classroom, among students, and between teacher and student. Learning environments that promote interaction and communication among participants and with the teacher are critical in nurturing sense of connectedness. According to the Centers for Disease Control and Prevention (n.d.b), students

feel connected to their school when they believe that their teachers care about them and trust in their ability to learn. Students who feel connected to their school usually:

- earn better grades,
- score better on assessments,
- have low absenteeism, and
- further their education after high school.

Schools and teachers play important roles in contributing to students' sense of connectedness.

The Centers for Disease Control and Prevention (n.d.a) provide six strategies that foster sense of connectedness:

- create processes that combine academic achievement with student engagement;
- provide opportunities for families to be actively involved with the academic content and school experiences of their students;
- teach academic, social, and emotional skills to students that will enable them successfully engage in all school activities and functions;
- create positive learning environments through, effective classroom management;
- recognize the importance of continued professional development of teachers; and
- create systems for open communication.

Of all these strategies, the one that stands to support sense of connectedness between teacher and student the most is the creation of positive learning environments. In this area, teachers have the most direct control to establish this goal. Expectations for this goal include:

- developing clear, consistent, and reasonable learning expectations with students,
- aligning lessons to content standards,
- connecting lessons to students' lives,

- instituting flexibility with instructional strategies,
- personalizing lessons to meet the diverse needs of students, and
- fostering open lines of communication with students. (Centers for Disease Control and Prevention, n.d.a)

Many studies have looked at students' sense of connectedness with their schools.

Smilyanski, Boyd, Perry, Rothman, and Jenkins (2015) examined the association between sense of connectedness and distance education of college students in a dental hygiene program. This study found a negative correlation between sense of connectedness and distance learning, suggesting that online learning decreases a sense of connectedness. Another study found just the opposite. Sadera, Robertson, Song, and Midon (2009) inquired about the role of community in online learning and reported that the more effort students put forth into learning course materials and interacting with others in a course, the higher their sense of connectedness.

Mobile Learning

Three characteristics of mobile learning are space, time, and areas of life. Space orientation refers to learning that can occur anywhere; time orientation refers to learning that can occur at any time; and, areas of life refers to learning for work-related reasons as well as personal reasons (Sharplesc Taylor, & Vavoula, 2010). Cheon, Lee, Crooks, and Song (2012) advocated for the use of mobile devices as instructional tools because of their ability to be interactive and provide for individualized learning opportunities outside of the classroom. Additionally, students associate mobile devices with increased independence, self-direction, motivation, and self-esteem (Ciampa, 2013).

Mobile devices have many educational benefits including:

- strengthening the link between learners and content,

- increasing the interaction between and among learners and teachers (Wang and Shen, 2012),
- improving communication and collaboration,
- aiding educational achievement,
- allowing for personalized and individualized learning, and,
- engaging reluctant learners (Yueh-Min et al., 2014).

Further, Abe and Jordan (2013) noted that mobile devices are inexpensive and augment instructional content. Krutka and Milton (2013) explained that learning with mobile devices focused on the individual learner. Nathan, MacGougan, and Shaffer (2014) articulated that mobile devices contribute to collaboration due to their ability to be spontaneous. Yueh-Min et al. (2014) maintained mobile devices enrich learning as well as student motivation. Haydon et al. (2012) elucidated how iPads were beneficial for students with emotional and behavioral issues.

Apps are “internet application that run of smartphones and other mobile devices” (www.webopedia.com, 2014, p. 1) and the plethora of their use can be attributed to their ease of availability and portability. Nisbet and Austin (2013) promoted the use of smartphones and tablets as aids in acquiring vocabulary. While they realize that this can be a high hurdle, given that many teachers are digital immigrants (people born before 1974 who did not grow up using current technology of computers, smartphones, and tablets), they made it clear that “teachers and students must begin with current technology and continue to build upon their knowledge as technological advances unfold” (Nisbet & Austin, 2013, p. 2). They pointed out that the benefits of using such technology include:

- increased student choice,

- technological skills are transferred to other areas in students' lives,
- an increase in motivation and engagement,
- students receive instant feedback, and,
- teachers are able to track their students' progress.

Moreover, students perceive the use of mobile devices as positive experiences that allow them to “increase their intercultural awareness and critical thinking skills” (Yang, 2013, p. 20).

Texting and Society

Text messaging is an integral part of adolescent culture today and is the main method used for communicating (Skierkowski & Wood, 2012). According to Chen and Lin (2016), the stages of technology integration into society began with electronic learning (e-learning), followed by mobile learning (m-learning), and finally leading to ubiquitous learning (u-learning). The goals of ubiquitous learning are to improve student motivation by transcending the traditional constraints of time and location. Indeed, research in the health industry has recognized the potential of using text messaging in behavior intervention for reasons of viability, outreach, individualization, and asynchronous nature (Fjeldsoe, Marshall, & Miller, 2009; Hall, Lewis, & Bernhardt, 2015).

The predominance of mobile devices in society today provides unique asynchronous learning opportunities for increasing academic vocabulary and knowledge. Mobile devices increase student choice, motivation, and engagement. Additionally, they have the capability to engage learners in vocabulary acquisition via text messaging, making them functional “mediating tools in the learning process” (Hu, 2013, p. 46). Yang (2013) found that students perceived their learning experiences with mobile devices as positive but noted that the length of

any learning module needs to be from 30 seconds to no more than 10 minutes due to “fragmented attention span of the use while on the move” (Hu, 2013, p.46).

However, some studies have shown that there are consequences to the explosion in the use of technology, specifically cell phone technology in society. When students are restricted from texting behavior, Skierkowski and Wood (2012) found that anxiety increased implying that this age group relies on texting behavior to maintain relationships and that texting is fundamental to their self-concept. Additionally, Lepp et al. (2014) found that a positive relationship exists between cell phone use and anxiety. With all the excitement surrounding mobile devices used as learning tools in educational institutions, Beland and Murphy (2015) focused on the effect on achievement of schools that ban such technologies. Unfortunately, for mobile device enthusiasts, they found that there was an overall significant increase in standardized test scores when students were barred from bringing mobile phones to school and that the greatest increase in scores came from the lowest achieving students. In another experimental study conducted by Davis (2012), the use of the instructional technologies was used to determine the effect on the academic achievement of fifth-grade math and science students. In this study, no evidence was found that indicated instructional technology enhanced student academic achievement (Davis, 2012). However, society must come to the realization that mobile devices are here to stay and instructional strategies must be developed that incorporate these technologies.

Benefits of Mobile Devices as Instructional Tools

According to Kolb (2011), there are many benefits to using mobile devices in the classroom such as:

- students already know how to use cell phones,
- learning activities do not have to occur during class time,

- students love mobile technologies,
- learning is possible whenever and wherever,
- learning can be individualized and differentiated, and
- mobile devices can help visually and hearing impaired students.

Many teachers see the benefits of mobile technology; teacher perceptions of cell phone use in the classroom tend to be positive and supportive (Thomas, O'Bannon, & Britt, 2014). Some teacher perceptions of the benefits of using mobile devices as educational tools include asynchronous learning, engagement, differentiation, communication, and motivation. However, concerns regarding the inclusion of mobile devices in the classroom included cheating and classroom distraction (Thomas & O'Bannon, 2013) and cyber bullying (Thomas et al., 2014). Another factor when considering the use of mobile devices is screen size. Kim and Kim (2012) investigated the effects that mobile devices with different screen sizes had on vocabulary achievement of Korean middle school students learning English. They found that larger screen size positively affected vocabulary acquisition and small screen size increased difficulty in vocabulary comprehension.

There are other benefits associated with text messages for communication purposes. Research by Rahamat et al. (2013) showed that students who received text messages from teachers felt that their motivation and interest in learning increased because they felt more accepted and appreciated. The researchers recommended that teachers include texting in their instructional practices to increase affective pedagogy. In another study, the Unified Theory of Acceptance and Use of Technology model was applied by Chen and Lin (2016), in which wireless networking, mobile devices, and online databases were integrated to facilitate learning

of fifth-grade Taiwanese students in an astronomy class. They found that availability and easy to use technology increased student motivation and performance.

Text Messaging and Vocabulary Learning

According to Noam Chomsky, language learning is “innate . . . something that humans acquire naturally” (as cited in La Piana, 2014, p. 21). Stephen Krashen’s natural order hypothesis would concur with Chomsky while Albert Bandura would emphasize the effects of society on language learning. However one chooses to interpret language acquisition, one thing is certain; the cornerstone of language learning and thus knowledge is vocabulary.

Vocabulary is at the root to all learning. Words “are powerful tools used to express ideas, communicate with others, access prior knowledge, and learn new concepts” (Cox, Jackson & Tripp, 2011, p. 45). Emphasis placed on initiating and maintaining instructional strategies promotes exhaustive vocabulary acquisition. There are four parts to successful vocabulary acquisition. First, words need to be taught explicitly through strategies, such as realia, imagery, definitions, translations, and multiple exposures. Second, students need to be able to categorize words, use contextual clues to derive meaning of new words, and differentiate between synonyms, antonyms, and homonyms. Third, vocabulary is best learned through listening, speaking, reading, and writing activities. And fourth, diction and games help to generate interest in words and their meanings (Nisbet & Austin, 2013).

There are many studies that involve the acquisition of vocabulary. Kim and Kim (2012) found little difference in vocabulary acquisition when vocabulary were presented on mobile devices with either text-only or text-with-picture formats. Suwantarathip and Orawiwatnakul (2015) found that students who completed vocabulary exercises on mobile devices on their own time outperformed students who completed the same exercises in class using pen and paper.

They concluded that vocabulary ability is significantly improved when mobile devices are used as learning tools. While no significant differences were found between Iranian college students who were taught English vocabulary using SMS technologies versus using a dictionary, a delayed post-test did indicate a significant effect, which indicated that text messages can help students with long-term vocabulary retention (Alemi, Sarab, & Lari, 2012).

Text Messaging

Students in public education today are classified as either being digital natives, students born from 1981 to 2001, or as millennials for students born after 2001 (Davis, 2012). Walk into any classroom today where mobile devices are allowed and students will be texting because that is their preferred way of communicating. Some reasons given by college age students for using text messaging included usefulness, convenience, and comfort level with technology. Lauricella and Kay (2013) concluded that text messaging is a practical tool for expanding communication among students and teachers. Idrus (2013) found that students see mobile devices as convenient and acceptable when used in learning and argued that students would benefit from “pedagogically articulated text messages” (p. 79).

Research that has examined these effects found that text messages (a) were helpful for increasing course interaction at the high school level (Faure & Orthober, 2011), (b) contributed to students learning course material at the college level (Gasaymeh & Aldalalah, 2013), and (c) were positively correlated to academic performance on science tests at the middle school level (Van Vooren & Bess, 2013). Faure and Orthober (2011) studied the effects on high school students who received course-related text messages and noted that students who received messages found them to be helpful and increased their sense of course interaction. A follow-up survey of the high school students revealed that not having a mobile phone, not having access to

a texting service, and not wanting to participate were the reasons why some students did not participate in the study. Gasaymeh and Aldalalah (2013) investigated sending text messages to college students enrolled in a computer programming class. The students were sent 36 text messages over a period of 12 weeks. The text messages contained information about upcoming assignments, content related review materials, and thought-provoking questions. This study found that text messaging significantly contributed to the students' learning. Additionally, in semi-structured interviews, students expressed that there were more advantages than disadvantages to using text messaging as an instructional tool. Van Vooren and Bess (2013) researched the correlation between a teacher's use of Twitter, a SMS, and eighth-grade science students' academic achievement. Messages were sent that supported concepts taught in class. Results revealed a positive relationship between using Twitter for reinforcement of course content and academic performance on tests. McKnight et al. (2016) elucidated that students benefited when teachers sent text messages that dealt with content covered in class because the text messages exposed the students to a wider selection of resources that provided opportunities for more in-depth understanding of the topic. In essence, students no longer had to rely on the teacher or classroom textbook for knowledge.

Text messaging on academic achievement is in its infancy. While there have been a quite a few qualitative studies, "the field is ready for quantitative and experimental study designs with larger sample sizes [in order to] contribute to our understanding of which technology use strategies contribute most to student learning" (McKnight et al., 2016, p. 208). There is a critical need for the field of education to understand how technology empowers teaching and learning because research findings have been deficient in this area.

Social Media and Mobile Devices

The positive impacts of using mobile devices as a medium of social media in the classroom are well documented. Abe and Jordan (2013) noted that such technology is cost-efficient and augments the delivery of course material. Krutka and Milton (2013) found that social media services allowed for student-centered educational experiences. Nathan et al. (2014) reasoned that social media contributed to collaboration. Yu-Chang and Yu-Hui (2012) claimed that the use of mobile devices led to spontaneous engagement and Yueh-Min et al. (2014) maintained that student use of mobile devices in cooperative learning situations enriched learning attitude and effectiveness. Research by Haydon et al. (2012) indicated the effectiveness of iPads for students with emotional and behavioral issues.

On the other hand, research on the use of mobile devices to enhance student achievement has been inconclusive. Haydon et al. (2012) discovered that student use of iPads resulted in more math problems being solved correctly in less time than those using traditional worksheets; however, this study did not assess student math achievement skills prior to the study and was limited in scope to iPads versus traditional worksheets. Friedman and Garcia (2013) utilized iPads in secondary history courses to allow students to interact with primary source information from September 11th archives and found that students using iPads reported a more positive experience with the course material, more fully understood the use of primary source information, and developed a deeper sense of empathy with the historical account they were interacting with than those students who did not use iPads for the same lesson. However, this study was limited to only three classes of 30 students, and no long-term effects of such technologies on social studies competencies were reported. Lung-Hsiang, Chee-Kuen, Chee-Lay, and May (2010) utilized smartphones to research the application of Chinese idioms through

activity learning to enhance language learning with results showing some unbroken language learning. Caverly (2013) found that students with access to mobile devices tended to use a variety of instructional applications that resulted in increased reading and writing skills, but the study was limited in its sample size and details about the applications and specific technology used. Harmon (2012) discovered that students with access to iPads scored significantly higher on the Ohio Graduation Test in reading and writing than students without access. Hutchinson, Beschorner, and Schmidt-Crawford (2012) elucidated that the use of iPads can help to address curriculum needs but did not relate how to implement the use of iPads into the curriculum.

The predominant number of studies involving text messaging were behavioral in nature and conducted in the field of medicine. In these studies, text messages sent to patients were reminders to do something with the aim of improving physical and mental health. However, the field of education has barely scratched the surface of researching text messaging in general. The majority of studies were situated at the college level and dealt with student perceptions and vocabulary learning. A limited amount of research was located at the high school level that involved studying the effects of text messaging on academic achievement and sense of connectedness. In addition, research found no studies measuring the effects of instructional text messaging on academic achievement and sense of connectedness in an economics high school course. Because smartphone technology and text messaging are recent phenomena, it could be argued that it is the novelty of text messaging alone that has led to increases in academic achievement and sense of connectedness. It is, therefore, critical that research into this area of inquiry determine how sending instructional text messages affects academic achievement and sense of connectedness.

Summary

As clarified in the introduction, God created each human to be a unique individual. Therefore, all people possess a wide variety of abilities and infinite parameters for learning. Because human beings were created to learn, teachers need to design systems where students can learn. As society and people change, educational leaders need to seriously strive to create systems where students can learn and prepare for the life ahead of them. In order for this to materialize, the educational community must be cognizant that change is normal, change should not be feared but rather embraced, and that a need for changes has resulted due to recent developments in technology.

Educational systems in the United States have been tasked with formalizing and advancing education so that all students from all socioeconomic and cultural backgrounds will benefit. Teaching and learning operate hand in hand to achieve America's five educational goals:

- defending democratic values,
- preparing a workforce,
- ensuring global economic superiority,
- dismantling poverty, and
- training students to be successful on tests.

In order to make sure these goals are realized, understanding how teaching and learning interact is more important today than ever before when designing and maintaining educational systems.

The world today is changing quickly and educational systems today are facing the challenges of disruption due to exponential public demand for online learning and personalized and customized student-centric learning. The majority of teachers and decision makers in

educational systems today are digital immigrants who are continually being challenged by digital natives who do not understand and cannot operate in schools designed for an industrial era mentality to be architecturally interdependent.

Teacher-centric learning, where teachers make decisions about what is learned, dominates instructional practices and pedagogical decisions. In this type of scholarly atmosphere, students must figure out the teacher and produce and deliver completed assignments that mesh with the teacher's way of thinking and requirements. Student-centric learning, preferred by digital natives, allows for student-led direction when making decisions about what is learned. Further, Christensen et al. (2011) saw student-centric learning as a means to achieving intrinsic motivation and enhancing student engagement. The technology associated with student-centric learning enables learning to occur 24 hours and possibly to take classes from the best available teachers. Even though technology and student-centric learning appear to lessen the role of teachers and the need for the teacher, this is incorrect. Teachers are needed to assist students in (a) making informed decisions, (b) organizing and customizing course materials to insure that learning is individualized, and (c) providing guidance and supervision of online learning environments.

Even though a teacher's role is changing in light of today's developments, one thing remains clear; the basic function of any teacher is to help someone learn something. How they help that person learn has changed over time and space and has been impacted by technological inventions and societal demands, but their purpose has always been and always will be to help another person learn.

This literature review dealt with the use of text messaging for instructional purposes. A theoretical framework for this study was presented which incorporated ecology of human

development theory, activity theory, dual coding theory, behaviorist theory, and constructivist theory. The review of literature included many research studies of texting messaging for academic achievement, vocabulary acquisition, and increased motivation of learners.

It was learned that texting and text messages have become an integral part of society today and that young adults develop increased levels of anxiety when they are apart from their phone. The mobile device is used primarily to communicate and is the preferred mode of communication of digital natives and millennials. Students today are attached to their cell phones and find ways to incorporate their uses into their daily lives. The main benefits of mobile devices to education are its ubiquitous nature, allowing for learning to occur anytime and anywhere, individualized learning, and differentiated learning. The main benefit of mobile devices to students are convenience and comfort level with using them.

CHAPTER THREE: METHODS

Overview

This chapter outlines the research design, including the research questions, null hypotheses, participants, settings, instrumentation, procedures, and data analysis. The purpose of this experimental research was to determine if sending text messages that reinforced content knowledge in an economics class had any effect on students' academic achievement and sense of connectedness.

Design

A quasi-experimental, pretest posttest, non-equivalent groups design was employed to determine if statistically significant differences existed in the mean scores of academic achievement in economics and sense of connectedness between high school students who received instructional text messages and those who did not receive instructional text messages. According to Gall, Gall, and Borg (2007), this research design is useful when the groups of students are predetermined by the teacher, are not equivalent, and are not random. In this design, manipulation of the intervention occurs when one group receives the treatment and the other group does not receive the treatment (Creswell, 2015). This design was the most appropriate for this study because a pretest and posttest was used to measure the effect of the manipulated intervention on non-equivalent groups. Boyles (2017) chose this design to compare "the effect of oral feedback on undergraduate students in online and in-residence courses" (p. 43). This design was also chosen by Schipper (2015) who measured the effect of using white board technology on student performance by comparing a group of students who were exposed to whiteboard technologies to a group of students who were not exposed to whiteboard technologies.

The independent variable was use of instructional text messaging and the dependent variables were academic achievement and sense of connectedness. This quasi-experimental, pretest posttest, non-equivalent groups research design allowed the researcher to determine if there was any effect on academic achievement and sense of connectedness after receiving instructional text messages by comparing a treatment group with a control group.

Research Questions

The research questions for this study were:

RQ1: Does a difference exist between the mean *academic achievement* scores of high school students who receive instructional text messages and those who do not receive instructional text messages as measured by the Test of Economic Literacy, Fourth Edition while controlling for pretest scores?

RQ2: Does a difference exist between the mean *sense of connectedness* scores of high school students who receive instructional text messages and those who do not receive instructional text messages as measured by the Classroom Community Scale?

Null Hypotheses

The null hypotheses for this study were:

H₀₁: There is no statistically significant difference between the mean *academic achievement* scores of high school students enrolled in an Economics course who receive instructional text messages and those who do not receive instructional text messages as measured by the Test of Economic Literacy, Fourth Edition while controlling for pretest scores.

H₀₂: There is no statistically significant difference between the mean *sense of connectedness* scores of high school students enrolled in an Economics course who receive

instructional text messages and those who do not receive instructional text messages as measured by the Classroom Community Scale.

Participants and Setting

The population for this study were all students enrolled in a mandatory economics course in the public high schools of an affluent north Georgia county. The county is the seventh largest district in the State of Georgia as well as being listed as the nation's 11th fastest growing with an ever expanding culturally diverse population. In the 2017 school year, the student population of the county consisted of 44,673 students with a demographic makeup of 65.22% White, 12.94% Hispanic, 3.39% Black, 2.79% Multi-race, 15.21% Asian, .40% American Indian/Alaskan, and .06% Pacific Islander ([REDACTED]). The county sits 30 miles north of Atlanta along Lake Lanier and minutes away from the Appalachian Mountains. The county is known for its plethora of parks and green spaces as well as state-of-the-art health and education facilities. Additionally, the school system has a reputation for being on the leading edge of technology as well as a state leader in high testing scores.

The participants for the setting included students taking an economics course at one of the county's high schools during the spring semester of the 2017-2018 school year. The high school is located at the center of the district and was the original and only high school for most of the district's history. The socioeconomic status of students at the high school ranged from a small percentage coming from lower income families with the remainder coming from middle-to-upper income families living in suburban neighborhoods north of Atlanta, Georgia. In the 2015 school year, the population of the school consisted of 1908 students with a demographic make-up of 68.29% White, 22.43% Hispanic, 3.41% Black, 2.83% Multi-race, 2.31% Asian, .63% American Indian/Alaskan, and .10% Pacific Islander ([REDACTED]).

All participants were enrolled in a required economics course. The participants were drawn from students being taught by two separate economics teachers in different classrooms at the same school. Students of Teacher A were the experimental group and received the intervention and students of Teacher B were the control group and did not receive the intervention. All students were recruited to be participants in the study at the beginning of the semester. The teacher went over the recruitment letter and students wanting to participate in the study were given an assent letter to sign or a consent letter for their parents to sign.

A convenience sample was used for the purposes of this study. A convenience sample occurs when the sample is easily accessible and the situation arises whereby it is the only feasible alternative. Randomized sampling was not available to the researcher because students were scheduled into sections of the economics course at the beginning of the school year. In this study, there were two teachers who taught the high school economics course. Teacher A taught four sections of on level high school economics and Teacher B taught two sections of on level high school economics. Each section was comprised of 25-30 students.

A convenience sample, which was large enough to represent the population, was used for this study (Gall, Gall, & Borg, 2007). There was one experimental group and one control group. Participants ranged in age from 17 to 19 years old. To test the null hypotheses, this study sampled 90 students. There were 34 students in the experimental group and 56 students in the control group. The required minimum number of students was met for a medium effect size with a statistical power of .5 at the .05 alpha level (Gall et al., 2007).

Instrumentation

Two instruments were administered in this study. The Test of Economic Literacy (TEL), Fourth Edition, Form A Pretest and Posttest, was used to measure academic achievement.

Request to use the instrument can be found in Appendix C and permission to use the instrument can be found in Appendix D. The CCS was used to measure participants' sense of connectedness. Request to use the instrument can be found in Appendix E and permission to use the instrument can be found in Appendix F.

Test of Economic Literacy, Fourth Edition

Academic achievement was measured using the TEL, Form A (see Appendix G) published by the Council for Economic Education (CEE, 2014). According to Lacatus and Staiculescu (2016), "The test of economic literacy (TEL) is one of the most popular and used assessment tools in order to measure students' performance in learning economics" (p. 400). The purpose of this nationally normed and standardized test is to measure high school students' achievement in basic economic concepts. The TEL, Form A has a pretest and a posttest with each consisting of 45 multiple-choice questions covering the topics of fundamental economics concepts, microeconomics, macroeconomics, international economics, and personal finance economics. National norming for the TEL occurred in 2011 with 7,368 students participating from 239 high schools, which represented different geographic regions of the United States, various socioeconomic levels, as well as varying school sizes. The norming data clearly show the TEL to be "a valid and reliable measure of economic understanding for high school students" (Walstad, Rebeck, & Butters, 2013, p. 5). Moreover, the Test of Economic Literacy has been used in research of Economic teaching and learning through the world. The Test of Economic Literacy, Fourth Edition, Form A has a Cronbach's alpha of .91 with a standard error of measurement of 2.99.

The content validity for the Test of Economic Literacy rests on two types of evidence: content and construct. Content validity is valued highly because it confirms if an achievement

test measures what it claims to measure. The Voluntary National Content Standards in Economics (CEE, 2010) functioned as the guiding principles for the development and selection of the test items because they mirrored content taught in high school economics courses. The test was developed with the help of three experienced economists each having extensive experience improving the teaching and learning of high school economic concepts, and previous experience with large-scale economic test projects. The fourth edition of the Test of Economic Literacy maintained a large portion of questions that were developed and normed from previous editions. These items were scrupulously reviewed by committees of high school economic teachers and economists and were found to be valid questions. Items from the previous editions and new items were field tested in order to compile the final set of test questions. Content validity was established through economics content experts by comparing the final set of test questions with the content judged to be important and aligned with the Voluntary National Content Standards in Economics (Walstad et al., 2013).

Construct validity in the Test of Economic Literacy is designed to measure understanding of economic concepts among high school students. Evidence of construct validity include (a) the test performs well across all groups of students and within expected directional parameters, and (b) a statistically significant difference exist between students with prior knowledge of economics concepts and those without prior knowledge. Furthermore, the Test of Economic Literacy has shown to be predictable and responsive to descriptive statistics of norming samples such as gender, race, school size, student teacher ratio, and percent of students receiving free and reduced lunch (Walstad et al., 2013).

The Test of Economic Literacy contains 45 questions on the pretest and 45 questions on the posttest. The combined possible score on the Test of Economic Literacy ranges from 0 to 45

points. A score of 0 points is the lowest possible score meaning that no questions were answered correctly. A score of 45 is the highest possible score meaning that all questions were answered correctly. There are four possible choices for each question, with one being the correct answer and the remaining three being distractors. Because there are four answer choices, there is a 25% chance, or 11 points on the test, of getting the correct answer for each question based solely on chance and not on economic knowledge. Scores this low should be omitted from data analysis due to random guessing or not taking the test seriously (Walstad et al., 2013).

Several recent studies have used the TEL for research purposes. One study by Happ, Förster, Zlatkin-Troitschanskaia, and Carstensen (2016) used the German version of the instrument to analyze the relationship between prior economic knowledge and personal factors on economic achievement in first-year university students in Germany. Findings from this study showed that (a) significant differences existed between students with prior knowledge in economics and students without or limited prior knowledge in economics, and (b) personal factors that helped to explain prior knowledge in economics included previous learning opportunities, gender, and students' first language. Another study by Gill and Gratton-Lavoie (2011) sought to add to the literature by assessing the efficacy of the State of California mandate that all high school students receive economics education. The two goals of this study were to (a) determine how much knowledge of economics is retained upon entering college, and (b) evaluate the impact of California's mandate for economics instruction by comparing a group of California students who had instruction in economics in high school with students from the State of Washington who did not have previous instruction in economics because there is no mandate to teach economics in Washington. This study showed that (a) students who had taken an economics course in California outperformed students from Washington who had not taken an

economics course in high school and (b) males tended to score higher than females on the TEL. In yet another study, Van Wyk (2011) used the TEL to measure the effects on achievement, retention, and attitude in economics when teams, games, and tournaments are used as interventions in a cooperative learning environment. One group of students received the teams, games, and tournaments intervention and another group did not. Each group was given the TEL as a pretest and posttest. Results showed that the group receiving the treatment scored higher in economic learning, retention, and attitude than the group not receiving the treatment.

Classroom Community Scale

Sense of connectedness was measured using the CCS (see Appendix I) developed by Rovai (2002). Cronbach's alpha for the CCS is .92. Rovai developed the scale in order to measure the construct of sense of community in an educational setting. Sense of community has at its heart two constructs intrinsic to the school setting: connectedness and learning. The construct of connectedness relates to the attachments and obligations of individuals to each other in a group, and the construct of learning is the conscientious development of transformation among members of a group brought about through cooperative action. (Rovai, 2002).

In 2004, Rovai, Wighting, and Lucking sought to further refine and validate the scale. Initially, 40 items were developed that all measured sense of community. Next, four experts in the field of researching psychological sense of community evaluated the 40 items rating them from completely relevant (a score of 5) to completely not relevant (a score of 0). Eight items with scores lower than a 4 were removed, leaving 32 items. After this, the CCS was administered to study participants. Analysis of the participants' responses reduced the number of items to 20. Finally, a factor analysis was conducted to confirm factor structures and ensure items were loaded unambiguously on both sides of the scale. The end result was the current CCS

consisting of 10 items that deal with the construct of classroom community and 10 items that deal with the construct of school community, totaling 20 items.

The CCS uses a 5-point Likert-type scale that includes responses that range from Strongly Agree to Strongly Disagree. Odd numbered questions relate to the construct of connectedness and even numbered questions relate to the construct of learning. Questions 1, 2, 3, 6, 7, 11, 13, 15, 16, and 19 are worded positively and use the following scoring scale: Strongly Agree = 4, Agree = 3, Neutral = 2, Disagree = 1, and Strongly Disagree = 0. Questions 4, 5, 8, 9, 10, 12, 14, 17, 18, and 20 are worded negatively and use the following scoring scale: Strongly Agree = 0, Agree = 1, Neutral = 2, Disagree = 3, and Strongly Disagree = 4. Total possible scores range from 0 to 40 for the construct of connectedness and from 0 to 40 for the construct of learning. An overall classroom community score is obtained by adding the weights of all 20 questions. Higher scores reflect stronger sense of connectedness to their school and community (see Appendix G).

Many studies have utilized the CCS to measure sense of connectedness. One such study by Aydin and Gumus (2016) used a quasi-experimental, nonequivalent groups, pretest-posttest control group design to understand the effects of sense of community of eight students taking a physical science class as an online course. A control group met in a face-to-face setting and participated in group activities that required collaboration. The experimental group was students taking the course online and participated in activities that also required collaborative activities using educational applications. The CCS was given to the students as a pretest and as a posttest. Results showed that students who met face-to-face had a higher overall sense of community. Wiest (2015) also used the CCS to compare sense of connectedness of college social work students taking online courses with students taking traditional face-to-face courses. However, in

this study, students taking the online courses scored higher in the areas of sense of connectedness and learning. The CCS was also used in a Turkish study (Aydin & Gumus, 2016) that suggested sense of classroom community could be used as a predictor of groups working together successfully.

Procedures

Institutional Review Board Approval

Approval to conduct the study was granted by the Institutional Review Board (IRB) at Liberty University (see Appendix A) prior to contacting the school district, principal, and parents of the participants. Following IRB approval, solicitations were sent to the school district and the principal of the high school asking for permission to conduct the study. After receiving school district and high school principal approval, a recruitment letter (see Appendix L) and participant consent form (see Appendix M) were given to students explaining the purpose of the study. Minor students who assented to participate in the study were given a parent/guardian consent form that explained the purpose of the study (see Appendix M). All signed consent forms were reviewed to ensure that all the documents had been signed and dated properly. All consent forms were stored securely and only the researcher had access to them.

Group Assignment

There were two economics teachers used in this study (Teacher A and Teacher B). Teacher A was assigned to teach four sections of on level high school economics course and Teacher B was assigned to teach two sections of an on level high school economics course. There were 25-30 students enrolled for each section of the economics course. Students were randomly assigned at the beginning of the year to either Teacher A or Teacher B. In this study, students of Teacher A were the experimental group and students of Teacher B were the control

group. In addition to signing the consent form, the students in the experimental group were to also download the Remind application on their phone in order to receive text messages. Students in the experimental group that returned consent forms was 65. Out of the 65 students, 41 downloaded the Remind application to receive text messages, and out of those 41 students, only 34 took both the pretest and posttest. Thus, the experimental group consisted of 34 students. Students in the control group that returned consent forms was 64 and out of those 64 only 56 students took both the pretest and the posttest. Thus, the control group consisted of 56 students. The total number of students who participated in the study was $N = 90$.

Text Messaging

Text messages that reinforce content taught in class were sent to students in the experimental group four times per week for eight weeks (see Appendix N). Text messages “are arguably the most widely used personal communication medium for the current generation” (Marshall, 2016, p. 66) with 63% of teens texting daily to send and receive information (Lenhart, 2012). Text messages were sent using an application known as Remind. Remind is a free and safe messaging application that can be used with iOS and Android technology. This application allowed the researcher to send one-way text messages while maintaining privacy of student numbers. When setting up the Remind application for this study, students were not given permission to respond to the text messages. Sending text messages using Remind “helps educators build and reinforce a sense of community [and also] enables *safe* text-based communication—which is both a familiar and increasingly expected form of communication for today’s students” (Marshall, 2016, p. 67).

Data Collection

There were two points during the experiment in which data was collected and analyzed. At the beginning of the experiment, students took the TEL, Form A Pretest. Scores from this test were used to establish a baseline of academic achievement and act as the covariant in the one-way analysis of covariance (ANCOVA) statistical procedure that was used to determine if any significant statistical differences existed between the experimental group and control group. The second data collection point was during the final week of the experiment in which data was collected from the TEL, Form A Posttest and from the CCS.

Teacher Training

The two economics teachers attended a meeting with the researcher where the experiment was explained to them. Both teachers were (a) informed of the start and end dates along with the purpose of the study, and (b) told that they would be responsible for passing out and collecting paperwork, administering the TEL, Form A Pretest and Form A Posttest, and assigning the CCS during class time. The teachers were informed that students in the experimental group would receive four text messages each week for eight weeks that covered economics topics discussed in class and that students in the control group would not receive any text messages. They were told that these text messages were going to be sent using an application known as Remind.

Experiment

The experiment began after the teachers were trained and all necessary paperwork required for students to participate in the study had been collected. During the first week, students in the experimental group and control group were given the TEL, Form A Pretest. For the next eight weeks, students in the experimental group received text messages that included a word or concept that was discussed in class along with a very brief definition and an image that

helped to explain the concept. At the end of the eight weeks, students in both groups were given the TEL, Form A Posttest and the CCS. Data from participants' responses were collected, results recorded, and information analyzed using SPSS software. Knowledge gained from this experiment was published.

Data Analysis

Statistical Package for Social Science (SPSS) software was used to analyze descriptive statistics as well as perform all tests of statistical significance.

Hypothesis 1

An ANCOVA was conducted to determine if a statistically significant difference exists between the mean academic achievement scores of the control group and the experimental group on the TEL. An ANCOVA uses a covariate to control for the linear effect of a variable the researcher is not interested in studying. By removing the effect of a covariate, a researcher is better able to understand the between the dependent variables (Gall et al., 2006). In this study, the covariate was the Test of Economic Literacy, Form A pretest. Using the ANCOVA allowed the researcher to adjust the differences in the pretest in order to minimize their effect on the posttest. Because the research design of this study was quasi-experimental using non-equivalent groups both taking a pretest and posttest, the ANCOVA was the best statistical technique (Ary, Jacobs, Razavieh, & Sorenson, 2010).

A two-tailed test of significance was conducted at an alpha level of .05. Partial eta squared was used to measure effect size and data was screened using a box and whiskers plot to check for outliers. SPSS software was used to analyze descriptive statistics as well as perform all tests of statistical significance.

Assumption testing included (a) a scatterplot to check for linearity, (b) Test of Between-Subject Effects to check for homogeneity of regression, (c) a histogram and a Kolmogorov-Smirnov test to check for normality, (d) a scatterplot of the standardized scores against the predicted values for each category of the independent variables to check for homoscedasticity, and (e) Levene's test to check for homogeneity of variance. Assumptions were considered to be tenable at $p > .05$.

Hypothesis 2

An independent samples t-test was conducted to determine if a statistically significant difference existed between the sense of connectedness scores of the experimental group and control group on CCS. Independent samples t-tests are used to compare the mean scores of two different groups in order to ascertain if a difference exists in their mean scores (Gall et al., 2007). A two-tailed test of significance was conducted at an alpha level of .05. Cohen's d was used to measure effect size and data was screened for outliers using a box and whiskers plot. SPSS software was used to analyze descriptive statistics as well as perform all tests of statistical significance.

Assumption testing included (a) a Shapiro-Wilk test to check for normality, and (b) Levene's test to check for homogeneity of variance. Assumptions were considered to be tenable at $p > .05$.

CHAPTER FOUR: FINDINGS

Overview

This chapter reports the statistical analysis of the data collected throughout this research study. The purpose of this dissertation was to determine if differences in academic achievement and sense of connectedness exist from sending instructional text messages that used imagery and text to high school students enrolled in an economics course. The independent variable was text messaging and the dependent variables were academic achievement and sense of connectedness. The TEL was used to measure academic achievement and the CCS was used to measure sense of connectedness.

Research Questions

The research questions for this study were:

RQ1: Does a difference exist between the mean *academic achievement* scores of high school students who receive instructional text messages and those who do not receive instructional text messages as measured by the Test of Economic Literacy, Fourth Edition while controlling for pretest scores?

RQ2: Does a difference exist between the mean *sense of connectedness* scores of high school students who receive instructional text messages and those who do not receive instructional text messages as measured by the Classroom Community Scale?

Null Hypotheses

The null hypotheses for this study were:

H₀₁: There is no statistically significant difference between the mean *academic achievement* scores of high school students enrolled in an Economics course who receive

instructional text messages and those who do not receive instructional text messages as measured by the Test of Economic Literacy, Fourth Edition while controlling for pretest scores.

H₀2: There is no statistically significant difference between the mean *sense of connectedness* scores of high school students enrolled in an Economics course who receive instructional text messages and those who do not receive instructional text messages as measured by the Classroom Community Scale.

Descriptive Statistics

The participants in this study were high school students enrolled in a mandatory economics course. Table 1 lists the demographic information of the participants in this study. Students were recruited from two high school teachers who both taught on level mandatory economics. Participants were recruited during the first week of the 2018 spring semester. Consent forms were signed by either the student or by the parent/guardian of the student. Students taught by Teacher A were in the experimental group and students taught by Teacher B were in the control group. After consent forms were collected, students in the experimental group were given instructions on how to download the Remind application and sign up to receive text messages. Students in the experimental group that returned consent forms was 65. Out of the 65 students, 41 downloaded the Remind application to receive text messages, and out of those 41 students, only 34 took both the pretest and posttest. Thus, the experimental group consisted of 34 students. Students in the control group that returned consent forms was 64 and out of those 64 only 56 students took both the pretest and the posttest. Thus, the control group consisted of 56 students. The total number of students who participated in the study was $N = 90$.

Table 1

Participant Demographic Information

| Variable | | Experimental (<i>N</i> = 34) | | Control (<i>N</i> = 56) | | Total (<i>N</i> = 90) | |
|-----------|----------|----------------------------------|-------|-----------------------------|-------|---------------------------|-------|
| | | <i>N</i> | % | <i>n</i> | % | <i>n</i> | % |
| Gender | Male | 9 | 26.47 | 25 | 44.64 | 34 | 37.78 |
| | Female | 25 | 73.53 | 31 | 55.36 | 56 | 62.22 |
| | Total | 34 | 100 | 56 | 100 | 90 | 100 |
| Age | 16 | 0 | 0 | 1 | 1.78 | 1 | 1.11 |
| | 17 | 20 | 58.82 | 25 | 44.65 | 45 | 50.00 |
| | 18 | 14 | 41.18 | 29 | 51.79 | 43 | 47.78 |
| | 19 | 0 | 0 | 1 | 1.78 | 1 | 1.11 |
| | Total | 34 | 100 | 56 | 100 | 90 | 100 |
| Ethnicity | White | 24 | 70.59 | 38 | 67.86 | 62 | 68.89 |
| | Black | 0 | 0.00 | 1 | 1.78 | 1 | 1.11 |
| | Hispanic | 8 | 23.53 | 15 | 26.79 | 23 | 25.56 |
| | Asian | 2 | 5.88 | 2 | 3.57 | 4 | 4.44 |
| | Total | 34 | 100 | 56 | 100 | 90 | 100 |

During week two, participants in the experimental group and control groups took the Test of Economic Literacy, Form A pretest. Table 2 lists the descriptive statistics for the Test of Economic Literacy Pretest, Form A assessment disaggregated by group. Unadjusted means are presented, unless otherwise stated. Pretest scores were greater in the control group ($M = 44$, $SD = 15.54$) compared to the experimental group ($M = 38.38$, $SD = 19.86$). The pooled mean and

standard deviations for the Test of Economic Literacy, Form A pretest were $M = 41.88$ ($SD = 17.40$).

Table 2

Descriptive Statistics for the Test of Economic Literacy, Form A (N = 90)

| Variable | Experimental ($n = 34$) | | Control ($n = 56$) | |
|------------------------------------|---------------------------|-------|----------------------|-------|
| | M | SD | M | SD |
| Test of Economic Literacy Pretest | 38.38 | 19.86 | 44 | 15.54 |
| Test of Economic Literacy Posttest | 67.36 | 3.00 | 55.96 | 2.33 |

During week eight, participants in the experimental group and control groups took the Test of Economic Literacy, Form A posttest and the CCS. Table 2 lists the descriptive statistics for the Test of Economic Literacy, Form A posttest assessment disaggregated by group.

Adjusted means are presented, unless otherwise stated. Posttest scores were greater for the experimental group ($M = 67.36$, $SD = 3.00$) compared to the control group ($M = 55.96$, $SD = 2.33$). The pooled mean and standard deviations for the Test of Economic Literacy, Form A posttest were $M = 60.27$ ($SD = 19.57$).

Table 3 lists the descriptive statistics for the CCS survey disaggregated by group. Unadjusted means are presented, unless otherwise stated. Survey scores were greater for the control group ($M = 49.18$, $SD = 9.35$) compared to the experimental group ($M = 47.76$, $SD = 11.08$). The pooled means and standard deviations for the CCS were $M = 48.62$ ($SD = 10.03$). The 10 questions on the CCS sub-test that measure sense of connectedness were analyzed. Scores were greater for the control group ($M = 24.20$, $SD = 5.49$) compared to the experimental group ($M = 20.94$, $SD = 4.83$). The pooled means and standard deviations for the CCS sub-test measuring sense of connectedness were $M = 22.90$ ($SD = 5.45$). The 10 questions on the CCS

that measure sense of learning were analyzed. Scores were much greater for the experimental group ($M = 43.88$, $SD = 6.74$) compared to the control group ($M = 24.98$, $SD = 4.96$). The pooled means and standard deviations were $M = 32.49$ ($SD = 10.91$).

Table 3

Descriptive Statistics for Classroom Community Scale (N = 83)

| Variable | Experimental (n = 33) | | Control (n = 50) | |
|---------------------------------|-----------------------|-----------|------------------|-----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Classroom Community Scale | 47.76 | 11.08 | 49.18 | 9.35 |
| Sense of Connectedness Subscale | 20.94 | 4.83 | 24.20 | 5.49 |
| Sense of Learning Subscale | 43.88 | 6.74 | 24.98 | 4.96 |

Results

mnNull Hypothesis One

H₀1: There is no statistically significant difference between the mean *academic achievement* scores of high school students enrolled in an economics course who receive instructional text messages and those who do not receive instructional text messages as measured by the Test of Economic Literacy, Fourth Edition while controlling for pretest scores.

Data screening was conducted on both the pretest and posttest for the experimental group and control group. Histograms were used to check for normality of distribution of the Test of Economic Literacy pretest (see Figure 1) and Test of Economic Literacy posttest (see Figure 2). Box-and-whiskers plots were used to test for extreme outliers of the Test of Economic Literacy pretest (see Figure 3) and Test of Economic Literacy posttest (see Figure 4). No outliers were found.

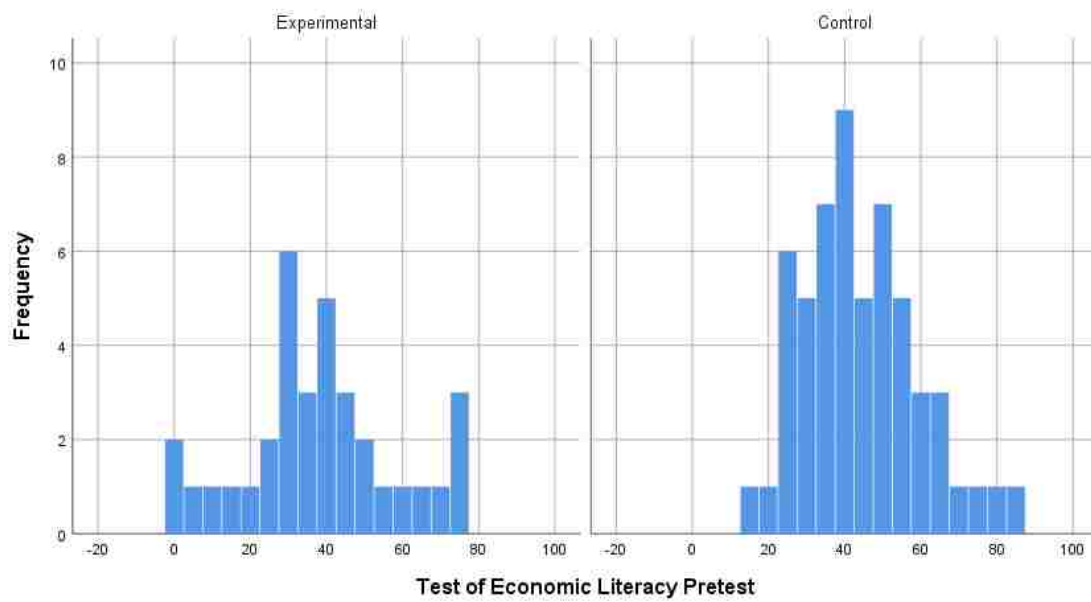


Figure 1. Histogram of Test of Economic Literacy pretest scores.

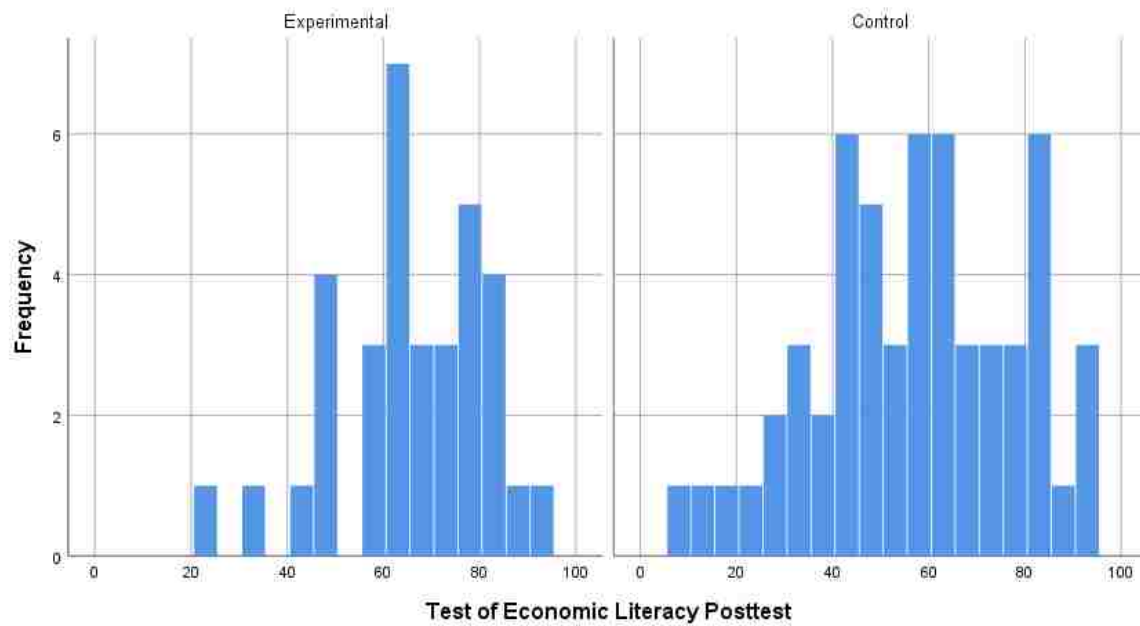


Figure 2. Histogram of Test of Economic Literacy posttest scores.

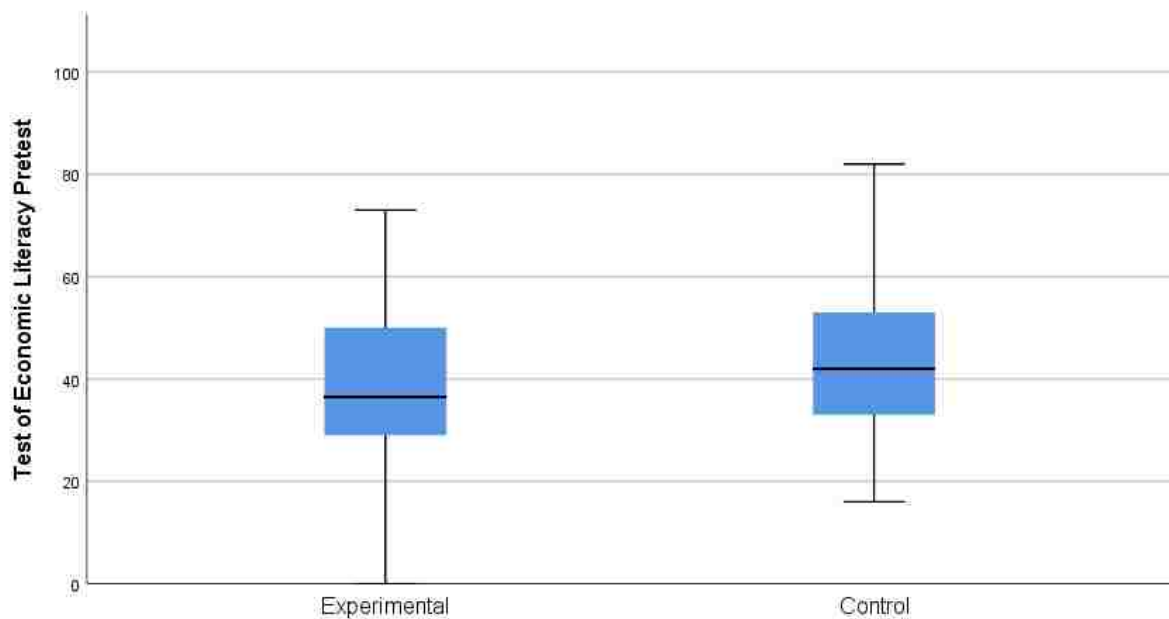


Figure 3. Box-and-whiskers plot of Test of Economic Literacy pretest scores.

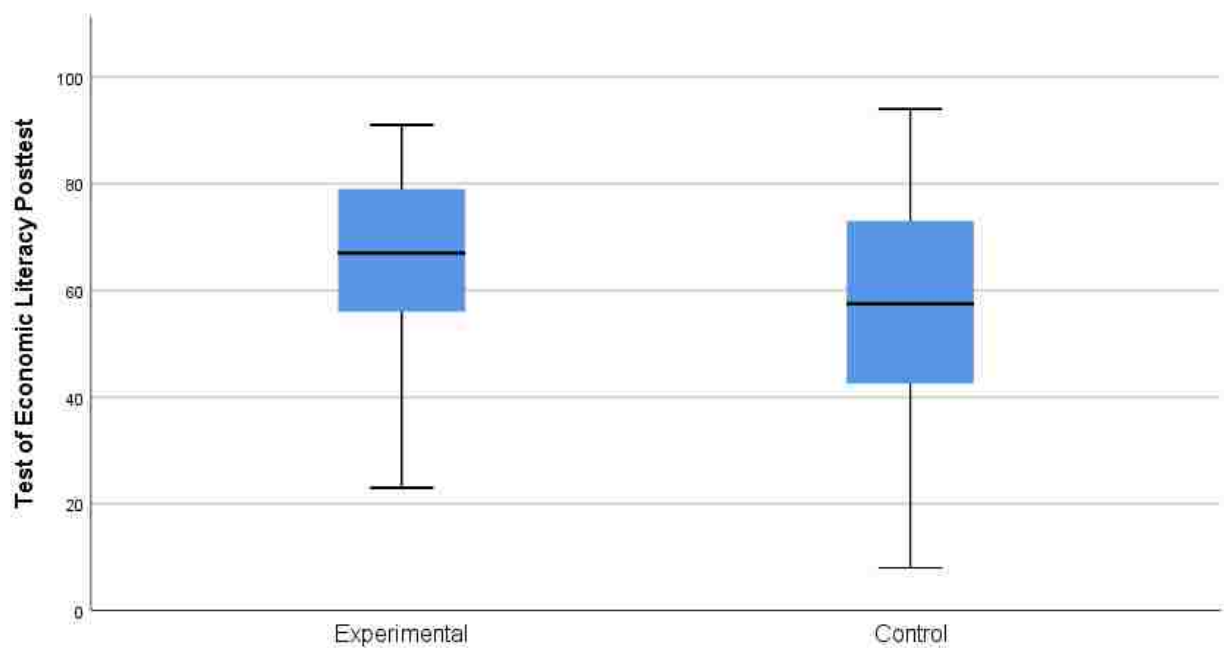


Figure 4. Box-and-whiskers plot of Test of Economic Literacy posttest scores.

A one-way ANCOVA was run to determine if there was a difference in academic achievement as measured by the Test of Economic Literacy posttest between an experimental group of high school students ($N = 34$) that received instructional text messages, which included visuals and text, with a control group of high school students ($N = 56$) that did not receive the instructional text messages after controlling with the Test of Economic Literacy pretest. An ANCOVA requires that the assumptions of linearity, normality, bivariate normal distribution, homogeneity of slopes, and the homogeneity of variance are met.

Visual inspection of a scatterplot (see Figure 5) met the assumption that there was a linear relationship between Test of Economic Literacy pretest and posttest scores for each group. Table 4 shows that the standardized residuals for the interventions and for the overall model were normally distributed, as assessed by Kolmogorov-Smirnov test ($p > .05$). Figure 6 shows bivariate normality for the distribution of the standardized residuals for the Test of Economic Literacy Posttest. Table 5 shows that there was homogeneity of regression slopes as the interaction term was not statistically significant $F(1,86) = 1.345, p = .249$. There was homogeneity of variances, as assessed by visual inspection of scatterplots between pretest and posttest variables for each group (see Figure 7). Further, Levene's test for equality of error variance ($p = .13$) confirmed homogeneity of variances (see Table 6).

Table 4

Results of Kolmogorov-Smirnov Test

| | | Statistic | df | Sig. |
|------------------------|--------------|-----------|----|------|
| Standardized Residuals | Experimental | .101 | 34 | .200 |
| | Control | .075 | 56 | .200 |

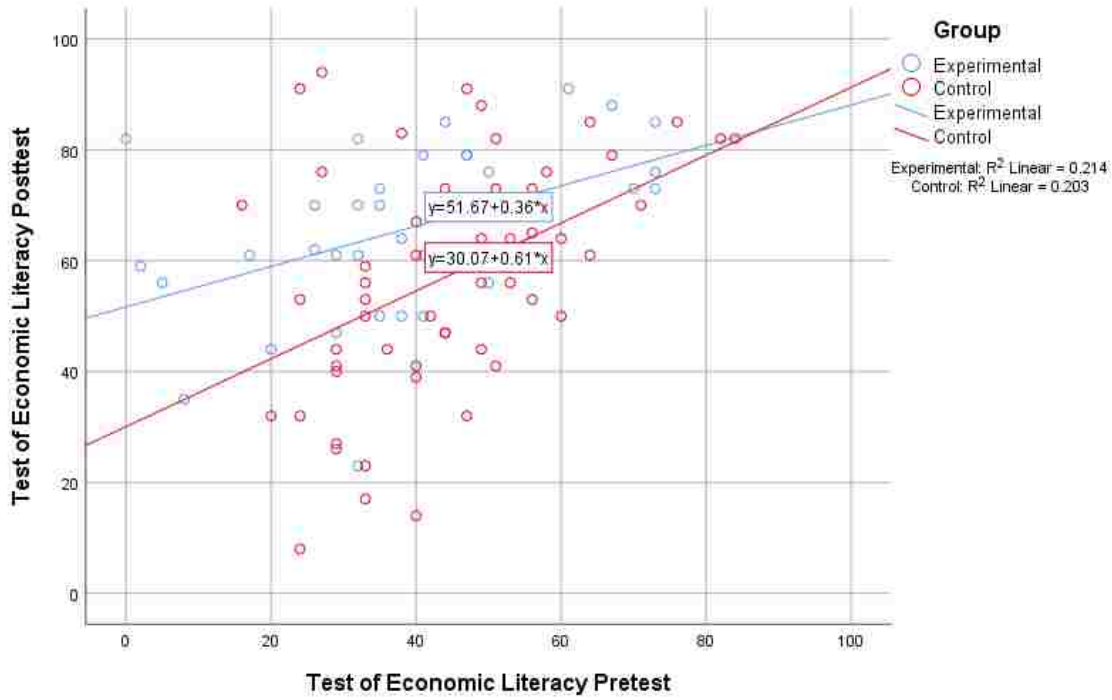


Figure 5. Scatterplot of Test of Economic Literacy pretest and posttest scores.

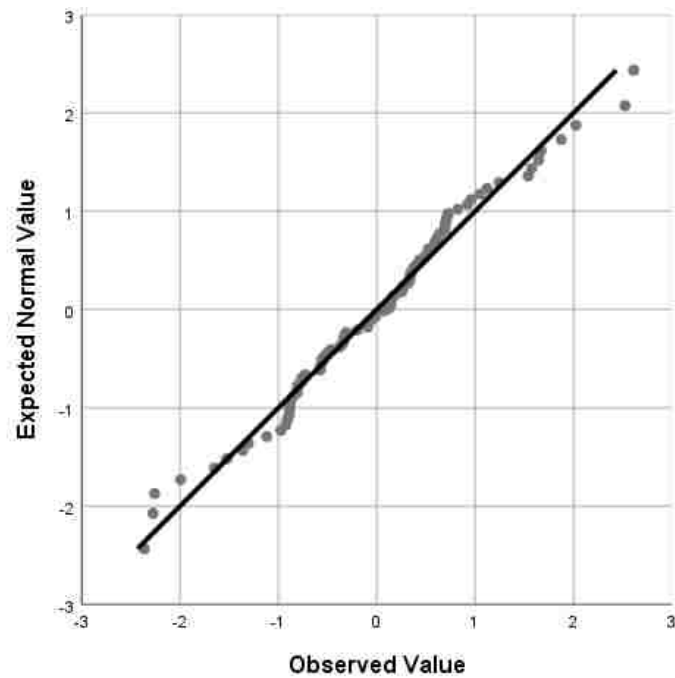


Figure 6. Normal Q-Q Plot of TEL posttest standardized residuals.

Table 5

Results of Test of Between-Subjects Effects

| | Type III Sum of Squares | Df | Mean Square | F | Sig. |
|-------------|-------------------------|----|-------------|-------|------|
| Group * Pre | 403.834 | 1 | 403.834 | 1.345 | .200 |
| Error | 25815.837 | 86 | | | |

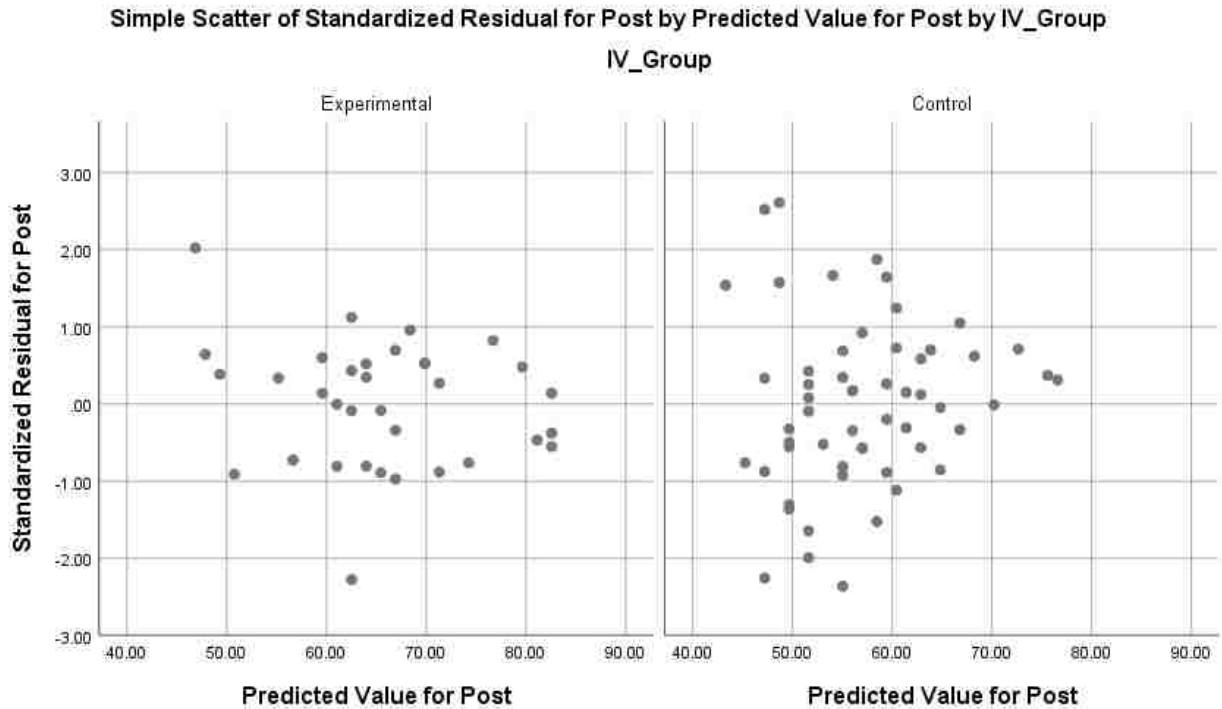
*Figure 7.* Scatterplots between pretest and posttest variables.

Table 6

Levene's Test for Equality of Variances Results

| | F | df1 | df2 | Sig. |
|----------|-------|-----|-----|------|
| Posttest | 2.276 | 1 | 88 | .135 |

There were no outliers in the data, as assessed by no cases with standardized residuals greater than ± 3 standard deviations. After adjustment for Test of Economics Literacy pretest scores, there was a statistically significant difference in Test of Economic Literacy posttest scores between the groups, $F(1, 87) = 8.890, p = .004, \text{partial } \eta^2 = .093$ (see Table 7).

Table 7

Results of ANCOVA Analysis

| Source | Type III Sum of Squares | Df | Mean Square | F | Sig. | Partial Eta Squared |
|-----------------|-------------------------|----|-------------|--------|------|---------------------|
| Corrected Model | 7875.929 ^a | 2 | 3937.964 | 13.067 | .000 | .231 |
| Intercept | 22197.179 | 1 | 22197.179 | 73.653 | .000 | .458 |
| Pretest | 6294.093 | 1 | 6294.093 | 20.885 | .000 | .194 |
| Group | 2679.286 | 1 | 2679.286 | 8.890 | .004 | .093 |
| Error | 26219.671 | 87 | 301.376 | | | |
| Total | 360982.000 | 90 | | | | |
| Corrected Total | 34095.600 | 89 | | | | |

Note. R Squared = .231 (Adjusted R Squared = .231)

In order to minimize the possibility of committing a Type I error, a Bonferroni post hoc analysis was performed. A Type I error occurs when the null hypothesis is rejected when it is actually true (Gall et al., 2007). The Bonferroni post hoc analysis divides the alpha level by the number of tests being run. In this study, the alpha level was .05 and there was one test, meaning that a p -value of .05 was needed to show a statistically significant difference (Warner, 2013). Academic achievement was statistically significantly greater in the experimental group ($M = 67.36$) compared to the control group ($M = 55.96$), a mean difference of 11.396 (CI, 3.799 to 18.992) $p = .004$. Because there was a statistically significant difference between the groups' posttest scores ($p = .004$), this researcher rejected the null hypothesis.

Null Hypothesis Two

H₀2: There is no statistically significant difference between the mean *sense of connectedness* scores of high school students enrolled in an Economics course who receive instructional text messages and those who do not receive instructional text messages as measured by the Classroom Community Scale.

An independent samples t-test was run to determine if there was a difference in sense of connectedness as measured by the CCS between an experimental group ($N = 33$) and a control group ($N = 50$). Data screening was conducted on the CCS. A box-and-whiskers plot was used to test for extreme outliers of the CCS responses. Figure 8 shows that there were no outliers in the data, as assessed by inspection of the box-and-whiskers plot. Table 8 shows that the CCS scores for each level of group were normally distributed, as assessed by Shapiro-Wilk's test ($p > .05$).

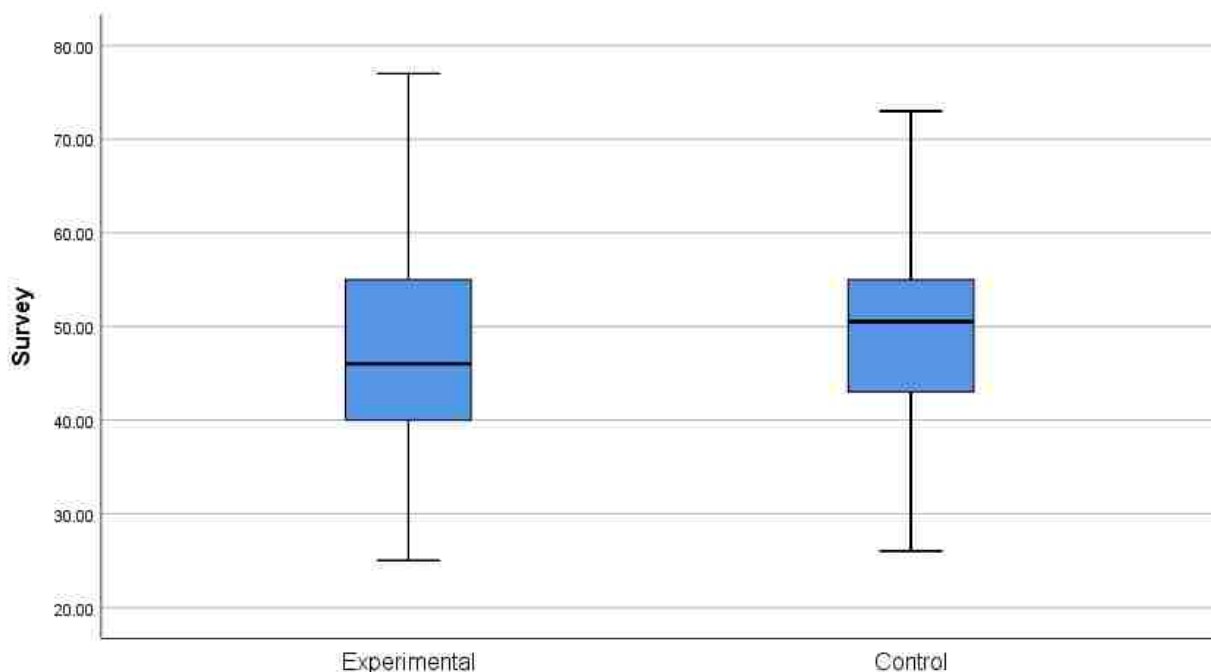


Figure 8. Box and Whiskers Plot of Classroom Community Survey Responses

Table 8

Results of Shapiro-Wilk's Test for Classroom Community Scale

| | | Statistic | Df | Sig. |
|---------------------------|--------------|-----------|----|------|
| Classroom Community Scale | Experimental | .981 | 33 | .806 |
| | Control | .977 | 50 | .434 |

Table 9 shows that there was homogeneity of variances, as assessed by Levene's test for equality of variances ($p = .295$). There was no statistically significant difference in sense of connectedness between the experimental and control group, $t(81) = -.630$, $p = .530$, $d = .14$ (see Table 10). The effect size for this analysis ($d = .14$) was found to be below Cohen's (1988) convention for a small effect size ($d = .20$).

Table 9

Levene's Test for Equality of Variance Results for Classroom Community Scale

| | F | Sig. |
|--|-------|------|
| TEL Posttest Equal Variances Assumed | 1.113 | .295 |
| TEL Posttest Equal Variances Not Assumed | | |

Table 10

T-Test for Equality of Means for Classroom Community Scale

| Equal Variances Assumed | t | Df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
|-------------------------|-------|----|-----------------|-----------------|-----------------------|---|---------|
| | | | | | | Lower | Upper |
| Yes | -.630 | 81 | .530 | -1.42242 | 2.25793 | -5.91501 | 3.07016 |
| No | -.608 | | | | | | |

An independent samples t-test was run to determine if there was a difference in sense of connectedness as measured by the CCS subscale for sense of connectedness between an experimental group ($N = 33$) and a control group ($N = 50$). There were no outliers in the data, as assessed by inspection of a boxplot (see Figure 9). Table 11 shows that the CCS scores for each level of group were normally distributed, as assessed by Shapiro-Wilk's test ($p > .05$), and Table 12 shows that there was homogeneity of variances, as assessed by Levene's test for equality of variances ($p = .151$).

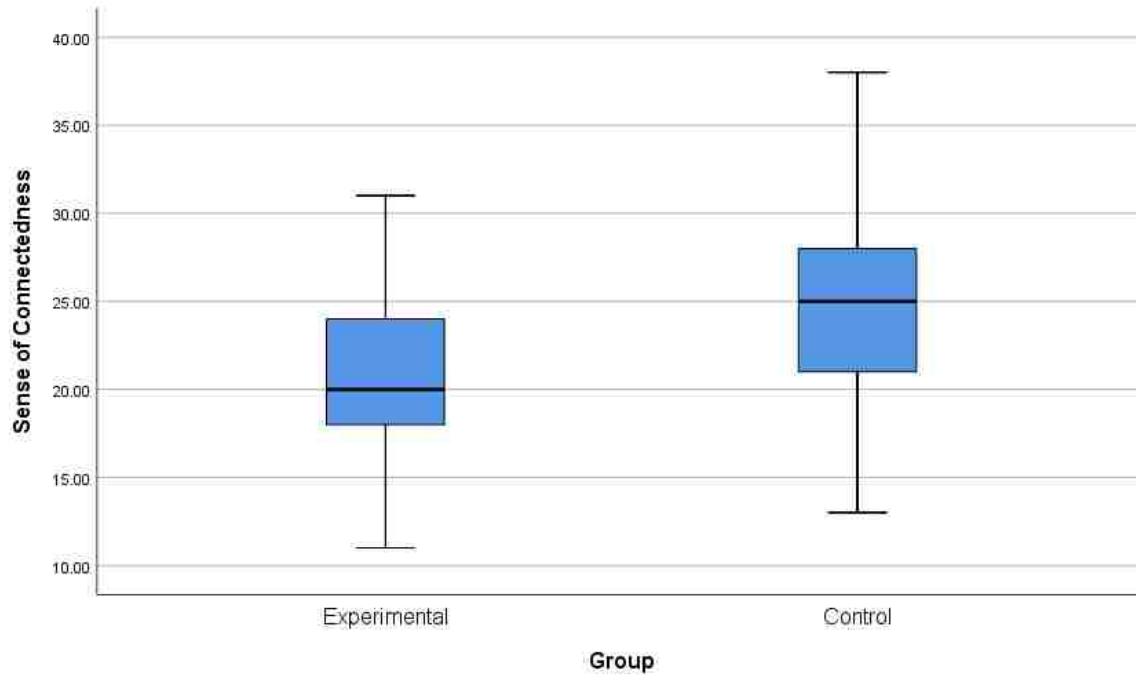


Figure 9. Box-and-Whiskers plot of CCS Connectedness subscale.

Table 11

Results of Shapiro-Wilk's Test for CCS Connectedness Subscale

| | | Statistic | df | Sig. |
|---------------------------|--------------|-----------|----|------|
| Classroom Community Scale | Experimental | .981 | 33 | .806 |
| | Control | .977 | 50 | .434 |

Table 12

Levene's Test for Equality of Variances for CCS Connectedness Subscale

| | F | Sig. |
|--|-------|------|
| TEL Posttest Equal Variances Assumed | 2.104 | .151 |
| TEL Posttest Equal Variances Not Assumed | | |

There was a statistically significant difference in sense of connectedness between the experimental and control group: $t(81) = 2.899$, $p = .005$, $d = .662$ (see Table 13). The effect size for this analysis ($d = .662$) was found to be medium using Cohen's (1988) convention for a medium effect size ($d = .50$). Sense of connectedness was statistically significantly greater in the control group ($M = 24.20$) compared to the experimental group ($M = 20.94$), a mean difference of 3.26 (CI, 5.65 to 1.05) $p = .005$. Because there was a statistically significant difference between the groups' sense of connectedness subscale scores ($p = .005$), the researcher rejected the null hypothesis.

Table 13

T-Test for Equality of Means for CCS Connectedness Subscale

| Equal Variances Assumed | t | Df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
|-------------------------|--------|--------|-----------------|-----------------|-----------------------|---|----------|
| | | | | | | Lower | Upper |
| Yes | -2.899 | 81 | .005 | -3.35152 | 1.15611 | -5.65182 | -1.05121 |
| No | -3.005 | 76.304 | .004 | -3.35152 | 1.11531 | -5.57270 | -1.13033 |

CHAPTER FIVE: CONCLUSIONS

Overview

This chapter reviews the purpose of the study, the implications for future research, the limitations inherent within the design, and recommendations for future research.

Discussion

The purpose of this quasi-experimental study was to determine if sending instructional text messages that used imagery and text to high school students would have an effect on their academic achievement in an economics course as measured by the TEL and on their sense of connectedness with the school as measured by the CCS. The independent variable for this study was instructional text messaging and the dependent variables were academic achievement and sense of connectedness. Participants were high school students aged 17 through 19 taking a mandatory economics class. There was one experimental group and one control group. No gifted, special education, or English language learner students were included in the study. All students attended a suburban high school located in north Georgia. This study is relevant considering the ubiquity of text messaging and the acceptance of text messaging as a valid form of communication by young people today. The goal of this study was to understand if text messaging is a useful learning tool.

The findings from this study showed a statistically significant difference in academic achievement with participants in the experimental group that received instructional text messages scoring higher on the TEL-Form A posttest than students in the control group that did not receive the text messages. Other findings showed a statistically significant difference in sense of connectedness with the control group scoring slightly higher on their mean scores, meaning that

sending instructional text messages to students does not increase their sense of connectedness to the school.

RQ1: Does a difference exist between the mean *academic achievement* scores of high school students who receive instructional text messages and those who do not receive instructional text messages as measured by the Test of Economic Literacy, Fourth Edition while controlling for pretest scores?

H₀1: There is no statistically significant difference between the mean *academic achievement* scores of high school students enrolled in an Economics course who receive instructional text messages and those who do not receive instructional text messages as measured by the Test of Economic Literacy, Fourth Edition while controlling for pretest scores.

A one-way ANCOVA was run to determine if there was a difference in academic achievement as measured by the TEL posttest between an experimental group of high school students that received instructional text messages which included visuals and text with a control group of high school students that did not receive the instructional text messages after controlling with the TEL pretest. After adjustment for TEL pretest scores, academic achievement was found to be statistically significantly greater in the experimental group compared to the control group. Because there was a statistically significant difference between the groups posttest scores ($p = .004$), the null hypothesis was rejected.

According to Embi and Nordin (2013), mobile devices and text messaging are rewriting educational pedagogy while Abas, Lim, and Woo (2009) emphasized that texting is the most widely accepted and useful application on mobile devices. Wang and Shen (2012) explained how this combination accelerates learning while Yang (2013) and Lepp et al. (2014) described their usefulness as vehicles of communication with students, ubiquitous learning, instant feedback,

access to instructional games, and student collaboration. Additionally, Ciampa (2013) maintained that today's learners associate mobile devices with increased independence, self-direction, motivation, and self-esteem, and Yang (2013) said that students perceive their interactions with mobile devices as positive experiences.

Skierkowski and Wood (2012) noticed that text messaging is the primary method of communication for teenagers today and a large contributing factor in society today. However, Yang (2013) noted that text messages that involve learning should be constrained between 30 seconds and ten minutes due to the limited attention span of young people today (Hu, 2013). Despite these time constraints, a positive correlation between anxiety and restricted text messaging exists (Lepp et al., 2014; Skierkowski & Wood, 2012). Thus, anxiety tends to increase when students are prohibited from interacting with their mobile devices. They concluded that this age group relies on texting behavior to maintain relationships and that texting is fundamental to their self-concept.

Studies involving the use of mobile devices and achievement have had mixed results. Beland and Murphy (2015) found that achievement increased on standardized tests when students were banned from bringing their mobile devices to school. Moreover, the greatest increase in scores came from the lowest achieving students. Other studies indicated that:

- using instructional technology did not enhance student academic achievement (Davis, 2012);
- little difference in vocabulary acquisition between vocabulary presented with a mobile device and presented with text-only or text-with-picture formats (Kim & Kim, 2012);

- students with access to mobile devices tended to use a variety of instructional applications that resulted in increased reading and writing skills (Caverly, 2013);
- students with access to iPads scored significantly higher on the Ohio Graduation Test in reading and writing than students without access (Harmon, 2012);
- student use of iPads resulted in more math problems being solved correctly in less time than those using traditional worksheets (Haydon et al., 2012); and,
- students who completed vocabulary exercises on mobile devices on their own time outperformed students who completed the same exercises in class using pen and paper. (Suwantarathip & Orawiwatnakul, 2015).

Results of studies that involved text messaging and achievement have shown that the two are positively correlated. Studies that support incorporating text messaging into educational pedagogy indicated that:

- Students who were taught vocabulary using text messages instead of a dictionary performed better in long-term vocabulary retention (Alemi et al., 2012);
- high school students who received course-related text messages found them to be helpful and increased their sense of course interaction (Faure & Orthober, 2011);
- text messaging that contained information about assignments and content significantly contributed to the students' learning and that the students felt that there were more advantages than disadvantages to using text messaging as an instructional tool (Gasaymeh & Aldalalah, 2013);
- a positive relationship existed between using Twitter for reinforcement of course content and academic performance on tests (Van Vooren & Bess, 2013); and,

- students benefited when teachers sent text messages that dealt with content covered in class because the text messages provided opportunities for more in depth understanding of the topic (McKnight et al., 2016).

This study indicated that the use of mobile devices to access text messages that contained instructional concepts taught in a high school economics course did increase academic achievement as measured on the TEL, Form A. While investigating the effects of text messaging on academic achievement is in its infancy, this study contributes to the literature by concluding that sending text messages did increase academic achievement. Despite affirming the connection between text messaging and increased academic achievement, the field of education has barely scratched the surface into researching text messaging. Because smartphone technology and text messaging are recent phenomena, it could be argued that it is the novelty of text messaging alone that has led to increases in academic achievement and sense of connectedness. It is, therefore, critical that research into this area of inquiry be performed to determine how sending instructional text messages affects academic achievement and sense of connectedness.

Theories supporting research question one were cognitive load theory, multimedia message design theory, activity theory, and behaviorist theory. Cognitive load theory states that the high cognitive demand on the brain impedes learning, making it essential that instructional lessons be spaced out over time, or presented in chunks (Swezzler, 1994). In this study, students in the experimental group received four text messages per week for eight weeks that reinforced economic concepts taught during class. These text messages were sent in the evenings on Mondays, Tuesdays, Thursdays, and Sundays. This theory is also backed by Hu (2013) who reiterated that vocabulary is best learned when instruction occurs over time and that sending text messages spaced out over time would considerably enhance learning. Multimedia message

design theory was designed by Mayer (2003) to overcome cognitive load theory. It suggested that in order to understand a larger concept, smaller elements of text, images, signs, and symbols should be used as building blocks to organize information to fit cognitive functioning. In this study, the experimental group received text messages that included text and images. Activity theory states that it is through interaction of external tools, such as a mobile device, learners can become transformed internally. In this study, students in an experimental group interacted with their mobile devices to read text messages that reinforced economic concepts that had been taught during class time. Behaviorist theory involves responding to a stimulus. In this study, the experimental group responded to text messages notifications sent to their mobile device by reading the text messages.

This study supports the theories of cognitive load theory, multimedia message design theory, activity theory, and behaviorist theory. This study also supports studies that found text messaging to positively influence academic achievement and learning. This study supports the theories and studies because the scores of experimental group who received text messages were higher than the control who did not receive text messages. Further, the ANCOVA, which was run to test the null hypothesis that no difference existed between the groups, did indeed show a statistically significant difference between the groups' scores.

RQ2: Does a difference exist between the mean *sense of connectedness* scores of high school students who receive instructional text messages and those who do not receive instructional text messages as measured by the Classroom Community Scale?

H₀2: There is no statistically significant difference between the mean *sense of connectedness* scores of high school students enrolled in an Economics course who receive

instructional text messages and those who do not receive instructional text messages as measured by the Classroom Community Scale.

Two independent samples t-tests were run to determine if there was a difference in sense of connectedness as measured by the CCS between an experimental group of high school students that received instructional text messages, which included visuals and text, with a control group of high school students that did not receive the instructional text messages. This study found a statistically significant difference in sense of connectedness between the experimental and control group as measured by the CCS scores ($p = .005$). Thus, the null hypothesis was rejected.

Rovai (2002) defined a sense of connectedness as the “spirit, trust, interaction, and commonality of expectations and goals” that occur within a classroom, among students, and between teacher and student (p. 198). Learning environments that promote interaction and communication among participants and with the teacher are critical in nurturing sense of connectedness. Many studies have shown that students who feel connected to their school usually: (a) earn better grades, (b) score better on assessments, (c) have low absenteeism, and, (d) further their education after high school (Centers for Disease Control, n.d.b.). Smilyanski et al. (2012) found a negative correlation between sense of connectedness and distance learning, suggesting that online learning decreases a sense of connectedness. Another study found just the opposite. Sadera et al. (2009) discovered that the more effort students put forth into learning course materials and interacting with others in a course, the higher their sense of connectedness.

Studies concerned specifically with mobile device, text messaging, and sense of connectedness found: (a) students who received text messages from teachers felt more motivated to learn, learning increased, and they felt more accepted and appreciated (Rahamat et al., 2013);

and (b) availability and easy to use technology increased student motivation and performance (Chen & Lin, 2016). While both of these studies purport that text messaging and mobile devices increase a student's sense of connectedness, this study found there was no difference in sense of connectedness between students in an experimental group who received text messages and students in a control group that did not receive text messages. However, unexpectedly, this study did show that sense of learning was much greater in the experimental group than in the control group. This research looked at sense of connectedness, but future research needs to be done regarding the relationship and effects of text messaging on sense of learning.

Theories supporting research question two were hierarchy of needs (Maslow, 1943) and ecology of human development (Bronfenbrenner, 1977). Maslow postulated that the five human needs are ordered by level of importance, relate to each other, and can be arranged in a hierarchy. The five human needs are physiological, safety, love and belonging, esteem, and self-actualization. Physiological and safety needs refer to the basic survival needs for food, clothing, and shelter. If these needs are not in place, student anxiety will be high and their ability to learn will be impeded. Love, belonging, and esteem are psychological needs and refer to relationships and personal accomplishments. It is predominantly within the school system that students establish relationships and achieve success. Bronfenbrenner (1977) maintained that environment contributes to student development and learning which is determined by immediate and distant systems. School is an immediate system that can influence a student tremendously. Text messaging has become integral to society and is an accepted and desirable form of communication for young people today.

This study examined if a difference in sense of connectedness existed between an experimental group of high school students who received text messages and a control group of

high school students who did not receive text messages. This study found a statistically significant difference between the two groups. However, because the control group scored higher on the CCS subscale for sense of connectedness, this researcher concluded that sending text messages did not contribute to sense of connectedness for the experimental group.

Implications

The purpose of this study was to determine if differences existed in academic achievement and sense of connectedness between an experimental group of students who received text messages that contained text and images about economic concepts that were being taught in a mandatory high school economics course and a control group of students who did not receive the text messages. This study used the TEL, Form A to assess academic achievement and the CCS to assess sense of connectedness. In regard to academic achievement, this study found a statistically significant difference between the experimental group and the control group and concluded that sending text messages with text and images that reinforced concepts taught in class and that were sent spaced out over time did increase academic achievement. In regard to sense of connectedness, this study found a statistically significant difference between the experimental group and the control group but concluded that sense of connectedness was not increased by sending text messages to students because the control group that did not receive the text messages scored higher on the CCS subscale that measures sense of connectedness. However, text messaging did appear to show a difference in sense of learning which is also measured by the CCS but was not within the realm of this study.

Limitations

This study was limited to high school students aged 17-19 enrolled in a mandatory high school economics course. Further, the study evaluated only general on level students and

excluded students in the gifted program, students in the special education program, and students in the English as a Second Language program. While the researcher paid careful attention to data entry, there is always the possibility that some data was entered incorrectly. Another limitation is that some students may have had prior knowledge of economics due to previous attempts at passing the course or from personal study of the material. Furthermore, the students and teachers involved in the study may have previously established a relationship that would affect this study. Teacher limitations include the fact that there were two teachers involved, each with different personalities and demeanors, as well as different ways of delivering educational content and utilization of instructional and assessment strategies. Assessment limitations include: (a) the fact that there was a pretest, which could have influenced the outcome on the posttest; and, (b) statistical regression could have occurred where extreme scores tend to migrate to the mean score on the posttest. A final limitation is the novelty effect, whereby the experimental group may have performed better than they would have on the TEL posttest because they felt that they had been given a special advantage by receiving the text messages.

Recommendations for Future Research

With all research, there is room for improvement. Because this research was limited in its scope and because a need for further research in the field of education concerning text messaging exists, this researcher has come up with the following recommendations for future research. Recommendations for future research that involves text message effects on academic achievement and sense of connectedness include:

- (1) Replicating this study in other regions of the United States;
- (2) Replicating this study for students in the gifted program, the special education program, and the English to speakers of other languages program;

- (3) Extending this study where text messages are sent over a longer period of time or for the entirety of the course;
- (4) Replicating this study in other languages and in foreign countries;
- (5) Conducting a similar study in middle and elementary schools;
- (6) Conducting a similar study using text messages with another academic subject matter;
- (7) Conducting a similar study using different assessments to measure academic achievement and sense of connectedness;
- (8) Conducting a similar study that looks for differences in sense of learning;
- (9) Conducting a similar study that required students to respond to the text messages;
- (10) Conducting a similar study that looked at the frequency of text messages sent per week;
and
- (11) Conducting a similar study that looked at the time of day the text messages were sent.

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APPENDIX A: Institutional Review Board Approval to Conduct Research**LIBERTY UNIVERSITY.**
INSTITUTIONAL REVIEW BOARD

January 2, 2018

Mary Sell

IRB Approval 3071.010218: Employing Text Messaging as an Instructional Tool: Effects on Student Academic Achievement and Sense of Connectedness

Dear Mary Sell,

We are pleased to inform you that your study has been approved by the Liberty University IRB. This approval is extended to you for one year from the date provided above with your protocol number. If data collection proceeds past one year, or if you make changes in the methodology as it pertains to human subjects, you must submit an appropriate update form to the IRB. The forms for these cases were attached to your approval email.

Thank you for your cooperation with the IRB, and we wish you well with your research project.

Sincerely,



Administrative Chair of Institutional Research
The Graduate School

LIBERTY
UNIVERSITY.
Liberty University | Training Champions for Christ since 1971

APPENDIX B: [REDACTED] Approval to Conduct Research

[REDACTED]

November 2, 2017

Mary Sell
[REDACTED]

RE: Research Study Approval: *Instructional Text Messaging: Effects on Student Academic Achievement and Sense of Connectedness*

Dear Ms. Sell:

This letter provides written approval for your above research study. As stated in your letter, participation should be considered voluntary and no students, staff members or schools will be identified in your report of the study. Your study sounds very interesting and I applaud your efforts of continued education. If I can provide additional information to support this approval, please be encouraged to contact me.

Sincerely,

[REDACTED]
Superintendent

APPENDIX C: Request to Use Test of Economic Literacy, Fourth Edition

October 8, 2017

Permissions Editor
Council for Economic Education
122 East 42nd Street, Suite 2600
New York, NY 10168

Dear Sir/Madam:

I am a doctoral student from Liberty University writing my dissertation titled *Instructional Text Messaging: Effects on Student Academic Achievement and Sense of Connectedness* under the direction of [REDACTED] who can be reached at [REDACTED] or by phone at [REDACTED]

I would like to use the Test of Economic Literacy, Fourth Edition instrument in my research study. I would to use your survey under the following conditions:

- I will only use the instrument for my research and will not sell or use it with any compensated or curriculum development activities.
- I will include the copyright statement on all copies of the instrument.
- I will send a copy of my completed research study to your attention upon completion of the study.

If these are acceptable terms and conditions, please indicate so by replying to me through email at msell4@liberty.edu.

Respectfully Yours,

Mary E. Sell
Doctoral Candidate
Liberty University
1971 University Blvd.
Lynchburg, VA 24515

APPENDIX D: Author's Permission to Use Test of Economic Literacy, Fourth Edition

Permission from CEE

Sally Wood <swood@councilforeconed.org>

Reply all|

October 10, 2017, 9:06 AM

Sell, Mary

Action Items

Good morning, Mary,

Via this email I am giving you permission to use the Test of Economic Literacy, Fourth Edition, Form A instrument as per your letter, reproduced below:

Dear Sir/Madam:

I am a doctoral student from Liberty University writing my dissertation titled Instructional Text Messaging: Effects on Student Academic Achievement and Sense of Connectedness under the direction of [REDACTED] who can be reached at [REDACTED] or by phone at [REDACTED]

- I would like to use the Test of Economic Literacy, Fourth Edition, Form A instrument in my research study. I would to use your survey under the following conditions:
- I will only use the instrument for my research and will not sell or use it with any compensated or curriculum development activities.
- I will include the copyright statement on all copies of the instrument.

I will send a copy of my completed research study to your attention upon completion of the study. If these are acceptable terms and conditions, please indicate so by replying to me through email at msell4@liberty.edu.

Please let me know if you have any questions.

Best regards,

Sally

Sally Wood | Chief Operating Officer

Council for Economic Education

122 East 42nd Street, Suite 2600

New York, NY 10168

O: 212.730.1065 M: 917-806-8733

swood@councilforeconed.org

APPENDIX E: Request to Use Classroom Community Scale

October 8, 2017

Dr. Alfred Rovai
Regent University
School of Education
1000 Regent University Drive
Virginia Beach, VA 23464
aprovai@mac.com
alfrov@regent.edu

Dear Dr. Rovai:

I am a doctoral student from Liberty University writing my dissertation titled *Instructional Text Messaging: Effects on Student Academic Achievement and Sense of Connectedness* under the direction of [REDACTED] who can be reached at [REDACTED] or by phone at [REDACTED].

I would like to use the Classroom Community Scale instrument in my research study. I would to print your survey under the following conditions:

- I will only use the instrument for my research and will not sell or use it with any compensated or curriculum development activities.
- I will include the copyright statement on all copies of the instrument.
- I will send a copy of my completed research study to your attention upon completion of the study.

If these are acceptable terms and conditions, please indicate so by replying to me through email at msell4@liberty.edu.

Respectfully Yours,

Mary E. Sell
Doctoral Candidate
Liberty University
1971 University Blvd.
Lynchburg, VA 24515

APPENDIX F: Author's Permission to Use Classroom Community Scale

Fred Rovai <aprovai@mac.com>

Reply all

Today (October 8, 2017), 7:24 PM

Sell, Mary

Good evening,

You may use the Classroom Community Scale for your research as requested.

Best wishes,

Alfred P Rovai, PhD

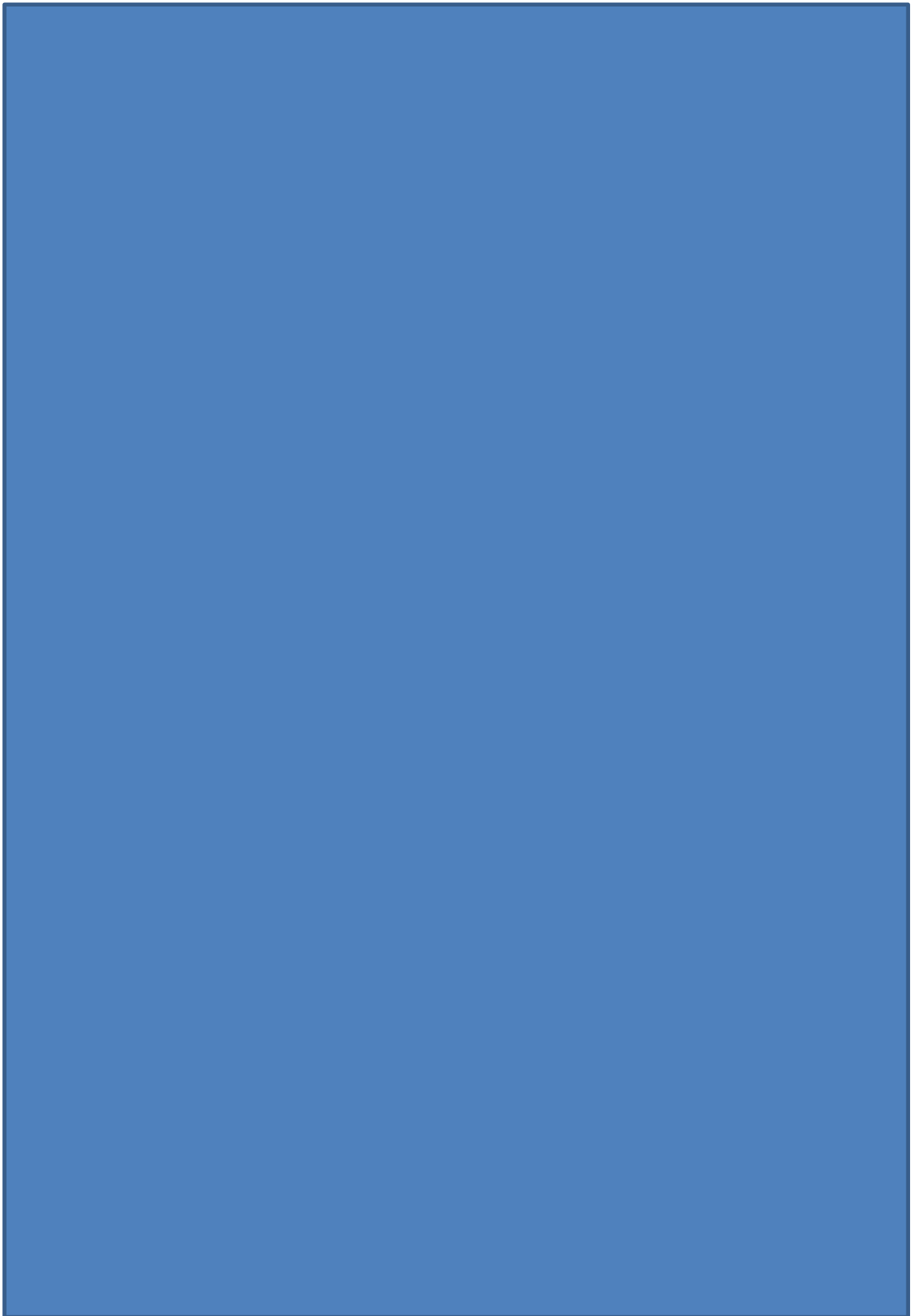
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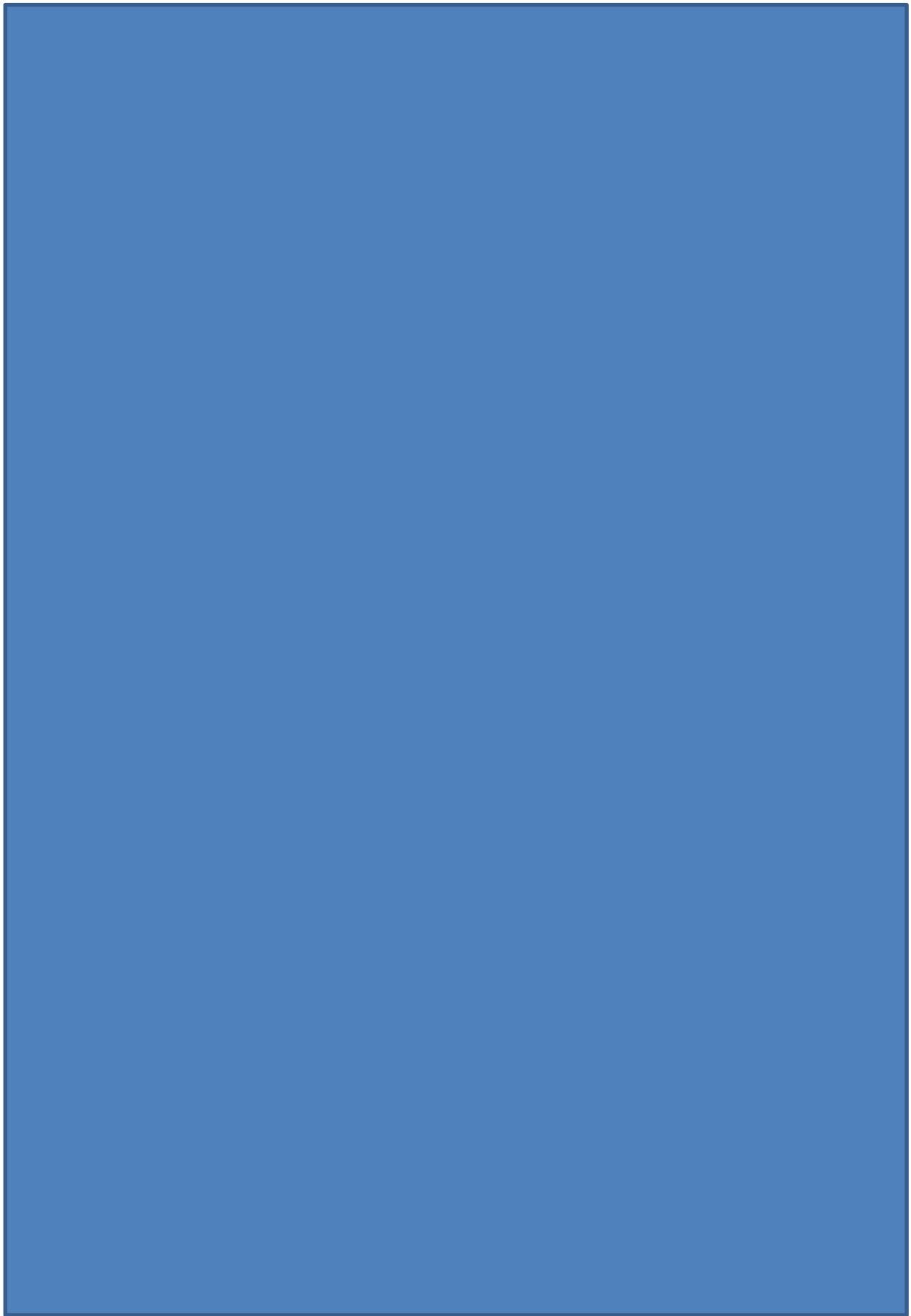
APPENDIX G: Test of Economic Literacy, Fourth Edition, Form A Pretest**Instructions:**

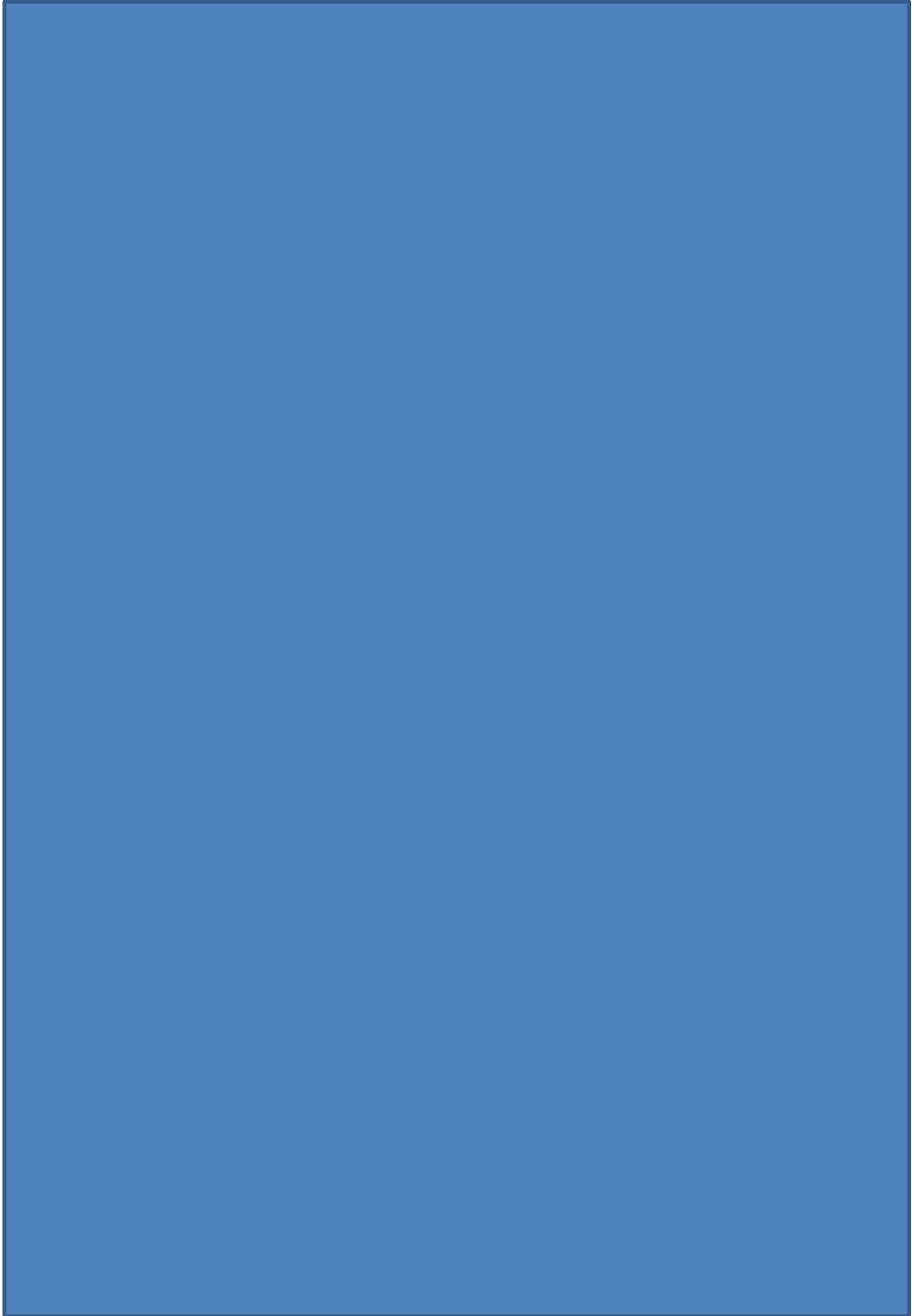
This test is designed to measure how well you understand the principles of economics and the way our economy works.

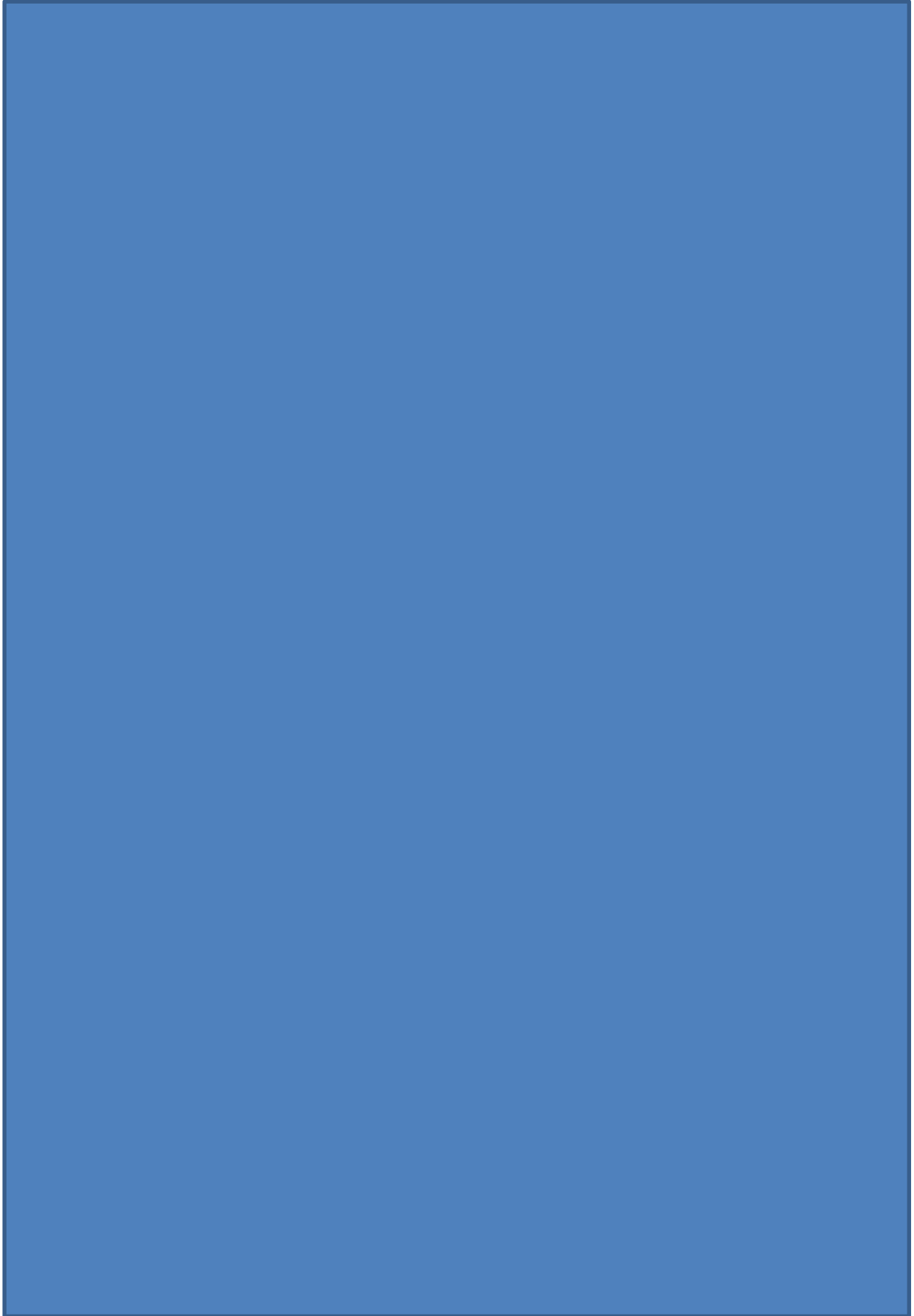
You should try to answer every question by selecting which you think is the best choice. You might not know the answers to some questions, but use the information you do have to eliminate those you think are incorrect and select your best answer. Work at a comfortable speed, but do not spend too much time on any one item. The test consists of 45 questions or incomplete statements, for which you should choose the one best answer. With some items, more than one answer may appear to be correct, but your task is to choose the best answer from the choices given for each item.

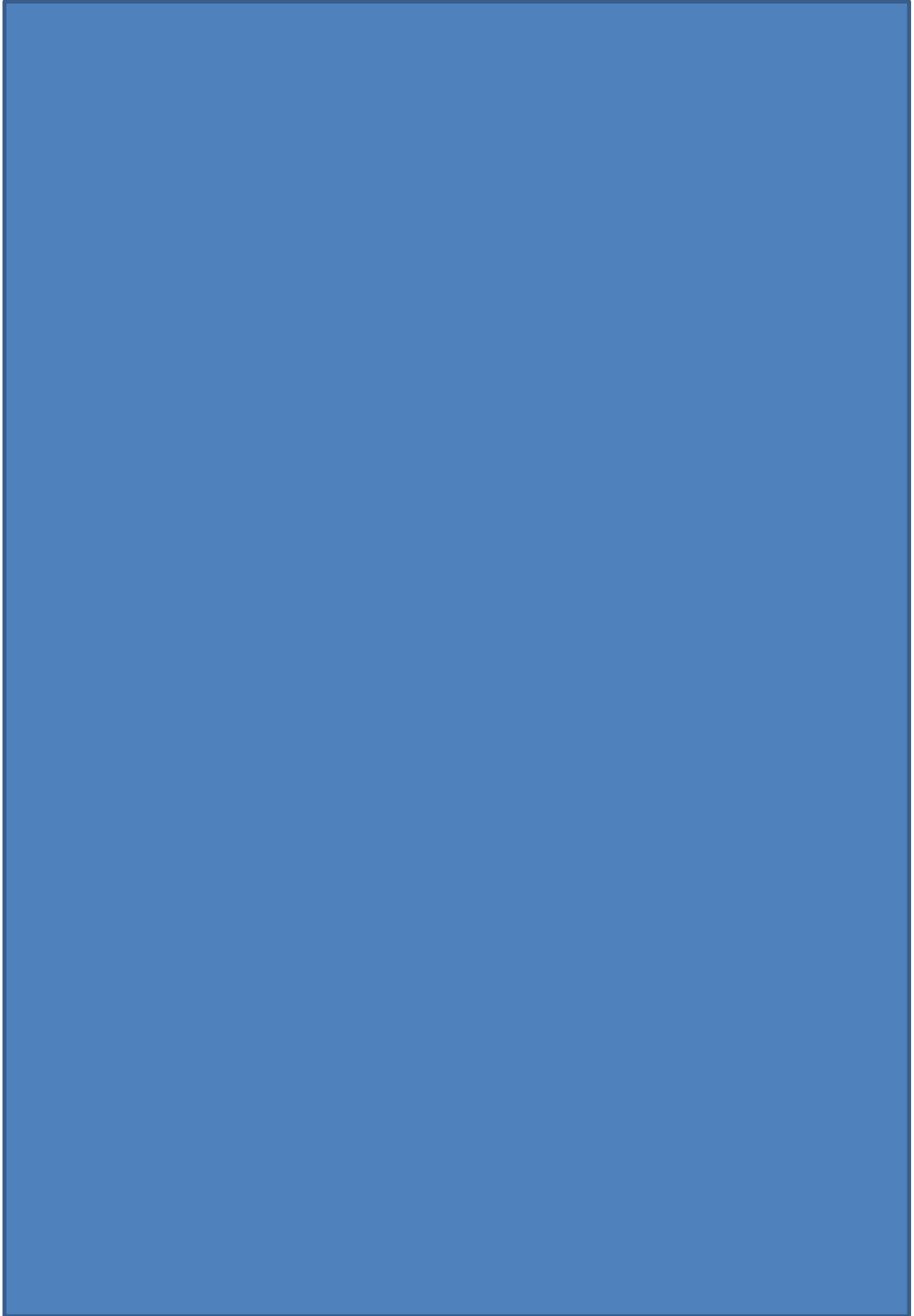


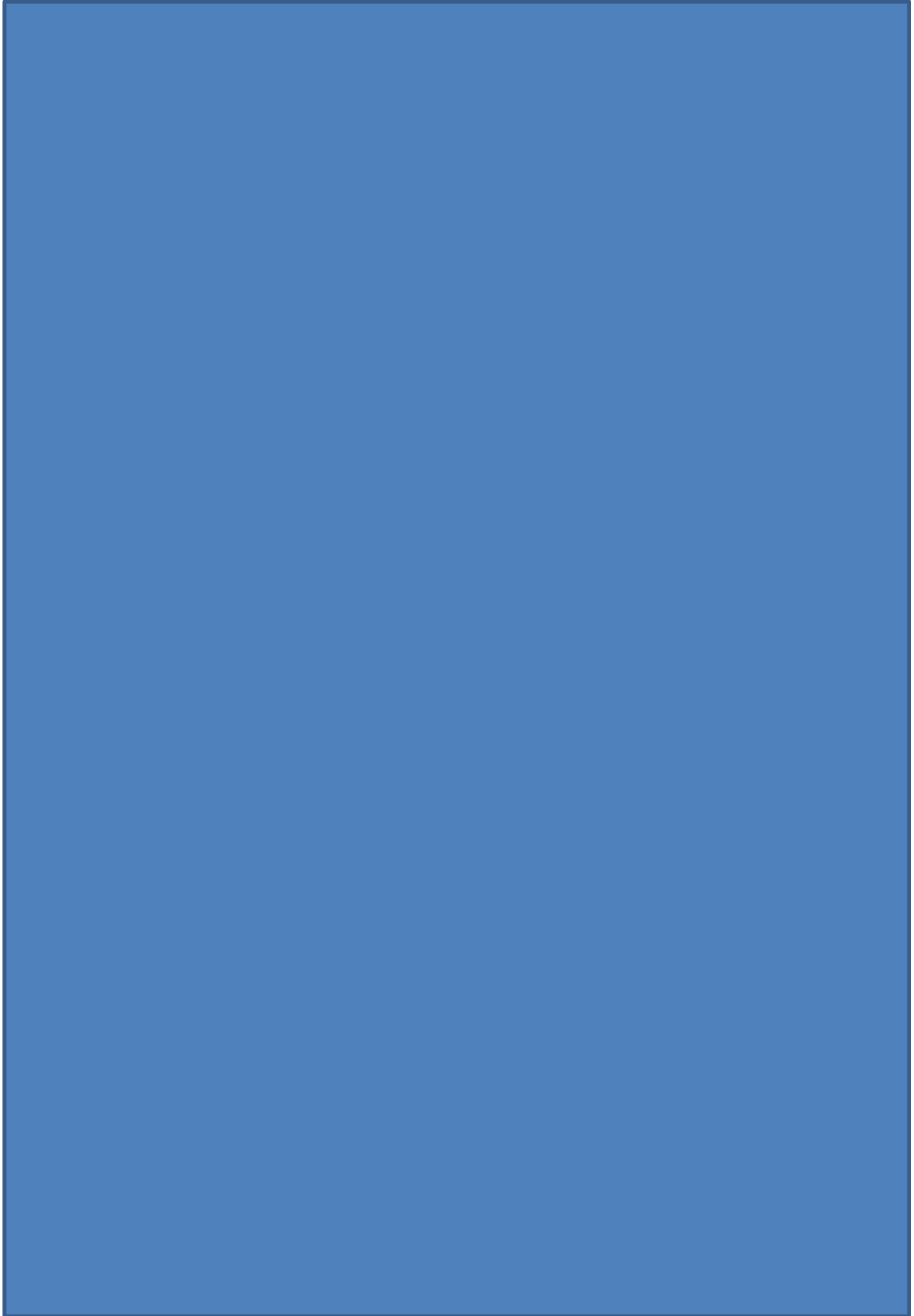


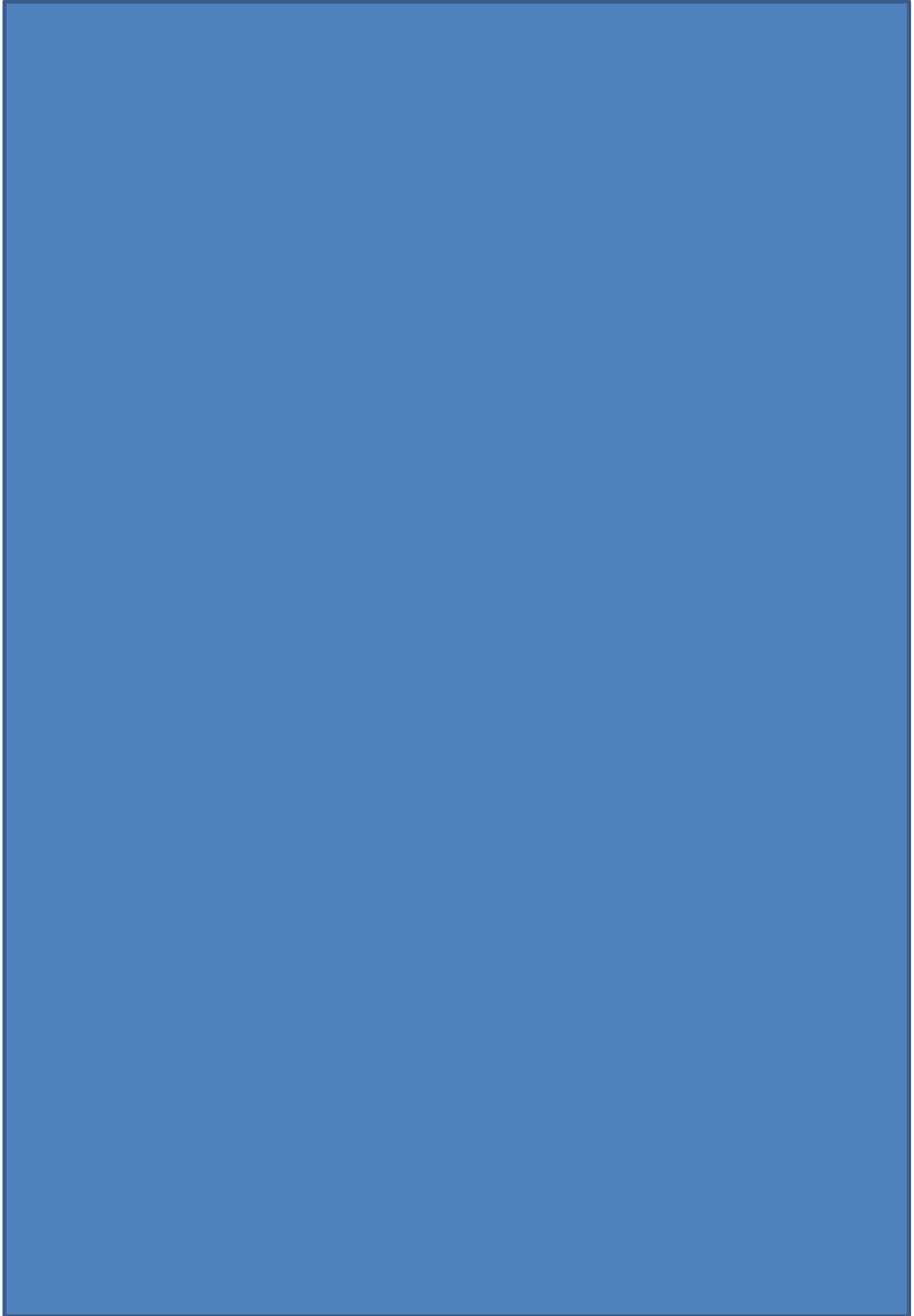


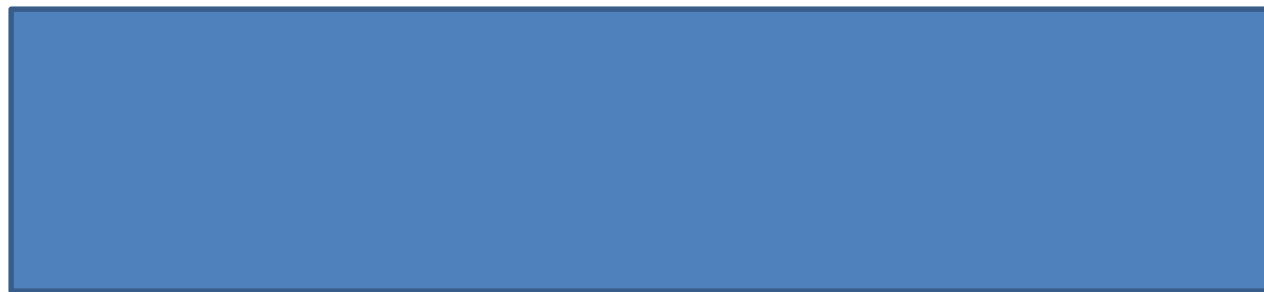












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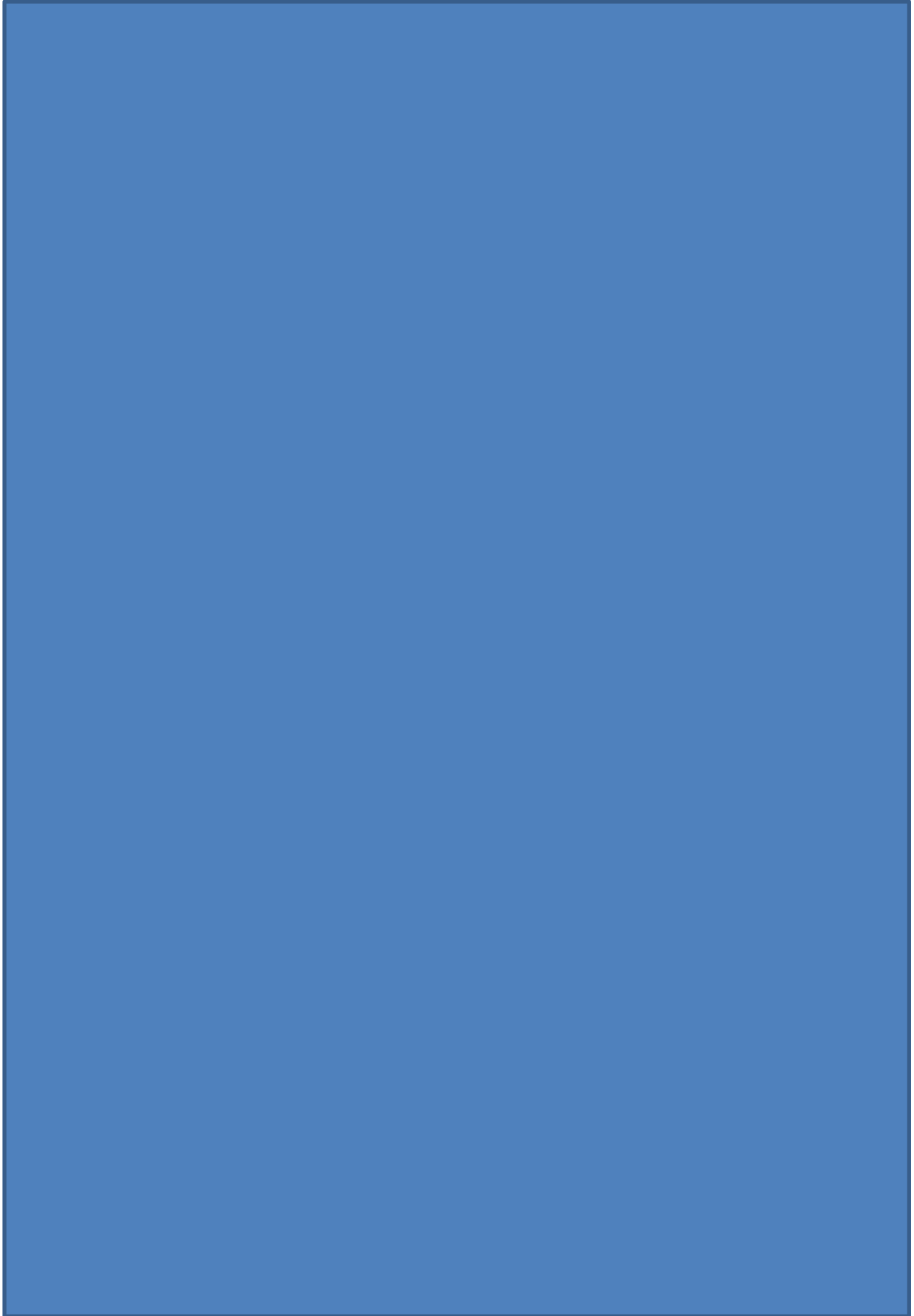
Appendix H: Test of Economic Literacy, Fourth Edition, Form A Posttest

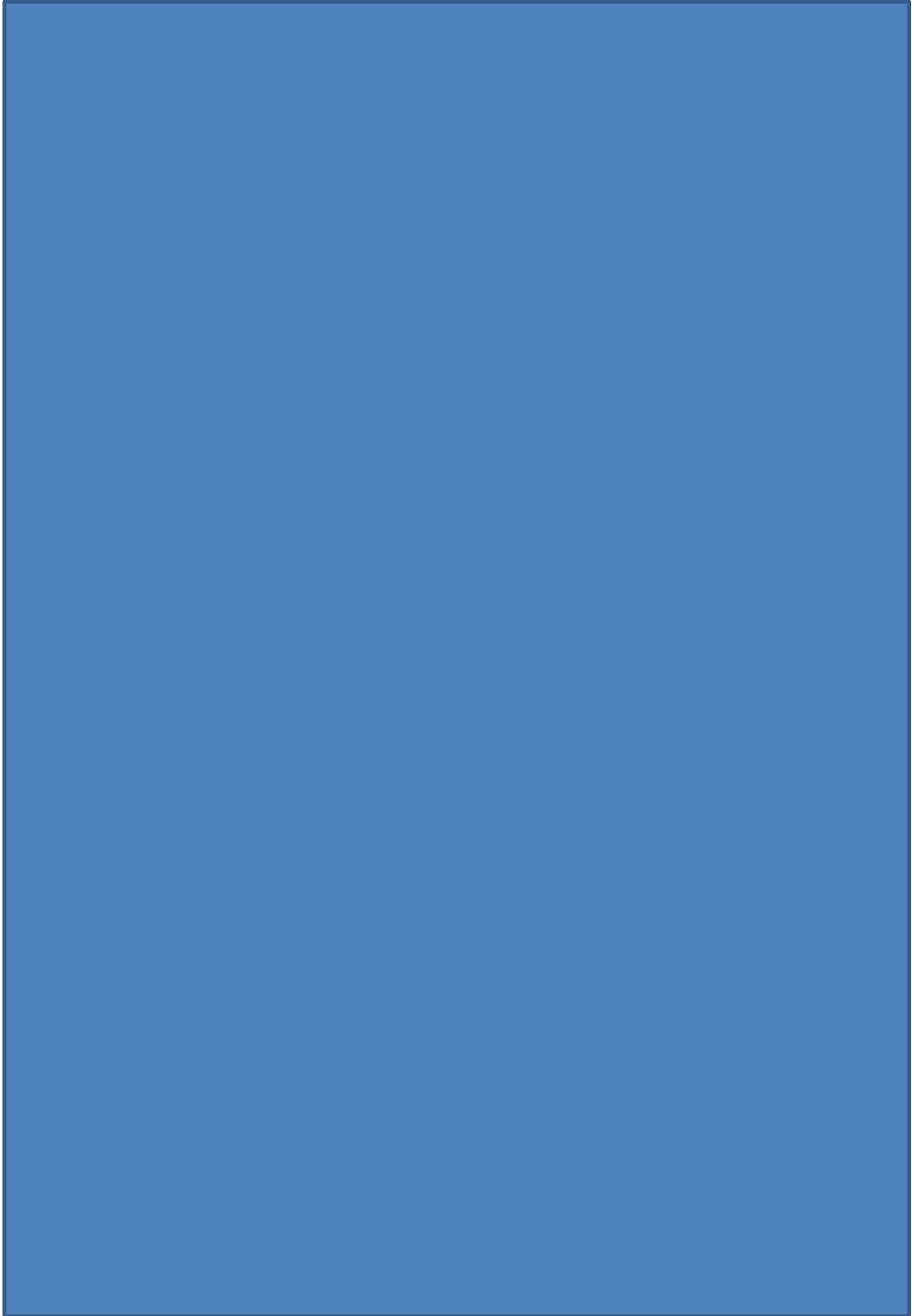
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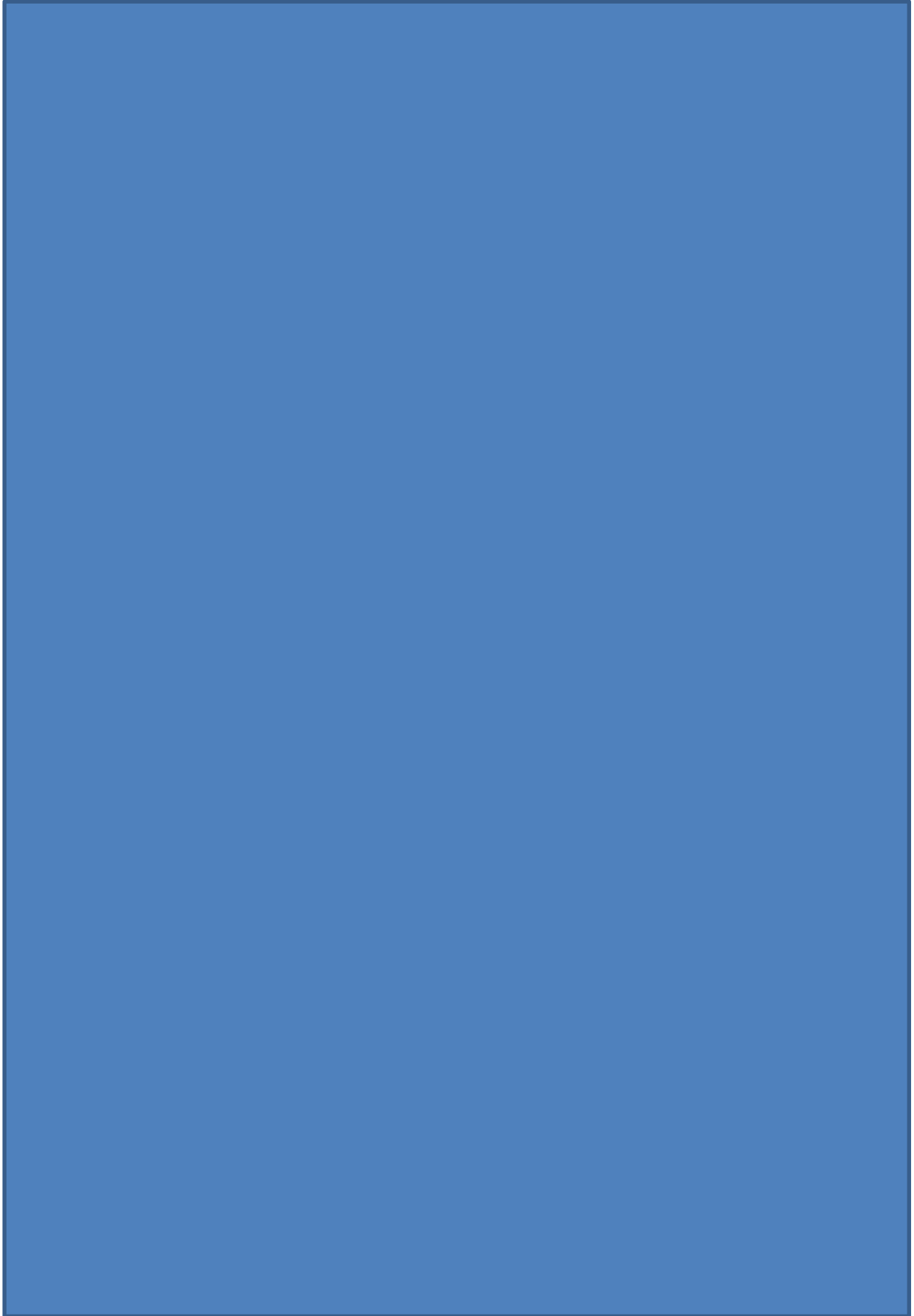
This test is designed to measure how well you understand the principles of economics and the way our economy works.

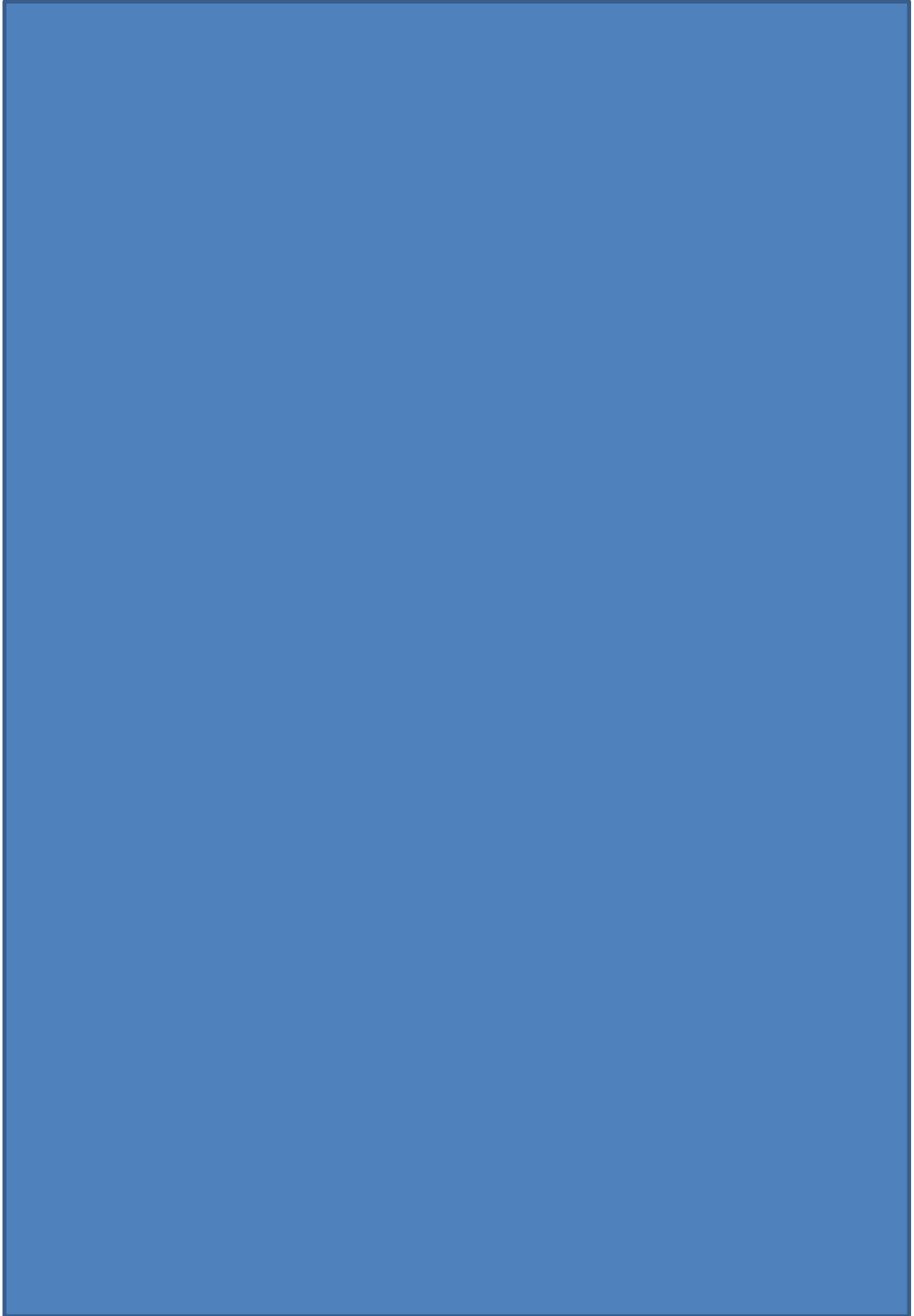
You should try to answer every question by selecting which you think is the best choice. You might not know the answers to some questions, but use the information you do have to eliminate those you think are incorrect and select your best answer. Work at a comfortable speed, but do not spend too much time on any one item. The test consists of 45 questions or incomplete statements, for which you should choose the one best answer. With some items, more than one answer may appear to be correct, but your task is to choose the best answer from the choices given for each item.

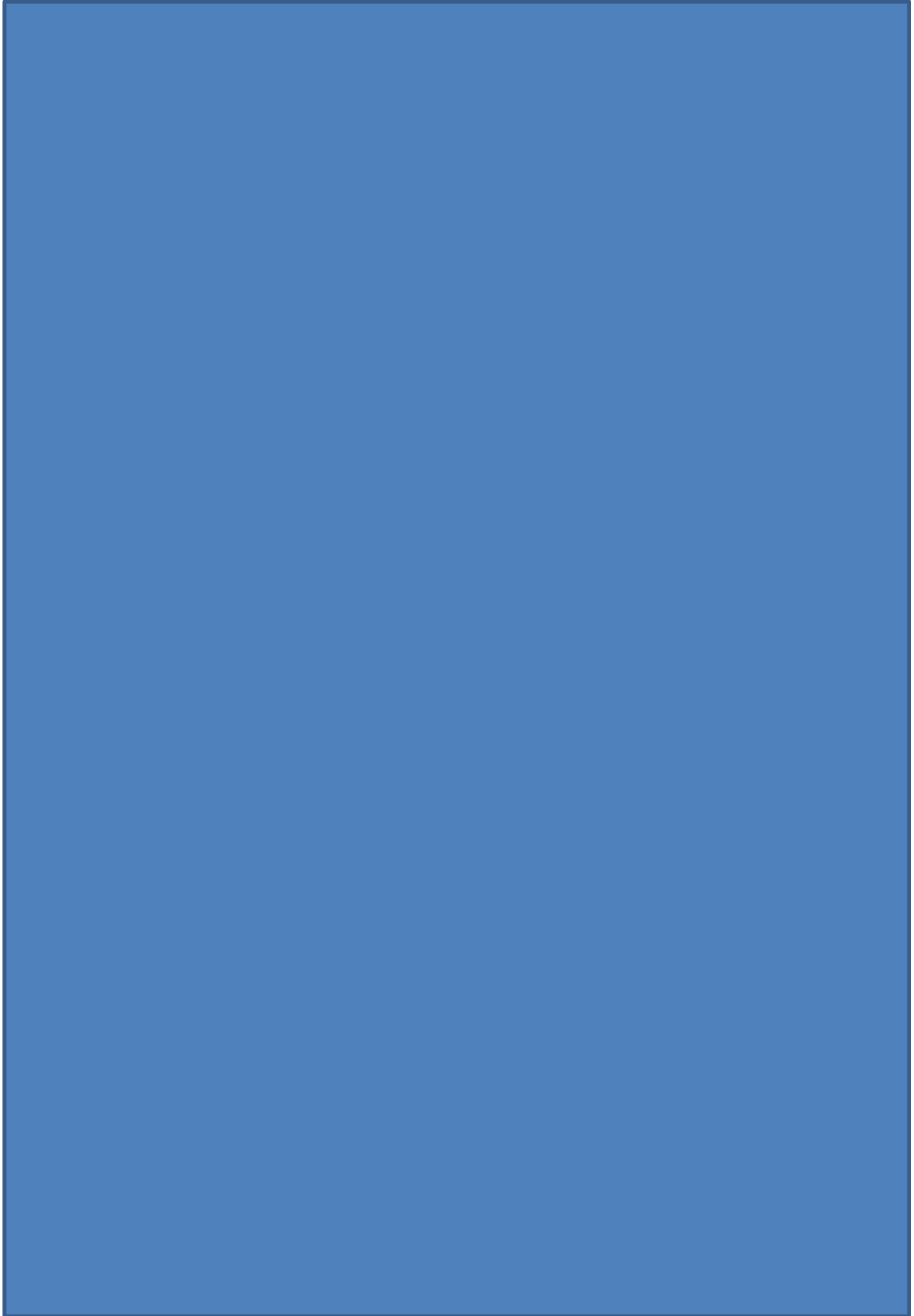


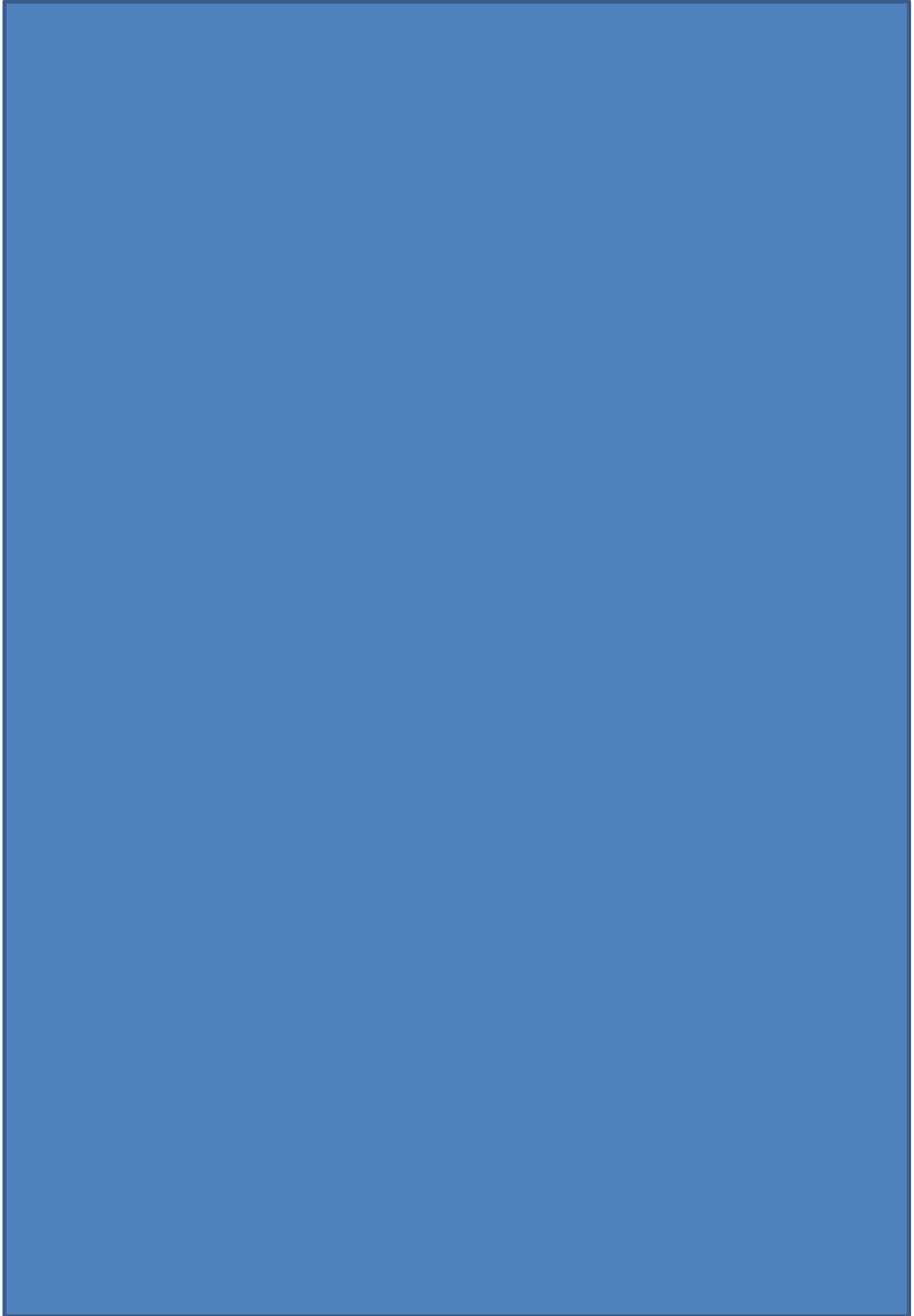


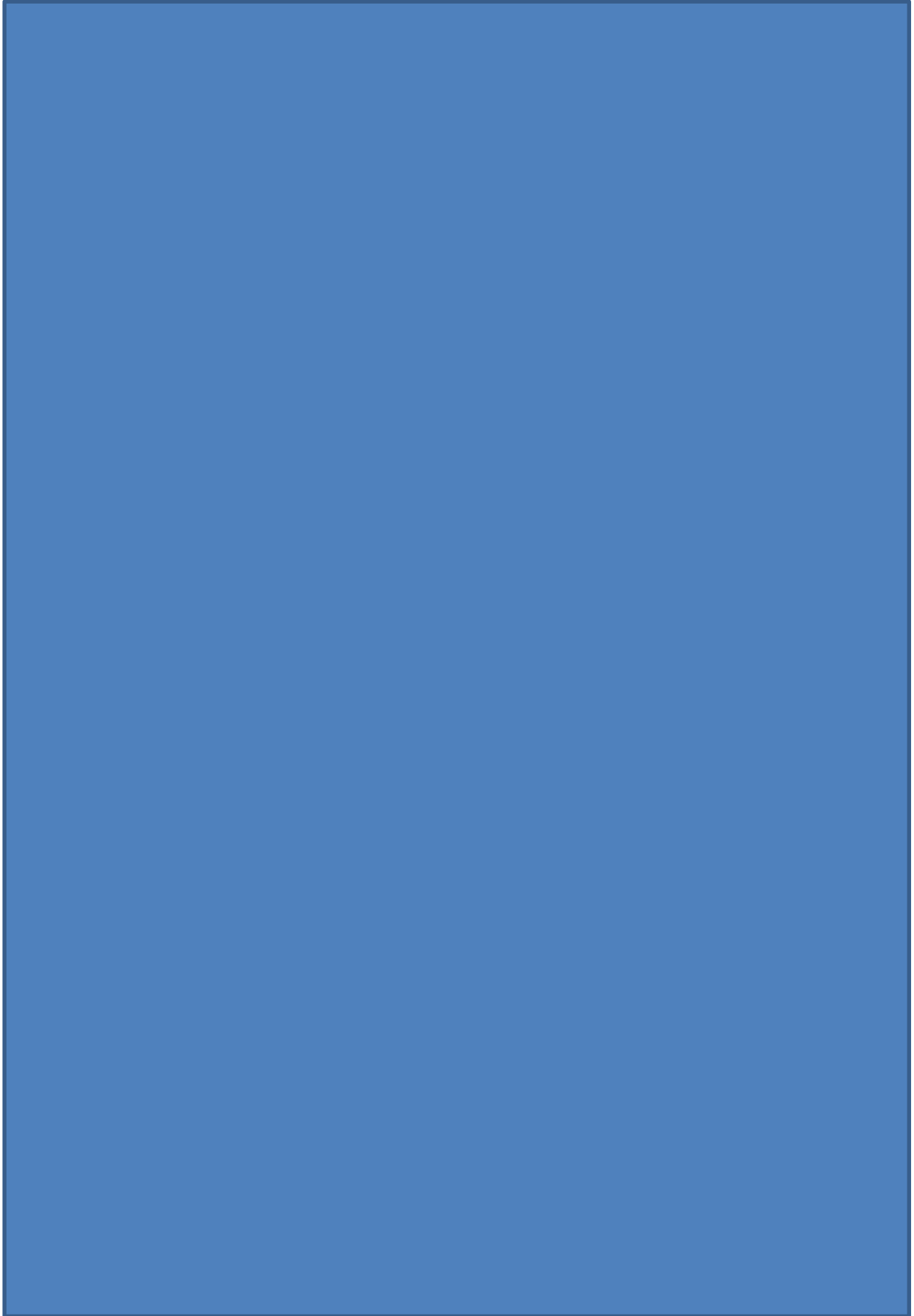










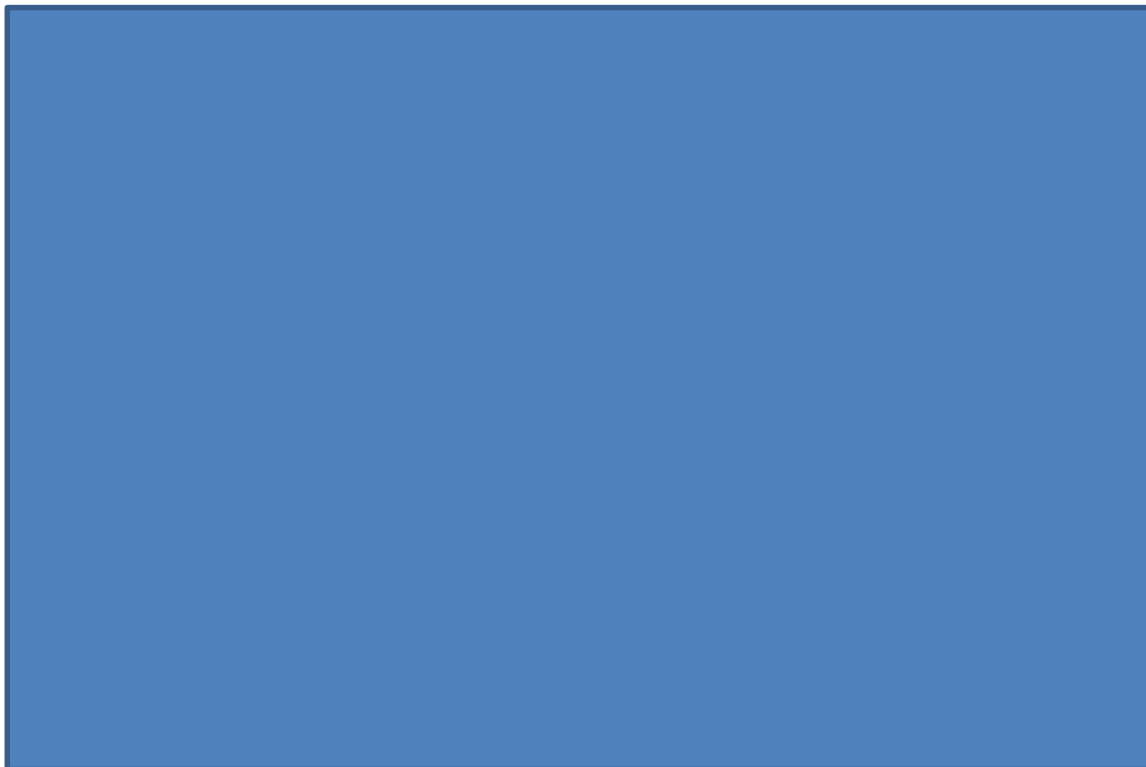




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APPENDIX I: Test of Economic Literacy, Fourth Edition, Form A Scoring Key

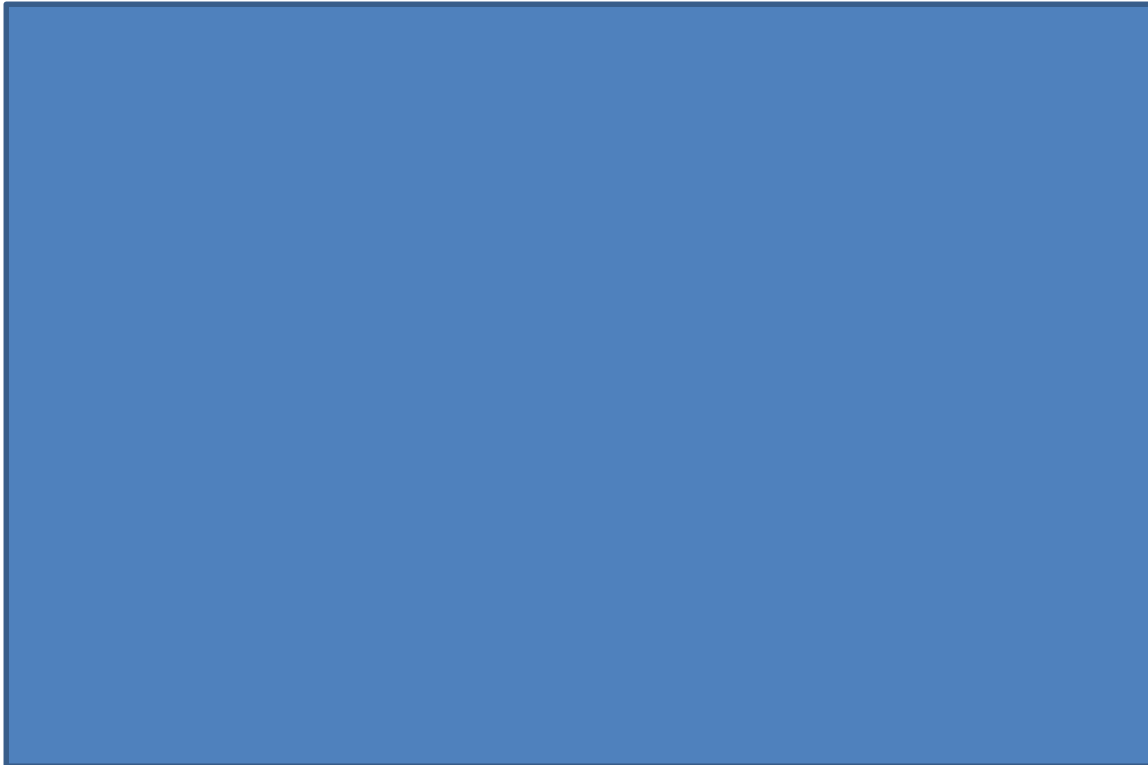
Scoring Key Form A



APPENDIX J: Classroom Community Scale

Directions

You will see a series of statements concerning the economics course you are enrolled in. Read each statement carefully and select the response that comes closest to indicating how you feel about the course. (SA = strongly agree, A = agree, N = neutral, D = disagree, SD = strongly disagree). There are no correct or incorrect responses. If you neither agree nor disagree with a statement or are uncertain, select the neutral (N) response. Do not spend too much time on any one statement, but give the response that seems to describe how you feel. Please respond to all items.



APPENDIX K: Classroom Community Scale Scoring Key

CCS raw scores vary from a maximum of 80 to a minimum of zero. Interpret higher CCS scores as a stronger sense of classroom community. Score the test instrument items as follows:

- For items: 1, 2, 3, 6, 7, 11, 13, 15, 16, 19; weights:
Strongly Agree = 4, Agree = 3, Neutral = 2, Disagree = 1, Strongly Disagree = 0
- For items: 4, 5, 8, 9, 10, 12, 14, 17, 18, 20; weights:
Strongly Agree = 0, Agree = 1, Neutral = 2, Disagree = 3, Strongly Disagree = 4
- Add the weights of all 20 items to obtain the overall CCS score. CCS subscale raw scores vary from a maximum of 40 to a minimum of zero. Calculate CCS subscale scores as follows:
- Connectedness (social community); add the weights of odd items: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19
- Learning (learning community); add the weights of even items: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

APPENDIX L: Student Recruitment Letter

Dear students participating in an economics class:

As a graduate student in the School of Education at Liberty University, I am conducting research as part of the requirements for a doctoral degree in Educational Leadership. The purpose of my research is to determine if academic achievement and sense of connectedness are affected when instructional text messages are sent to students while enrolled in an economics course.

The purpose of this letter is to invite you to be a part of this research study. If you are currently enrolled in an economics class and are willing to participate in this research study, and have parental/guardian permission, you will be asked to do the following:

- Own a cell phone capable of receiving text messages. Text messages sent by teacher will only review economics concepts covered in class. Two to three text messages will be sent per week.
- Create an account on the Remind application to receive text messages. Remind is an application that allows for one-way communication from teacher to student. Students will not be allowed to text each other from this application and students will not be allowed to respond to teacher with this application. Cell phone numbers, email addresses, and other contact information stays private on Remind.
- Take a 45-question Test of Economic Literacy, Fourth Edition pretest during one class period at the beginning of your economics course
- Take a 45-question Test of Economic Literacy, Fourth Edition posttest during one class period at the end of your economics course
- Respond to a 5-question online questionnaire during class at the end of the study
- Complete a 20-question Classroom Community Scale survey online during class at the end of the research study

If you choose to participate, signing the assent document lets me know that you understand and are willing to participate in my research study. All personally identifying information about yourself will remain confidential and will not be shared with anyone.

The consent document contains additional information about my research and will need to be signed by a parent/guardian and returned to your economics teacher.

I truly appreciate your willingness to participate in my research study.

Respectfully,

Mary E. Sell,
Doctoral Candidate
Liberty University
1971 University Blvd.
Lynchburg, VA 24515

APPENDIX M: Participant Consent Form

The Liberty University Institutional
Review Board has approved
this document for use from
1/2/2018 to 1/1/2019
Protocol # 3071.010218

“Employing Text Messaging as an Instructional Tool: Effects on Student Academic
Achievement and Sense of Connectedness”

Mary E. Sell
Liberty University
School of Education

Dear Participant:

Hello, my name is Mary E. Sell, and I am a doctoral student in the School of Education at Liberty University. I would like to invite you to be in a research study. My study is about looking at the possibilities of using text messaging and an instructional tool to help students better understand economic concepts taught in class. You were selected as a possible participant because you are currently enrolled in an economics course. I ask that you read this form and ask any questions you may have before agreeing to be in the study.

Background Information: The purpose of my research is to determine if academic achievement and sense of connectedness are affected when text messages about economics topics are sent to students while enrolled in an economics course.

Procedures: There are two Economics teachers involved in this research. Students with one of the teachers are considered the control group and students with the other teacher are considered the experimental group. Students in both the control group and the experimental group would be asked to do the following things:

- 1) Take a 45-question Test of Economic Literacy, Fourth Edition pretest during one class period of the economics course. The time allotted for this test is 40 minutes.
- 2) Take a 45-question Test of Economic Literacy, Fourth Edition posttest during one class period of the economics course. The time allotted for this test is 40 minutes.
- 3) Complete a 20-question Classroom Community Scale survey during one class period of the economics course. The time allotted for this survey is 20 minutes.

Additionally, if you are in the experimental group, you would also be asked to do the following:

- 4) Download and create an account on an application called Remind onto your cell phone. Remind is an application that allows for one-way communication from teacher to student. Students will not be allowed to text each other from this application and students will not be allowed to respond to teacher with this application. Cell phone numbers, email addresses, and other contact information stays private on Remind. The time allotted to download and create a Remind account is 20 minutes.

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- 5) Receive text messages about economic topics that I will send using the Remind application. Four text messages will be sent per week for eight weeks. The time allotted for receiving and reading text messages is 80 minutes, or 10 minutes per week.

All personally identifying information about you will remain confidential and will not be shared with anyone.

Risks and Benefits of being in the Study: The risks involved in this study are minimal, which means they are equal to the risks you would encounter in everyday life. You should not expect to receive a direct benefit from taking part in this study.

Compensation: There will be no compensation to participate in this study.

Confidentiality: The records of this study will be kept private. In any sort of report I might publish, I will not include any information that will make it possible to identify you. Research records will be stored securely, and only I will have access to the records. I may share the data I collect from you for use in future research studies or with other researchers; if I share the data that I collect about you, I will remove any information that could identify you, if applicable, before I share the data. All data will be stored on a password locked computer or in a locked filing cabinet and may be used in future presentations. Only I will have access to those records. I will use a coding system to keep all personal information, test data, and survey responses private. Additionally, after three years, all data will be destroyed by deleting digital data and shredding paper forms.

Voluntary Nature of the Study: Participation in this study is voluntary. Your decision whether or not to participate will not affect your grade in the economics course nor your current or future relations with Liberty University and [REDACTED]. If you decide to participate, you are free to not answer any question or withdraw at any time without affecting those relationships.

How to Withdraw from the Study: If you choose to withdraw from the study, please contact the researcher at the email address/phone number included in the next paragraph. Should you choose to withdraw, any data collected will be destroyed immediately and will not be included in this study.

Contacts and Questions: The researcher conducting this study is Mary E. Sell. You may ask any questions you have now. If you have any questions later, you are encouraged to contact her [REDACTED] may also contact the researcher's faculty

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If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, you are encouraged to contact the Institutional Review Board, 1971 University Blvd, Green Hall 1887, Lynchburg, VA 24515 or email at irb@liberty.edu.

Please notify the researcher if you would like a copy of this information for your records.

Statement of Consent: I have read and understood the above information. I have asked questions and have received answers. I consent to participate in the study.

(NOTE: DO NOT AGREE TO PARTICIPATE UNLESS IRB APPROVAL INFORMATION WITH CURRENT DATES HAS BEEN ADDED TO THIS DOCUMENT.)

Signature of Participant

Date

Researcher

Date

APPENDIX N: Parent/Guardian Consent Form

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“Instructional Text Messaging: Effects on Student Academic Achievement and Sense of
Connectedness”

Mary E. Sell
Liberty University
Department of Education

Dear Parent/Guardian:

Hello, my name is Mary E. Sell, and I am a doctoral student in the School of Education at Liberty University. I would like to invite your child/student to be in a research study. My study is about looking at the possibilities of using text messaging and an instructional tool to help students better understand economic concepts taught in class. Your child/student was selected as a possible participant because he or she is currently enrolled in an economics course. I ask that you read this form and ask any questions you may have before agreeing to allow him or her to be in the study.

Background Information: The purpose of my research is to determine if academic achievement and sense of connectedness are affected when text messages about economics topics are sent to students while enrolled in an economics course.

Procedures: There are two Economics teachers involved in this research. Students with one of the teachers are considered the control group and students with the other teacher are considered the experimental group. Students in both the control group and the experimental group would be asked to do the following things:

- 1) Take a 45-question Test of Economic Literacy, Fourth Edition pretest during one class period of the economics course. The time allotted for this test is 40 minutes.
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- 3) Complete a 20-question Classroom Community Scale survey during one class period of the economics course. The time allotted for this survey is 20 minutes.

Additionally, if your child/student is in the experimental group, he or she would also be asked to do the following:

- 4) Download and create an account on an application called Remind onto his or her cell phone. Remind is an application that allows for one-way communication from teacher to student. Students will not be allowed to text each other from this application and students will not be allowed to respond to teacher with this application. Cell phone numbers, email

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addresses, and other contact information stays private on Remind. The time allotted to download and create a Remind account is 20 minutes.

- 5) Receive text messages about economic topics that I will send using the Remind application. Four text messages will be sent per week for eight weeks. The time allotted for receiving and reading text messages is 80 minutes, or 10 minutes per week.

All personally identifying information about your child/student will remain confidential and will not be shared with anyone.

Risks and Benefits of being in the Study: The risks involved in this study are minimal, which means they are equal to the risks your child/student would encounter in everyday life. Your child/student should not expect to receive a direct benefit from taking part in this study.

Compensation: There will be no compensation to participate in this study.


Confidentiality: The records of this study will be kept private. In any sort of report I might publish, I will not include any information that will make it possible to identify your child/student. Research records will be stored securely, and only I will have access to the records. I may share the data I collect from your child/student for use in future research studies or with other researchers; if I share the data that I collect about your child/student, I will remove any information that could identify him or her, if applicable, before I share the data. All data will be stored on a password locked computer or in a locked filing cabinet and may be used in future presentations. Only I will have access to those records. I will use a coding system to keep all personal information, test data, and survey responses private. Additionally, after three years, all data will be destroyed by deleting digital data and shredding paper forms.

Voluntary Nature of the Study: Participation in this study is voluntary. Your decision whether or not to allow your child/student to participate will not affect his or her grade in the economics course nor his or her current or future relations with Liberty University and [REDACTED] School. If you decide to allow your child/student to participate, he or she is free to not answer any question or withdraw at any time without affecting those relationships.

How to Withdraw from the Study: If your child/student chooses to withdraw from the study, please contact the researcher at the email address/phone number included in the next paragraph. Should your child/student choose to withdraw, any data collected will be destroyed immediately and will not be included in this study.

Contacts and Questions: The researcher conducting this study is Mary E. Sell. You may ask any questions you have now. If you have any questions later, you are encouraged to contact her

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 may also contact the researcher's faculty

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, you are encouraged to contact the Institutional Review Board, 1971 University Blvd, Green Hall 1887, Lynchburg, VA 24515 or email at irb@liberty.edu.

Please notify the researcher if you would like a copy of this information for your records.

Statement of Consent: I have read and understood the above information. I have asked questions and have received answers. I consent to allow my child/student to participate in the study.

(NOTE: DO NOT AGREE TO ALLOW YOUR CHILD/STUDENT TO PARTICIPATE
UNLESS IRB APPROVAL INFORMATION WITH CURRENT DATES HAS BEEN ADDED
TO THIS DOCUMENT.)

Signature of Minor

Date

Signature of Parent





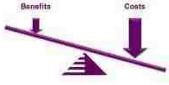
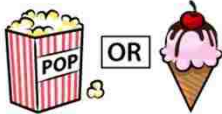


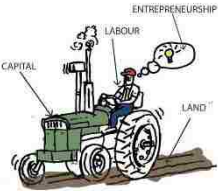




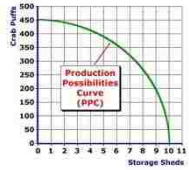
Date

Researcher

Date

APPENDIX O: Text Messages

Week 1 Text Messages

| | | | |
|--|--|---|--|
| <p style="text-align: center;">Foundations of Economics</p> | <p style="text-align: center;">SCARCITY</p>  <p style="text-align: center;">unlimited wants exceed limited resources basic economic problem</p> | <p style="text-align: center;">GOODS</p>  <p style="text-align: center;">tangible items purchased by consumers</p> | <p style="text-align: center;">SERVICES</p>  <p style="text-align: center;">intangible things purchased by consumers</p> |
| <p style="text-align: center;">MARGINAL</p>  <p style="text-align: center;">the measure of additional cost or benefit</p> | <p style="text-align: center;">RATIONAL DECISION</p>  <p style="text-align: center;">marginal benefits exceed marginal costs</p> | <p style="text-align: center;">IRRATIONAL DECISION</p>  <p style="text-align: center;">marginal costs exceed marginal benefits</p> | <p style="text-align: center;">TRADE-OFFS</p>  <p style="text-align: center;">choices in Economics (what you gain when you make a choice)</p> |
| <p style="text-align: center;">OPPORTUNITY COST</p> <p style="text-align: center;">Scarcity & Opportunity Cost</p>  <p style="text-align: center;">next best alternative given up when individuals, businesses, and governments confront scarcity by making choices (what you lose when you make a choice)</p> | <p style="text-align: center;">3 ECONOMIC QUESTIONS</p>  <p style="text-align: center;">What to produce? How to produce it? For whom to produce for?</p> | <p style="text-align: center;">PRODUCTIVE RESOURCES</p>  <p style="text-align: center;">land, labor, capital, entrepreneur</p> | <p style="text-align: center;">LAND</p>  <p style="text-align: center;">natural resources used for production</p> |
| <p style="text-align: center;">LABOR</p>  <p style="text-align: center;">the people who work to make products</p> | <p style="text-align: center;">CAPITAL</p>  <p style="text-align: center;">machines and tools used for production</p> | <p style="text-align: center;">ENTREPRENEUR</p>  <p style="text-align: center;">organizer of land, labor, and capital risk-taker</p> | <p style="text-align: center;">PRODUCTION POSSIBILITIES CURVE PPC</p>  <p style="text-align: center;">illustrates trade offs between two options</p> |

Week 2 Text Messages

Understanding the PPC

PRODUCTIVITY

The Production Process

the relationship of inputs to outputs

EFFICIENCY

rate of productivity

SPECIALIZATION

division of labor that improves efficiency

GROWTH

new jobs and businesses in an economy

GUNS OR BUTTER

government must choose between the production of military or consumer goods

ECONOMIC SYSTEMS

market, command, traditional, mixed

COMMAND

government makes all economic decisions

MARKET

The Characteristics of a Free Market

economic system in which decisions are freely made; based on supply and demand

MIXED

economic system in the United States mixture of command and market

CONSUMER SOVEREIGNTY

customer decides what products are produced

VOLUNTARY EXCHANGE

market transactions benefit both buyer and seller; buyer and seller freely participate

COMPETITION

businesses' struggle for consumer support Competition regulates price and quality in economy and helps to keep prices low

GOVERNMENT REGULATION

government involvement in a mixed market

REGULATION


government rules to control industry decreases productivity and efficiency

DEREGULATION

government takes away rules from industry increases productivity and efficiency

Week 3 Text Messages

FREEDOM




consumers and buyers make their own economic choices; exists in market economy

SECURITY



knowing that your basic needs will be met
strength of a command economic system

EQUITY



economic equality; being fair

GROWTH



gross domestic products grow
economy gets better

EFFICIENCY



economies don't waste resources
use resources wisely

STABILITY



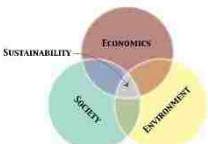
rate of change or continuity

FULL EMPLOYMENT



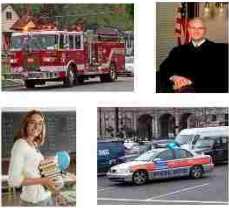
government makes sure citizens have a job

SUSTAINABILITY



long term growth over long periods of time

PUBLIC GOODS AND SERVICES




goods and services provided by the government for everyone to use

GOVERNMENT REDISTRIBUTION PROGRAMS



government use tax money to provide benefits for Americans in need

PROPERTY RIGHTS




government protects your rights to own property to encourage you to work hard

PRIVATE OWNERSHIP



you control your property
incentive to produce

PROFIT MOTIVE



incentive to work in a free enterprise economy

HUMAN CAPITAL




investing in education and training of employees to improve performance and efficiency

NEGATIVE EXTERNALITY

Examples of Negative Production Externalities


Negative production externalities include pollution generated by a factory that imposes costs on others



Any economic activity that imposes a negative effect on an unrelated third party.

POSITIVE EXTERNALITY

Positive Externalities



Any economic activity that imposes a positive effect on an unrelated third party.

Week 4 Text Messages

MICROECONOMICS

Microeconomics

The effects of decisions by individuals, businesses, and corporations on an economy

DEMAND

describes quantities purchased by consumers at each price level must have the desire, ability, and willingness to buy a product

DEMAND SCHEDULE

| | Price of Stuffed Animals | Quantity of Stuffed Animals |
|---|--------------------------|-----------------------------|
| A | 5 | 90 |
| B | 10 | 80 |
| C | 15 | 70 |
| D | 20 | 60 |
| E | 25 | 50 |
| F | 30 | 40 |
| G | 35 | 30 |
| H | 40 | 20 |
| I | 45 | 10 |
| J | 50 | 0 |

chart that lists price and quantity demanded

DEMAND CURVE

graph that illustrates price and quantity demanded

LAW OF DEMAND

Demand Schedule Demand Curve

| Price | Quantity |
|-------|----------|
| 10 | 1 |
| 20 | 2 |
| 30 | 3 |
| 40 | 4 |
| 50 | 5 |
| 60 | 6 |
| 70 | 7 |
| 80 | 8 |
| 90 | 9 |
| 100 | 10 |

consumers want to buy more at lower prices and less at higher prices

INVERSE RELATIONSHIP

Law of Demand

When the price goes up... the quantity demanded goes down. When the price goes down... the quantity demanded goes up.

relationship between price and quantity demanded

INCOME EFFECT

A fall in price, if a consumer's budget remains constant, means they can buy more goods.

Price determines how much will be bought. Demand curve does not shift.

- if the price of a product goes down, such as sales, discounts, etc. then a consumer can buy more of the product.

SUBSTITUTION EFFECT

Substitute Good Graphical Example

If the price of Coke goes up, people will buy less Coke and more Pepsi

- the quantity demanded of Coke decreases, demand curve does not shift
- the demand for Pepsi increases, demand curve shifts to the right

DIMINISHING MARGINAL UTILITY

*DON'T TRY THIS AT HOME ;)

6th ICE CREAM = NOT SO HAPPY

decreasing additional satisfaction and utility

DETERMINANTS OF DEMAND

Party In The Central School Everyday

- Population
- Income
- Tastes and Preferences
- Complements
- Substitutes
- Expectations

shift the demand curve left or right

POPULATION

population increase shifts demand curve right
population decrease shifts demand curve left

INCOME

income increase shifts demand curve right
income decrease shifts demand curve left

TASTES AND PREFERENCES

The Daily Besting Chocolate is Best for Your Health

T&P increase shifts demand curve right
T&P decrease shifts demand curve left

COMPLEMENTS

goods that are used together, inverse relationship
If price increases demand for complement decreases
If price decreases demand for complement increases

SUBSTITUTES

Substitute Goods

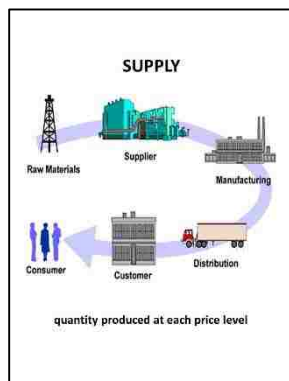
goods that can be used in place of one another
If price increases, demand for substitute increases
If price decreases, demand for substitute decreases

EXPECTATIONS

The Daily chocolate shortage expected

Expectations of future events affect demand

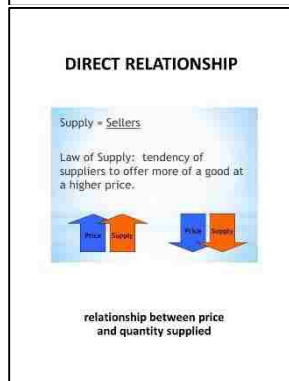
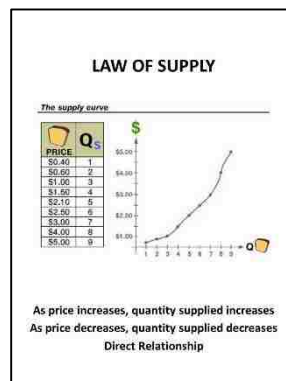
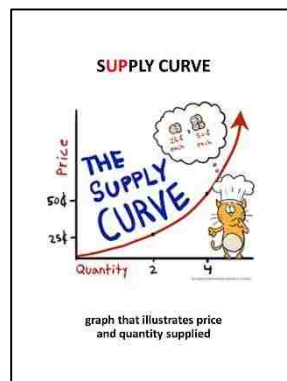
Week 5 Text Messages



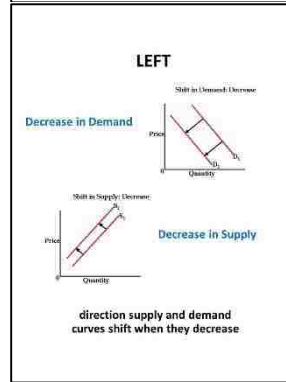
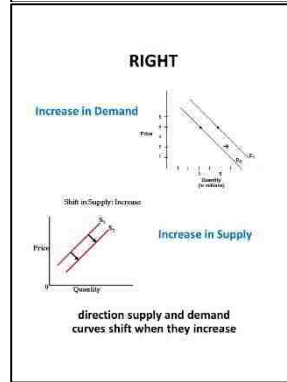
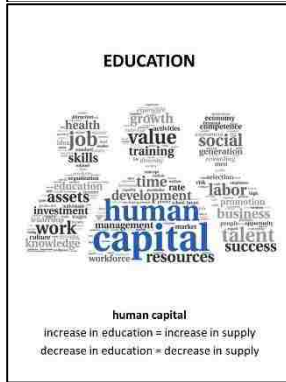
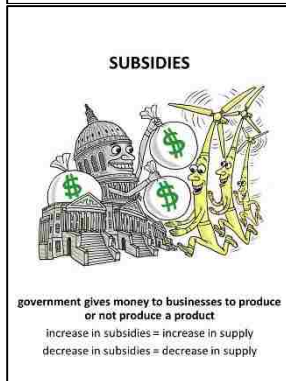
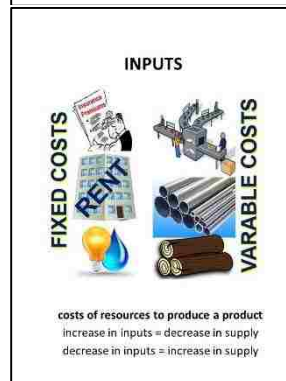
SUPPLY SCHEDULE

| | Price | Quantity Supplied |
|---|-------|-------------------|
| A | 5 | 0 |
| B | 10 | 100 |
| C | 15 | 200 |
| D | 20 | 300 |
| E | 25 | 400 |
| F | 30 | 500 |
| G | 35 | 600 |
| H | 40 | 700 |
| I | 45 | 800 |
| J | 50 | 900 |

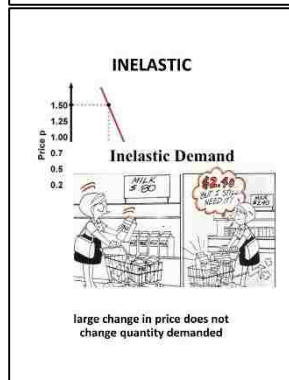
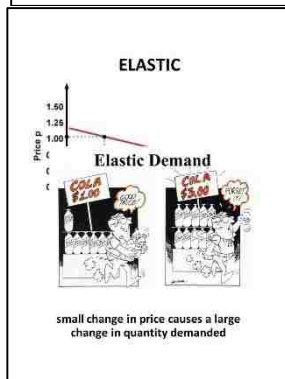
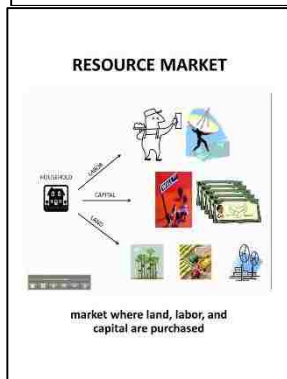
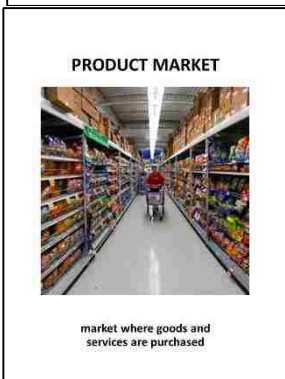
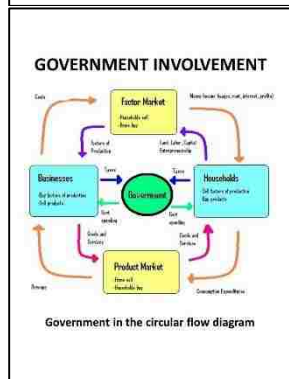
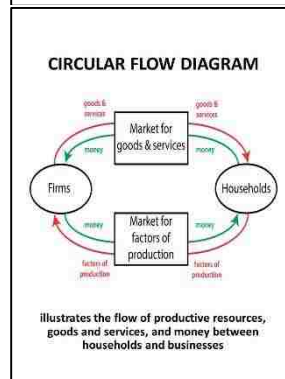
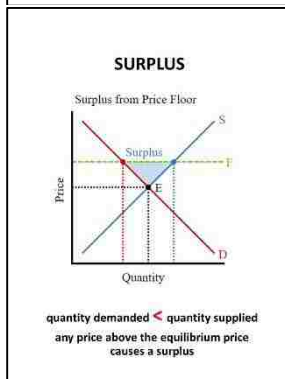
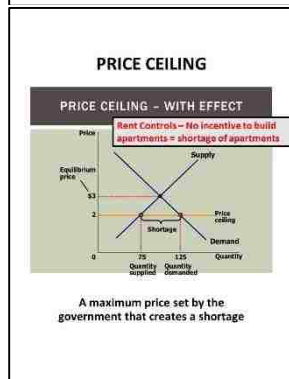
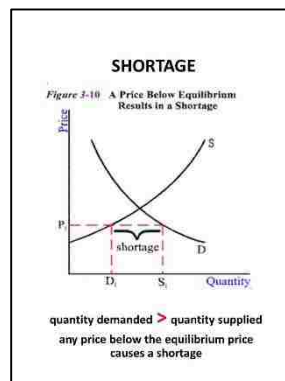
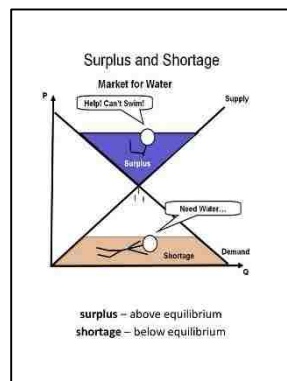
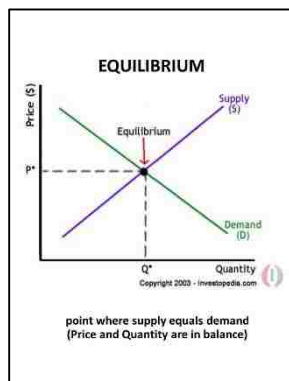
chart that lists price and quantity supplied



- ### SHIFTERS OF SUPPLY
- First In The Sun Turns Red Evenly Everyday*
- Firms
 - Inputs
 - Taxes
 - Subsidies
 - Technology
 - Regulations
 - Expectations
 - Education
- shift the supply curve left or right
Left = decrease in supply
Right = increase in supply



Week 6 Text Messages



Business Organizations

| Sole Proprietorship | Partnership | Corporation |
|--|---|---|
| General Characteristics <ul style="list-style-type: none"> Owned by one person Most common form of business organization | General Characteristics <ul style="list-style-type: none"> Owned by two or more people Least common form of business organization | General Characteristics <ul style="list-style-type: none"> Owned by shareholders Earns the greatest percentage of business profits in the U.S. |
| Advantages <ul style="list-style-type: none"> Keep all profits Make all decisions Easy to start | Advantages <ul style="list-style-type: none"> Easy to start Can benefit from specialization More access to start-up money than sole proprietorships | Advantages <ul style="list-style-type: none"> Access to large amounts of funds for expansion Can grow large and offer opportunity for advancement Limited liability Unlimited life |
| Disadvantages <ul style="list-style-type: none"> Unlimited liability Limited life Difficult to attract top talent Limited access to funds | Disadvantages <ul style="list-style-type: none"> Unlimited liability Limited life Potential for conflict Division of profits | Disadvantages <ul style="list-style-type: none"> Double taxation Can lose control of company Greater government oversight and legal issues |

SOLE PROPRIETORSHIP

| Advantages of Sole Proprietorship | Disadvantages of Sole Proprietorship |
|--|--|
| <ul style="list-style-type: none"> Easy Formation Taxation Prompt Decisions Easy Dissolution | <ul style="list-style-type: none"> Limited Resources Limited Business Life Unlimited Liability Scale of Business & Expertise |

business owned and operated by one person

PARTNERSHIP

business owned and operated by more than one person; divides risks and profits of business ownership among two or more people

Week 7 Text Messages

CORPORATION

business that operates as a separate legal entity from the person/people who started it

UNLIMITED LIABILITY

major disadvantage of sole proprietorship and partnership; means the owner is personally responsible for debts of the business.

LIMITED LIABILITY

major advantage of corporations, stockholders personal assets are protected if the corporation is sued.

LIMITED LIFE

In sole proprietorships and partnerships, the business does not continue to exist if the owner(s) die.

UNLIMITED LIFE

Corporations are considered an entity that continue to survive even when the people in charge die.

BOARD OF DIRECTORS

elected by the shareholders to make decisions in large corporations.

SHAREHOLDER / STOCKHOLDER

person who owns stock in a corporation

STOCK

represents part ownership in a corporation; used to raise capital to invest in the business

DIVIDENDS

corporations pay a share of their profits annually to their shareholders.

DOUBLE TAXATION

Corporations pay a tax on the income earned AND shareholders pay a tax on the income earned from their dividends

MARKET STRUCTURES

| | Perfect Competition | Monopolistic Competition | Oligopoly | Monopoly |
|-------------------|-----------------------------------|----------------------------------|----------------------------------|--------------------------------|
| Number of firms | Infinite | Many; Several | A few companies (some up to 10) | One |
| Barriers to entry | None | Few | Many; restrictions | High; Blockaded totally |
| Type of Product | Homogenous (no branding) | Differentiated (branded) | Differentiated (branded) | Unique |
| Examples | Commodities: e.g. oil, foodstuffs | Small restaurants, shops, trades | Financial services, Supermarkets | Government services, utilities |

BARRIERS TO ENTRY

Barriers to Entry

How hard it is for a seller to get into a market

PRODUCT DIFFERENTIATION

the use of advertising to make one firm's product seem better than another's.

COLLUSION

when businesses in an oligopoly work together to fix prices (OPEC)

PURE COMPETITION

Many small firms selling identical products (small farmers selling their crops)

MONOPOLISTIC COMPETITION

Examples of Monopolistic Competition

many sellers for a good or service (restaurants, clothing stores, nail salons)

Week 8 Text Messages

OLIGOPOLY

2-5 businesses produce the good or service (soft drink companies, sports shoes, cars)

MONOPOLY

one business controls all output of a good or service; no competition (electric, water and sewer companies)

PATENT

rewards inventors by allowing them to profit from their invention

PRICE WARS

oligopolies compete ruthlessly by engaging in these

NON PRICE COMPETITION

Other things that businesses do to convince people to buy their product

SHERMAN ANTI-TRUST LAW

Made monopolies illegal

MACROECONOMICS

MACROECONOMICS

| MICROECONOMICS | MACROECONOMICS |
|---|--|
| Studies individual income | Studies national income |
| Analyzes demand and supply of labor | Analyzes total employment in the economy |
| Deals with households and firms decisions | Deals with aggregate decisions |
| Studies individual prices | Studies overall price level |
| Analyzes demand and supply of goods | Analyzes aggregate demand and aggregate supply |

study of the economy on a large scale, usually looking at the economy of a country

ECONOMIC GOALS

3 GOALS OF MACROECONOMICS:

- Economic Growth
- Full Employment
- Economic Stability

ECONOMIC INDICATORS

used to measure the economy and guide economic policy

GROSS DOMESTIC PRODUCT

GDP Breakdown

dollar value of all final goods and services produced in a country in a year

C+G+I+(X-M)

four components of GDP

NOMINAL GDP

$GDP = C + I + G + (X - M)$

GDP measured in current prices. It does not account for inflation from year to year.
 $C+I+G+(X-M)$

REAL GDP

Real GDP

- Real GDP= Nominal GDP adjusted for inflation.
- Calculation:
Real GDP = $\frac{\text{Nominal GDP}}{\text{Price Index in Hundredths (deflator)}}$

Example:
U.S. 2005 Real GDP = $\frac{\$12,4558 \text{ (billions)}}{1.1274 \text{ (based on 2000)}}$
\$11.048 Trillion

GDP adjusted for inflation. It is expressed in constant dollars. Real GDP is the best measure to see if the economy is growing.

GDP PER CAPITA

GDP per capita is used as an indicator of the standard of living for a country.
Real GDP/Country Population

PER CAPITA

average money per person in a country