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Economic Literacy: Measuring the Economic Human Capital of Arkansas K-12 Teachers

June Marie Freund
University of Arkansas, Fayetteville

Economic Literacy: Measuring the Economic Human Capital of Arkansas K-12 Teachers

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by

June Marie Freund
University of Arkansas
Bachelor Science in Public Administration, 1972
Missouri Southern State University
Bachelor Science in Business Administration, Economics, 1976
Pittsburg State University
Master of Business Administration, 1977
Pittsburg State University
Education Specialist in Community College & Higher Education, 1989

July 2015
University of Arkansas

This dissertation is approved for recommendation to the Graduate Council.

_____
Dr. Mounir A. Farah
Dissertation Chair

_____
Dr. Jason Endacott
Committee Member

_____
Dr. Felicia Lincoln
Committee Member

_____
Dr. Michael Wavering
Committee Member

Abstract

Economic literacy is recognized as a deficit quality in the United States, no more prevalent than during the last great recession. It is paramount the K-12 educational system lead the movement to educate the public on economic content and issues, as it is the one institution that has direct contact with all citizens. The question then must be asked, how economic literate are teachers entrusted with the responsibility of imparting economic knowledge to his/her K-12 grade level student. A sample of Arkansas teachers at each grade level K – 12 were tested using national normed economic literacy tests designed to test the economic knowledge of their respective grade level student. Using multiple regression, one-way and factorial ANOVA, and one-way MANOVA to analyze the data, a picture of both economic knowledge and teacher human capital investment in economics emerged. Teacher data were analyzed using a composite score, an economic content score, and scores on each of the twenty voluntary national content standards in economics as defined by the Council for Economic Education. A correlation of the voluntary national content standards in economics to Arkansas social studies curriculum frameworks allowed for analysis of Arkansas teachers' mastery on content set forth in the curriculum standards. Elementary teachers were best prepared to cover their grade level economic curriculum content and high school teachers the least prepared whether the high school content was taught in a stand-alone class or infused into another social studies course. The number of professional workshops attended were the best predictor of success on the grade level economic literacy test. Recommendations discussed include economic educational preparation of socials studies teachers and grade specific professional development workshops accompanied by pedagogical techniques.

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Dedication

In memory of Gracie and my parents Arthur and Grace Freund

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Chapter 1

Brief background on the Need for Economic Literacy

According to Levitt, "The American economy is the eighth wonder of the world; the ninth wonder is the economic ignorance of the American people" (as quoted in Gupta, 2006, p. 3). The economic turbulence of the past few years from 2008 to 2010, now referred to as the Great Recession, has certainly heightened the importance of economic and financial education, and demonstrated the economic ignorance referred to by Levitt. Hung, Parker, and Yoong (2009) and Watts and Walstad (2011) supported the ideas of Bosshardt, Grimes, and Sutter (2011):

> The recent financial crisis and ensuing recession are replete with stories of households and business decision-makers who do not fully understand how changing market forces would impact the agreements and contracts that they had signed. A poor understanding of the marketplace results in poor choices, which in turn lead to poor outcomes not only for individuals but for society in general. (para. 2)

Economics is best defined by Marshall as "the study of mankind in the ordinary business of life" (Breidenstein, Butler, & Kamdar, 2001, p. 373). As members of society go about their daily life making decisions on what to buy or how to organize tasks to optimize their skills, time, and money to gain the most value, individuals are making economic decisions. As individuals react to the environment around them by dealing with consequences of supply and demand, voting on public issues, or participating in political discussions, they act as their own economic analysts, requiring the vocabulary and understanding of economic concepts underlying the issues (Bach et al., 1961; Bosshardt, Grimes & Sutter, 2011; Hansen; 1989; Gupta, 2006; Miller & VanFossen, 2008; Gwartney & Schug, M. C., 2011; Stigler, 1970; Walstad, 1998; Watts & Walstad, 2011). After all, economics is "the study of choice and its consequences. Because unintended consequences are so often overlooked by noneconomists, economists often define

their discipline as the study of choice and its unintended consequences" (Heyne, Boettke, & Prychitko, 2014, p. 424). It is unintended consequences that necessitate a need for a stronger educational foundation in economics.

Former President Bill Clinton, speaking at a luncheon in support of Economics Arkansas, said it best: "The mess we got into in this country is that people didn't have enough economic literacy. We pay a terrible price when people don't understand economics" (as quoted in Parker, 2010, para 5). Stigler (1970) inquired, "Why should people be economically literate, rather than musically literate, or historically literate, or chemically literate?" (p. 78). According to Stigler:

> The public does concern itself most frequently with economic questions is a true and persuasive reason for economic literacy, in the best of all worlds it might be most desirable to have musical or theological literacy, but in ours the public wants to talk about money…. the public has chosen to speak and vote on economic problems so the only open question is how intellectually it speaks or votes. (p. 82).

Duval, past CEO and president of the Council for Economic Education (CEE), stated that young people in our country need to know that economic education is not an option**.** Economic education and economic literacy is a vital skill, just as vital as reading literacy (Stern, 1998).

Statistics reinforce Levitt's and former President Clinton's statements regarding the economic ignorance of society. A poll conducted in 2005 by Harris Interactive, a market research firm, for the CEE suggested a lack of economic literacy in both the general public and high school students. The survey indicated that 97% of adults over the age of 18 and 93% of high school students believed it was important for Americans to have a good understanding of economics; however, only 34% of adults and 9% of high school students actually had a good understanding of economics (Binns & Amorosi, 2005). When given an economic literacy test high school students scored on average 53%, while adults performed better, scoring 70%. One alarming statistic was 28% of adults and 60% of students received a grade of F on the literacy

test (Markow & Bagnaschi, 2005). Equally alarming, given the economic crisis of 2008 to 2010, was a 2008 Jump$tart Coalition national survey reported high school students scored 43.3% on a financial literacy test—the lowest score ever recorded for the test. College students did marginally better on the financial literacy test, scoring 64.8% (Mandel, 2009, p. 5-7). A review of the Harris poll results indicated participants were less likely to correctly answer questions in three categories: (a) money, interest rates, and inflation; (b) government and trade; and (c) personal finance (Binns & Amorosi, 2005). Similar categories were indicated in a study by Walstad (1989) as topics the public is less likely to know: (a) that one of the major causes of low income in the U.S. is lack of labor market skills, (b) that an increase in U.S. tariffs would have an adverse effect on U.S. international trade, (c) that higher wages usually depended on higher worker productivity, (d) that increasing investment could stimulate a nation's economic growth, and (e) that government budget deficit is created when government spending exceeds tax revenues.

The National Assessment of Education Progress (NAEP) economics assessment was administered to grade 12 students in 2006 and 2012. Students were tested on their understanding of a limited set of economic principles in three categories (market economy, national economy, and international economy) and their ability to apply economic principles to economic situations. Alarmingly, only 42% of the students scored at or above the proficient level on the 2006 assessment. The percentage of students scoring at or above the proficient level by 2012 had increased to 43% (NCES, 2013, p. 2). Damasio, President of the Global Association of Teachers of Economics (GATE), stated

> this new NAEP (2006) assessment shows us that … Students have a pretty good grasp of the logic of economics—of trade-offs, of supply and demand… But when we look at the actual questions they can answer and the ones most of them get wrong, we see that many

> students are pretty shaky on the terminology of economics and on the actual ways that government and financial institutions work. (Damasio, 2007, p. 1)

A review of the NAEP sample questions revealed students, on the 2006 assessment, were more likely to incorrectly answer questions requiring the use of economic reasoning or application of economic principles to public issues. Similar to the Harris poll finding, students posted low scores on macro and international topics, such as feasibility analysis, price controls, interest rates, tax systems, GDP, the business cycle, and interdependence of global economic growth (NCES, 2007). The NAEP 2012 economics assessment scores were not significantly different from the 2006 economics assessment (NCES, 2013).

Low scores on the national assessment of economic knowledge are particularly disturbing because these low scores occurred at a time when enrollment in K-12 grade level economics classes were at an all-time high. According to the NAEP economic assessment report, only 13% of the 12th graders who took the assessment had no formal economic instruction. Either a general economics course or an advanced placement economics course were taken by 56% of the NAEP respondents. Even for students not enrolling in a formal economics course, 23% of 12th graders reported enrollment in either a business course or learning economic content that had been infused into another course (NCES, 2007). Research by Walstad and Rebeck (2012) supported the assertion that more students are taking economics courses than ever before. Analyzing data from the high school transcript study (HSTS), Walstad and Rebeck (2012) found that in 1982 only 23.9 % of all high school graduates enrolled in an economics course; by 2005, the percentage had risen to 44.4 %, and in 2009 had reached a high of 57.7% (p. 345). The number of high school students enrolled in the minimum economics credit (0.5) in 2009 was lower at 56.7% than other social studies subjects, such as U.S. history (1.0) at 94.2%; U.S. government, civics, and politics (0.5) at 84.3%; and world history (1.0) at 81.3%, but is a higher

percentage than those taking psychology or sociology (0.5) 38.5% and geography (0.5) 28.8% (Walstad & Watts, 2011, p. 3). At a time when K-12 grade students are taking economics courses at the highest level ever, still 4 out of 10 students have not taken a separate course in economics (Walstad & Watts, 2011).

The Harris poll, the Jump$tart coalition survey, and the NAEP economics assessment painted a dismal picture of economic literacy in America's schools at a time when enrollment in economics and personal finance classes was at an all-time high. The high level of enrollment in economics courses correlated with 22 states requiring completion of a high school economics course for graduation, per the Council for Economic Education (CEE) 2011 Survey of the States. According to Watts and Walstad (2011),

> As the market for the high school economics course grew over these decades, so too did initiatives to include economics instruction into other social studies course, and particularly in elementary grades even in core subjects such as language arts, mathematics, and science. Certainly standards developed by national organizations in other academic disciplines, and particularly other social studies classes, explicitly included a considerable amount of economics. (Watts & Walstad, 2011, p. 202)

To date, 40 states require economics concepts be incorporated into the curriculum (CEE, 2001). Arkansas social studies curriculum frameworks, or standards, embed economic concepts across the K-12 curriculum and include kindergarten to eighth grade social studies, Arkansas history, U.S. history, American history, geography, and world history. In July 2009, the Arkansas State Board of Education approved a one-semester economics requirement beginning with high school students graduating in 2014 (Economics Arkansas, 2013). By its actions, the state of Arkansas would appear to agree with Watts and Walstad (2011) that "In today's world, economics is simply too important to ignore in the daily news or in the K-12 curriculum" (p. 6).

Problem Statement

The question must then be asked, why do high school students not score higher on economic literacy tests if K-12 grade level students are required to take a course in economics and/or the content infused into the curriculum?

Considerable research was conducted to determine characteristics that predict a student's successful economic literacy score (Allgood & Walstad, 1999; Angrist & Guryan, 2004; Aske, 2000; Bach & Saunders, 1965; Carr, 1997; Grimes, Millea, & Thomas, 2010; Hoxby & Lee, 2004;, Parkison & Sorgman, 1998). One consistent factor critically impacting a student's economic literacy score was the human capital investment in economics of their teacher (Becker, Greene, & Rosen, 1990; Bosshardt & Watts, 1990; Butters, Asarta, & Fischer, 2011; Walstad & Watts; 2011; Watts, 1985). Human capital is defined as the knowledge and skills that people accumulate through education, training, or experience that enable them to supply valuable productive services to others (Heyne, Boettke, & Prychitko, 2014, p. 424). Rohlf (2011) stated that human capital is acquired through education and training (p. 508).

According to Allgood and Walstad (1999), "Teacher education in economics is essential if high school students are to have an opportunity to learn economics. Teachers need to develop a solid understanding of economics through course work because students cannot be expected to learn what teachers do not know" (p. 99). VanFossen (2011) analyzed influencing factors on elementary student learning of economic subjects and suggested a background in economics and education is critical. The "question is not really *whether* economics will be taught, but only *how well (or not)* it will be taught, given such factors as the classroom teacher's understanding and training in teaching economic concepts and issues" (Walstad & Watts, 2011, p. 5). Economic subject matter training, both in content and pedagogy, resulted in increased student learning

(VanFossen, 2011). While logically it makes sense that subject content training would be positively correlated to student achievement, the little research conducted to this point comes from math (Wiens, 2012).

Past research on K-12 grade level teachers' economic literacy focused on teacher coursework, training in economics, instructional materials, and methods. Research studies have used a proxy measure of the number of college courses taken by the teachers to equate to teachers level of economic knowledge (Aske, 2000; Rebeck, 2002). Other studies (Butters et al, 2011; Grimes, Millea, & Thomas, 2010; Lynch, 1990; Logan, 2011; Thorton & Vredeveld, (1977); Walstad & Watts, 1985) actually tested teachers' economic knowledge as part of pre- and post-testing during summer economics education workshops using the Test of Economic Literacy (TEL) or Test of Understanding of College Economics (TUCE). The review of the literature revealed research by Butters, Asarta and Fischer (2011) in Nebraska, Grimes et al. (2010) in Mississippi, and Logan (2011) in Arkansas tested their respective state for a statewide-level human capital investment in economics of teachers in after a summer workshops.

The Purpose of the Study

The purpose of this study was to determine the level and nature of economic literacy of Arkansas's K-12 grade teachers. This research used economic literacy tests specifically designed to measure economic content taught in elementary, middle school and high school to inform policy. The baseline data provided a means to evaluate, specific to a grade-level economic curriculum framework, an educator's economic literacy. In-service K-12 teachers were measured using grade-level standardized tests designed, for the CEE, to measure grade-level competencies per the voluntary national content standards in economics (economic standards; see Appendix A). The alignment of economic standards with Arkansas social studies

frameworks (Arkansas frameworks) allows for grade-level competencies, as per Arkansas social studies framework (see Appendix B). An economic literacy score and a score for each of the four economic content groups were calculated, allowing for an in-depth analysis of Arkansas teachers' economic knowledge, or lack thereof. Additionally, teachers completed a brief survey of educational background, training, and teaching tenure used to measure the level of human capital investment in economics by Arkansas K-12 teachers. The following points detail the purpose of the study:

1. To measure Arkansas K-12 grade-level teachers' economic literacy with a grade specific national normed test, grades kindergarten to sixth (elementary) Basic Economics Test (BET), seventh to ninth (middle school) Test of Economic Knowledge (TEK), and tenth to twelfth (high school) Test of Economic Literacy (TEL).
2. To analyze Arkansas K-12 grade-level teachers' economic literacy on the four economic content groups as defined by the CEE (economic fundamentals, microeconomics, macroeconomics, and international economics) to determine if there was a difference between content scores to inform policy.
3. To analyze Arkansas K-12 grade-level teachers' economic literacy on the 20 economic standards to determine if there was a difference between economic standard scores to inform policy.
3. To analyze Arkansas K-12 grade-level teachers' economic literacy score to determine if there was a difference in economic literacy scores between teachers of stand-alone economics classes and teachers of infused-content classes, based on the percentage of time spent on economic content to inform policy.

5. To analyze Arkansas K-12 grade-level teachers' economic literacy scores to determine if there was a difference in score by: educational background, professional development activities, tenure teaching economics, and school district environment to inform policy.
6. Analyze how good a predictor education, training, and school district environment on economic literacy score as to inform educational and professional development decisions for economics teachers.

Hypotheses of the Study

1. There is no difference in teachers' economic literacy score between grade levels.
2. There is no difference in teachers' economic literacy score on four economic content sub-category between grade levels.
3. There is no difference in teachers' economic literacy score on four economic content sub-category within grade level.
4. There is no difference in teachers' economic literacy score on the voluntary national content standards in economics between grade levels.
5. There is no difference in economic literacy score based on human capital characteristics.
6. There is no difference in economic literacy score based on a teacher's school characteristics.
7. There is an association between human capital investment characteristics and economic literacy score.

Research Questions

1. What is the level of economic literacy of Arkansas teachers?
2. Is there a difference in economic literacy percentage score by grade level?
3. Is there a difference in economic content percentage score by:
    a. Grade level

b. Within grade level kindergarten to sixth

c. Within grade level seventh to ninth

d. Within grade level tenth to twelfth

e. By self-evaluation of economic content knowledge?

4. Is there a difference in economic literacy percentage score and economic content percentage score by human capital investment?

    a. Undergraduate degree

    b. Graduate degree

    c. University attended

    d. Number of undergraduate economics courses completed

    e. Number of professional development workshops attended in the last five years

        i. Average length of professional development workshop in days

    f. Social studies Praxis exam

    g. Certification

    h. Number of years teaching economics

5. Is there a difference in economic literacy percentage score by school environment?

    a. Size of school district

    b. Geographic location

    c. Economic content infused vs. stand-alone class

    d. percentage of class time spent to infuse economic content

6. Is there a difference in 20 voluntary national standards in economic percentage score by grade level?

7. Which teacher characteristics best predict economic human capital investment?

a. By grade level

b. Within grade level

Significance of the Study

The significance of the study is it informs educational policymakers, curriculum directors, and state legislatures on economic training, curriculum evaluation, and systemic change to better meet the demand for an economically literate citizenry. The research informs policy makers regarding the formal education requirements for teachers responsible for economic content instruction. Research on the level of Arkansas teachers' human capital investment in economics informs responsible parties, in-service professional development staff, and external sources, such as the state Council for Economic Education, Economics Arkansas, the Federal Reserve, and Junior Achievement, to the type and structure of future economic workshops. The research provided policy makers a baseline assessment of the level and nature of economic knowledge of Arkansas K-12 teachers and provided an initial investigation of Arkansas K-12 teachers economic literacy based on national normed grade level economic literacy tests.

Limitations of the Study

Traditionally the sub-set of personal finance is not included in a discussion of economic literacy. Calderwood, Lawrence, & Maher explain "economics is not the same as personal finance and although the consumer plays a vital role in the economy, an exclusive devotion to wise buying or how to open a savings account is not itself economics" (as quoted in Miller & VanFossen, 2008, p. 289). Mankiw, economic advisor to former President George W. Bush, said regarding the inclusion of personal finance and economic literacy, "personal finance is a useful skill, but students need a more thorough grounding in other basic economic principles" **(**as

quoted in Grimes, 2012, p. 261**).** However as personal finance concepts are covered in the Arkansas Secondary Education economic curriculum frameworks for 2009, for the purpose of this paper personal finance is included in the scope of economic literacy. A specific question testing personal finance knowledge is outside the scope of the three economic literacy tests used in the research.

The sample was a voluntary sample obtained from an email listing and solicited by Economics Arkansas on behalf of the author; this limited the scope of data collection. While the sample is representative of the teachers in Arkansas and included teachers from a geographically diverse population, the sample is skewed in favor of teachers who participated in economic professional development activities. The survey and economic literacy test were completed via online survey and did not allow for monitoring of the testing environment.

The results are applicable only to the state of Arkansas. Although the research conclusions might provide insight into the nature of human capital investment in economics of Arkansas K-12 grade-level teachers, there is no implied generalization of results to a larger, smaller, or different population.

To delve into quantitative results in greater depth it is suggested a follow-up qualitative study be performed.

Definition of Terms

1. Arkansas Curriculum Frameworks – Guideline of academic discipline content to cover in a class, with benchmark of competency to master as developed by a social studies curriculum committee of teachers, university professors of history and political science, and economic education specialist from the Little Rock Federal Reserve and Economic Arkansas

2. Basic Economics Test (BET) – nationally normed test over content outlined in the Voluntary National Content Standards in Economics for kindergarten to sixth grade
3. Council on Economic Education (CEE) – organization dedicated to the improvement of economic education
4. Economic Fundamentals – basic elements of economic thinking, scarcity of resources, unlimited wants versus limited resources, trade-offs, opportunity cost, productivity of resources, economic systems, economic institutions, people respond to incentives, exchange, money as a facilitator of exchange, decision making on the margin, cost benefit analysis
5. Economic Literacy – the ability to apply the economic way of thinking, economics principles and methods in daily life experiences
6. Elementary teachers – kindergarten to sixth grade
7. Human capital investment – education, skills, knowledge, training, and experiences individuals accumulate and bring to the workplace
8. International Economics – international trade and finance, specialization and comparative advantage, why nations trade, exchange rates
9. Macroeconomics – measuring health of the economy, gross domestic product, unemployment, inflation and deflation, business cycle, monetary policy, fiscal policy, government policies to assure economic growth, unintended consequences of policy, big picture of the economy
10. Microeconomics – study of interaction of individual units in the economy choices under conditions of scarcity, how individuals and individual market choices affect prices and quantities, evaluation of competition within markets
11. Middle school teachers – seventh and eighth grade teachers

12. Test of Economic Knowledge (TEK) – nationally normed test over content outlined in the Voluntary National Content Standards in Economics for seventh to ninth grade
13. Test of Economic Literacy (TEL) – nationally normed test over content outlined in the Voluntary National Content Standards in Economics for tenth to twelfth grade
14. Test for Understanding College Economics (TUCE) – test to measure content taught in principles of microeconomics and principles in macroeconomics college courses
15. Voluntary National Content Standard in economics (economic standards) – 20 economic content standards, the accepted definition of economic literacy for K-12 education as developed by a committee of economist, social studies educators, college of education faculty members, curriculum and design specialist, and assessment specialist for CEE.

Conclusion

Chapter 1 presented the need for the research project and the research questions. Chapter 2 will provide a literature review of the importance of K-12 economic education, the development of curriculum guidelines, the testing instrument used to measure students' economic achievement, and factors affecting student achievement in economics focusing on the importance of teacher content knowledge to student success.

Chapter 2: Review of the Literature

Chapter 2 will provide a review of the literature. The chapter begins with a definition for economic literacy and the importance of economic education in the K-12 curricula. As economic education is an important component of K-12 curriculum a discussion of various methods used to measure economic literacy is presented. Next, the correlation of teacher characteristics to student achievement is discussed. The chapter concludes with a discussion of teacher preparation related to gain in economic content knowledge.

Economic Literacy

While no definitive definition of economic literacy exists, three main themes appeared in all literature of economic literacy; first is the role individuals play as consumers, producers, workers, savers, or investors and their use of information to make intelligent decisions (Dempsey, Meszarso & Suiter, 1999; Miller & VanFossen, 2008; Rivlin, 1999). Next is the role individuals' play as evaluators of public policy and legislation and their ability to analyze the potential implications of an economic situation (Buitrago, 2009; Carr, 1997; Corus & Ozanne, 2011; Ferber, 1999; Miller & VanFossen, 2008; Walstad, 1998). Finally, and of importance to current research, is the ability to apply basic economic principles and use economic reasoning in everyday life (Dahl, 1998; DeRooy, 1995; Ferber, 1999; Gupta, 2006; Lucas, Kruger & Blank, 2002; Miller & VanFossen, 2008; Wentworth, 1987; Wentworth & Western, 1990; Wheelan, 2002).

The key thread through all three themes is an economically literate individual who can apply basic economic concepts, logic, and structured ways of reasoning years after completing an economics course in a situation relevant to his or her life and different from those encountered in the classroom (Breidenstein, Butler, & Kamdar, 2001; Salemi, 2005). According to Fettig

(1999), "Economic literacy is not just about teaching people to react to certain policies or ideas, but how to put them into context and evaluate them" (para 8). To synthesize all definitions of economic literacy, I quote Alice Rivlin (1999), former Vice Chairman of Federal Reserve Board:

> Without a basic understanding of how the economy works, what the essential terms and concepts are, the average citizen is likely to feel completely left out of any conversation, whether in the media or around the water cooler, about what is happening in the economy and what to do about it. What economic literacy means –a rudimentary working knowledge of the concepts and language of economic activity and economic policy" (paras. 7, 11).

Why Economic Literacy and economic literacy in the K-12 curricula

> James Tobin, Nobel Laureate in Economics, stated
>
> The case for economic literacy is obvious. High school graduates will be making economic choices all their lives, as breadwinners and consumers, as citizens and voter. A wide range of people will bombard them with economic information and misinformation for their entire lives. They will need some capacity for critical judgment. They will need it whether or not they go to college. (as quoted in Walstad, 2007, p. 2)

Watts and Walstad (2011) said that "most people never take a college course in economics, so waiting until college courses in economics to develop economic literacy 'write off' most of the population of future consumers, savers, investors, workers, and citizens" (p. 201). Watts and Walstad went on to say that "In today's world, economics is simply too important to ignore in the daily news or in the K-12 curriculum" (p. 6). According to Gwartney and Schug (2011), "In teaching economics to students before college, most often we have only one opportunity to get it right. Most high school students will not go to college. For those that do, only a handful will study economics" (p. 11). Therefore, it is imperative to gain an understanding of economics prior to leaving high school.

The need for economic education was recognized as early as the 1940s, at which time the Brookings Institute reported "less than 5% of high school students had completed the equivalent of a one semester course in economics" (Allen, 1959, p. 95). The St. Louis Federal Reserve

Bank of St. Louis reported for the period 1998 to 2009 approximately 65.9% of high school graduates, defined as age 16 to 24, enrolled in two- or four-year colleges immediately after high school, and over the same period approximately 30% of individuals earn a bachelor's degree or higher (Canon & Gascon, 2013). According to the 2011 Current Population Survey of educational attainment, only 27.8 % of the population received a bachelor's degree or higher (Census, 2012). Of students who do go to college, only 40% will take an economics course, resulting in only 11% of the population having taken a college economics course (Mengel, 2003).

As a result of a 1940 Brookings Institution report, in 1948 the Joint Council on Economic Education was founded. The purpose of the Joint Council on Economic Education, now called the Council for Economic Education (CEE) "is to assist school systems and teacher preparation institutions in improving the quality of social and economic education programs and the preparation of materials for teachers and pupils" (Allen, 1959, p. 96). According to its mission statement:

> CEE is the leading organization in the United States that focuses on the economic and financial education of students from kindergarten through high school—and we have been doing so for over 65 years. We do this by educating the educators: providing the curriculum tools, the pedagogical support, and the community of peers that instruct, inspire, and guide" (About the CEE, 2015).

By early 1960, the American Economic Association and the Joint Council on Economic Education created a National Task Force on Economic Education, resulting in the 1961 report "Economic Education in the Schools: Report of the National Task Force on Economic Education." The report was an attempt to describe "the minimum understanding of economics essential for good citizenship attainable by high school students" (Saunders, 2012, p. 6). From its inception, the CEE believed economic concepts should be integrated into the curriculum

beginning with kindergarten and continuing through 12th grade through grade-appropriate curriculum. In the mid-1960s, the CEE began work on a document to describe the economic concepts to be taught in the K-12 curricula. In 1977, a final product, "A Framework for Teaching Economics: Basic Concepts (Frameworks)," was published (Rodgers, Hawthorne, & Wheeler, 2008; Saunders, 2012; Walstad, 2001, 2007). The Voluntary National Content Standards in Economics (Economic Standards), the current iteration of Frameworks, was developed in 1997 by the CEE, National Association of Economic Educators, Foundation for Teaching Economics, and the American Economic Association Committee on Economic Education. For economic education research, the Economic Standards are currently accepted as the operational definition for an economically literate person (Becker, 2007; Miller & VanFossen, 2008; Saunders, 2012).

Consisting of 20 economic content standards and accompanying 211 benchmarks, the Economic Standards describe what a student should have mastered by grades 4, 8, and 12 (Hansen, 1998; NCEE, 2010; Siegfried & Meszaros, 1997; Walstad, 2007). A summary of the Economic Standards is provided in Appendix A, and a complete listing of the most recent Economic Standards is found on the CEE website. Differing from standards developed by other social studies disciplines, Economic Standards are conceptual and not factual. The committee responsible for composing Economic Standards noted economic facts change constantly; however, if a student understood the conceptual ideas he or she would be able to use current economic data to solve any problem faced in the future (Siegfried & Meszaros, 1997). The Economic Standards mean students have "a comprehensive, integrated set of decision making concepts" (Jenkins & Sharp, 2001, p. 39). In addition to Economic Standards, economic content

is embedded in civics, geography, history, and other social studies frameworks (Hansen, 1998, Watts & Walstad, 2011).

The Economic Standards are grouped into four categories: economic fundamentals, microeconomics, macroeconomics, and international economic concepts. Standard 1 and the accompanying grade benchmarks of the Economic Standards follows as an example; for a complete list of standards, see CEE website (National voluntary economic content standards in economics, n.d.).

Standard 1: Scarcity, productive resources are limited. Therefore, people cannot have all the goods and services they want; as a result, they must choose some things and give up others.

- *Students will be able to use this knowledge to*: Identify what they gain and what they give up when they make choices.

Benchmarks

- At the completion of Grade 4, students will know that:
  - People make choices because they cannot have everything they want.
  - Whenever a choice is made, something is given up.
  - The opportunity cost of a choice is the value of the best alternative given up.
- At the completion of Grade 8, students will know the Grade 4 benchmarks for this standard and also that:
  - The choices people make have both present and future consequences.
  - Choices involve trading off the expected value of one opportunity against the expected value of its best alternative.

        - Like individuals, governments and societies experience scarcity because human wants exceed what can be made from all available resources.
    - At the completion of Grade 12, students will know the Grade 4 and 8 benchmarks for this standard and also that:
        - Choices made by individuals, firms, or government officials often have long-run unintended consequences that can partially or entirely offset the initial effects of their decisions.

Individual states often use the Economic Standards to develop their own state economic curriculum standards or to include economic content within social studies curriculum standards (Butters & Fischer, 2008; Grimes, 2012; Rogers, Hawthorne & Wheeler, 2008). Arkansas Social Studies curriculum framework standards mirror closely the Economics Standards both in content and grade level of appropriateness. For a complete listing of Arkansas social studies curriculum frameworks, see Arkansas State Department of Education website (Curriculum framework document, 2014). For an alignment of the Arkansas Social Studies Frameworks as correlated to the Economic Standards, see Appendix B. A comparison between Economic Standard 1, scarcity, to the Arkansas Social Studies Framework standard, choice, is given below.

Social Studies Curriculum Framework Grades K-8, Strand Economics Standard 7: Choices. Students shall analyze the cost and benefits of making economic choices.

Benchmarks

- At the completion of grade level, students will know that (each student is proficient in all requirements at current and previous grades):
    - Grade K, Discuss the concept of making choices related to wants and needs

- Grade 1, Determine the relationships between unlimited wants and limited resources
- Grade 2, Discuss that because of scarcity people must make choices and incur opportunity costs
- Grade 3, Evaluate examples from the local community that illustrate scarcity
- Grade 4, Evaluate the priority of economic wants and consequences of the opportunity cost
- Grade 5, Recognize that choices have both present and future consequences
- Grade 6, Explain that all decision making involves opportunity cost
- Grade 7, Investigate choices made by early civilizations that had long-range economic consequences
- Grade 8, Analyze scarcity of productive resources and the need for people to make choices and incur opportunity costs

Social Studies Curriculum Framework, Economics 9 -12, Strand: Economic Fundamentals, Content Standard 1: Students shall examine scarcity and choice. The Arkansas Standard 1 is based on the *Standards* Standard 1 above.

Benchmark:

- Describe the use of cost/benefit analysis in making choices by individuals, businesses, and governments
- Explain the concepts of tradeoffs (e.g., budget, career choices, earnings potential, education and/or training)

- Discuss individual or societal economic choices, which are guided by incentives and based on rational self-interest (e.g., employee benefits, tax incentives)

Given their breadth and depth, the Economic Standards cannot adequately be covered in a one-semester economics course. Grimes (2012) said "Students from kindergarten to twelfth grade are now exposed to economic principles once reserved for serious study by those in college (p. 259). Walstad and Watts (2011) agreed Economic Standards topics are complex by asserting "even a one semester course is not sufficient to adequately prepare students in the economic way of thinking. It is important that economic content be explicitly infused in other subjects. Fortunately, economics is almost certain to come up at different points in different kinds of courses in the K-12 curriculum" (p. 4). Therefore, it is important for economic education to begin as early as possible (Buitrago, 2009; Haskel & Jenkins, 2002; Jenkins & Sharp, 2001; Rivlin, 1999). The content for each economic standard should be introduced at the earliest appropriate grade level with increasing content complexity added at subsequent grade levels. Introduction of economic content into curriculum content requires selection of relevant Economic Standards for each student audience (Salemi, 2005). After a review of grade level-requirements of Economic Standards, Grimes (2012) said

> The extended breadth of content coverage at the elementary and middle school levels is apparent when comparing the current standards to the recommended "framework" concepts published in the mid-1980's. Today, sixteen of the twenty content standards have benchmarks for fourth grade students, whereas only nine of twenty-one "framework" concepts were recommended for introduction through fourth grade. Only one standard, fiscal and monetary policies, is reserved for introduction at the high school level. (2010, p. 263; see Appendix C)

This necessitates elementary teachers be knowledgeable in basic-level economic content. A number of studies found students in the lower grades were capable of learning economic

concepts (Mabry & Suiter, 2010; Miller & VanFossen, 2008; Valentine, 1994). A quick review of curriculum offered by the CEE found substantial classroom material designed for grade levels kindergarten through fourth grade.

In support of elementary grades learning economics, Kourilsky said,

> As a large number of today's at-risk elementary school students will never reach high school. Without economics instruction during their elementary school years, the students are not likely to acquire the knowledge and skills necessary for functioning successfully within the American economic system. (as quoted in James Laney, 1993, p. 99)

According to Mabry and Suiter (2010), "Elementary students can and do learn economics when their teachers are knowledgeable" (p. 17). Evans and Meszaro (2010) "argue economic instruction needs to start early to ensure students are well prepared for their adult roles as consumers, producers, investors, U.S. Citizens and global citizens. Young children can learn the basics of economics if teachers are knowledgeable about the content" (p. 4). Introduction of substantial economic content in the early grades places immense pressure on elementary teachers to have a strong understanding of economics.

Measuring K-12 Students Economic Literacy

No other emphasis in social studies has been quantitatively researched more than the teaching and learning of economics (Walstad, 1992). First developed in 1976, the most widely used instrument to measure student economic literacy is the nationally normed Test of Economic Literacy (TEL). The TEL was revised in 1985 to allow for a standardize test and again in 2001, resulting in a nationally normed test.

In past research, a TEL test was used to measure student gain scores after completion of a course in economics and/or a course infused with economic content. Infusion of economic content happens primarily in social studies classes, although economic content is also infused in consumer science, business, entrepreneurship, and mathematics. Multiple studies found students

enrolled in stand-alone economics classes had higher TEL scores than students who covered economic topics infused in other social studies, business, or family and consumer science classes (Asarta & Rebeck, 2010; Bushati, 2010; Graton-Lavoie & Gill, 2009; Poloeorgis, 2002; Rader & Stock, 1997; Rebeck, 2002; Walstad & Soper, 1989).

A review of high school student TEL scores by Walstad and Rebeck (2001) discovered students scored higher on questions covering economic fundamentals and lowest on macroeconomics and international content. In a study of high school students in Ohio, Rader and Stock (1997) found students scored higher on topics "relating to economic systems, money and currency exchange, and competition" (p. 63). Rader and Stock concluded "high school students understood these subjects best because they are becoming active participants in the economy either as consumer or producers or both….the subjects students understood least were scarcity of resources, market failures, and inflation" (p. 63). An explanation for both findings might be economic fundamentals and microeconomic content are covered early in the semester in high school economics textbooks and are therefore covered in more detail, while macroeconomic content coverage is often rushed since macroeconomic content is usually covered at the end of a textbook and thereby the end of semester.

Teacher Effect and Student Achievement on Economic Literacy Test Scores

Schug and Walstad (1991) list three reasons for low student TEL score: lack of teacher confidence, teacher preparation, and limited time available to cover economic concepts. Walstad and Watts (2011) identified three influences on student learning, "(1) the amount of time students spend on economics in their class, (2) teachers' knowledge and training in economics, (3) the use of instructional materials with good economics content and pedagogical methods that students and teachers find interesting and accessible" (p. 203). Teacher's economic training in

both content and pedagogy result in increased student learning (VanFossen, 2011). Miller and VanFossen (2008) suggested low TEL scores were a function of relatively low teacher economic knowledge and the lack of confidence in mastery of the subject material. This same hypothesis is supported by Allgood and Walstad (1999), Bosshardt and Watts (2005), Bosshardt and Watts (1990, 1994), Butters et al. (2011), Walstad (2007). All studies seem to imply low teacher preparation in economics content led to low student economic test scores.

An analysis of past research found a significant number of researchers identified the following as teacher characteristics influencing student economics achievement score: years of teaching, graduate credit hours in economics courses, number of professional development workshops attended, last date workshop was attended or college course work in economics completed, gender, undergraduate course work, taught an economics course, college undergraduate degree, age, grade level taught, teach a stand-alone economic class versus infused content , school size, gender, and certification (Allgood & Walstad, 1999; Becker, Greene, & Rosen, 1990; Butters & Fischer, 2008; Grimes, Millea, & Thomas, 2010; Heath, 1989; Koshal, Gupta, Goyal, & Choudhary, 2008; Logan, n.d; Lynch, 1990; Marlin, 1991; Tabesh & Schultz 2007; Valletta, Hoff, & Lopus, 2012; Walstad & Soper 1982, 1989; Watts, 1885, 2005).

Years of teaching experience had a positive effect on student achievement; however, the effect seemed to taper off after the first year and by the fourth or fifth was not applicable (Valetta et al., 2012, p 3). However, Valletta et al. (2012) concluded research conducted with regard to student achievement and teacher characteristics, such as academic degree, years of teaching experience, certification, and professional development, was not conclusive. Bosshardt and Watts (1990) researched teacher characteristics of college credits in economics, noncredit workshops in economics, years of teaching experience, and extent of the teacher's past

instruction in economics on student learning and found the most effective teachers were better trained, taught some economics, and worked in large to medium school districts. The number credit hours of economics completed by a student's instructor had no statistically significant difference on the students' TEL scores with one exception. Students enrolled in advanced placement (AP) economics courses scored higher on the TEL than students in a standard economics class or an economics-content-infused class (Miller & VanFossen, 2008; Rebeck, 2002). Scahill and Melican (2005) attributed the higher AP TEL score to the majority of AP instructors having completed at least 18 hours in economics (basically a minor in economics), whereas the normal classroom and infused-content instructors had completed on average only one economics course.

Teacher content knowledge and student learning.

Stanley (1991) described content knowledge as "what teachers need to know, the most recent knowledge in their discipline as well as the history and philosophy of that discipline, including schools of thought and how the knowledge base of the discipline informs or is informed by other disciplines and fields. A teacher's knowledge of subject matter influences how he or she modifies the materials used and the particular representations employed to teach concepts. Teachers who possess a high level of content knowledge were better able to detect student misconceptions, were able to discuss relationships between related subjects, and, more importantly, were able to explain the content for student understanding. Teachers with less content knowledge tend to be more superficial and frequently inappropriate or inaccurate in their presentation of the material" (p 253). The teacher has special responsibilities in relation to content knowledge, serving as the primary source of student understanding of subject matter.

The manner in which that understanding is communicated conveys to students what is essential about a subject and what is peripheral" (Shulman, 1991).

A number of studies found positive effects for teaching teacher training and content-specific disciplines but not for formal education including the attainment of advanced degrees (Aaronson et al., 2007; Valletta et al., 2012). Betts, Zau and Rice (2003) found a teacher's college major had no systematic impact on student achievement in high school. Harris and Sass (2007) and Clotfelter, Ladd, and Vigdor (2007) found math teachers that majored in mathematics education or had advanced degrees in math actually were associated with lower achievement scores.

In 1985, the CEE called for more formal teacher preparation in economics of at least one basic economic course for all elementary and secondary teachers. Additionally, CEE suggested all secondary social studies teachers complete at a minimum nine hours in economics, and all advanced placement teachers have a major in economics. Butters and Fischer, in their 2008 research of Nebraska teachers, found teachers who demonstrated more economic knowledge had a greater impact on their student's level of economic understanding. The teacher preparation should include economic content, a methods class, and clinical experiences (Schug and Walstad, 1991). VanFossen (2011) stated that economic subject matter training, both in content and pedagogy, resulted in increased student learning. Economic content knowledge may be obtained through formal education, in-service professional development, or summer institute workshops. What follows is a description of both methods of gaining economic content knowledge.

Teacher preparation.

Comments from a 1999 symposium on economic literacy expressed an educator's view on the current approach to assigning economics to a teacher's course load. Robb, Social Studies

teacher St. Paul Public Schools, said, "Social Studies teachers need to be decathletes," and Meszaros of the University of Delaware said "that while a chemistry teacher would not be expected to teach biology, a political science teacher is expected to teach economics" (in Fettig, 1999).

Clotelter et al. (2007) found teacher credentials had a larger effect on test scores than student characteristics. What is the level of human capital possessed by those entrusted to teach K-12 level economics? Hermanowicz stated "requiring formal instruction in economics in our schools by teachers *well prepared in the discipline* would be a major step to correct problems with economic illiteracy" (as quoted in Jenkins & Nelson, 2000, p. 102).

A 1994 New York state study by Eisenhauer and Zaporowski found no certification course requirements for economics teachers. Therefore, teachers could cross disciplines and teach economics without any formal preparation in economics. The study found 12% of those teaching economics had never taken an economics course (Eisenhauer & Zaporowski, 1994, p. 227). Aske (2000) reported nationally 27 states currently do not specify, except in United States history, western history, and state history, the minimum hours of coursework required in the various social studies disciplines necessary for licensure (p. 35). Lynch (1990) and Aske (2000) found for most social studies licensure programs the area of concentration is history. Research by Valetta et al. (2012) suggested that certification is a teacher characteristic to consider in examination of student achievement scores; he "examined middle school gain scores in mathematics from a single school district and found significant positive effects for content certification in mathematics" (p. 4).

Most economics content, whether taught as a separate economics class or infused into other subjects, is taught by teachers prepared to be comprehensive social studies teachers.

According to Miller & VanFossen, 2008, "Certification of teacher preparation follows the guidelines established by the National Council for the Accreditation of Teacher Educations, now the Council for the Accreditation of Educator Preparation (CAEP)" (p. 291). According to current CAEP

> Standard 1.3, the standard for content and pedagogical knowledge required Providers ensure that completers apply content and pedagogical knowledge as reflected in outcome assessments in response to standards of Specialized Professional Associations (SPA), the National Board for Professional Teaching Standards (NBPTS), states, or other accrediting bodies (e.g., National Association of Schools of Music – NASM). (Standarad 1: content and pedagogical knowledge, 2015)

According to the NCATE social studies program review (2010), "NCSS is the social studies specialty program association affiliated with NCATE." Referring to the National Council for the Social Studies (NCSS), disciplinary standards for teachers in licensure in history, geography, civics and government, economcis, and psychology. However, the document noted teachers desiring license in social studies do not have to meet the licensure requirement for the respective license above. A review of the disciplinary standard for economics indicated the 22 capabilites coordinate with the Economic Standards; however, no required economic courses are indicated (National Standards for Social Studies Teachers, volume 1, 2004). National Standards for Social Studies Teachers, volune 2, 2002, provide the guidelines for course work:

> The subject matter content course work for those licensed to teach social studies as a broad field
>
> - At the secondary school level should include no less than 40% of a total four-year or extended-preparation program, with an area of concentration of at least 18 semester hours (24 quarter hours) in one academic discipline.

- At the middle school level should include no less than 30% of a total four-year or extended-preparation program, with an area of concentration of at least 18 semester hours (24 quarter hours) in one academic discipline

The subject matter content course work for those licensed to teach a single discipline of history or social science at the secondary or middle school level should include both

- A discipline major of no less than 30% of a total four year or extended-preparation program; and
- Additional course work outside the major selected from each of the content fields specified in this standard in order to assure that the key concepts from history and the social science disciplines closely related to the major are studied and integrated with the major.

Walstad and Watts (1985) reviewed data from 15 states included in the 1981 National Survey of Economic Education and found economics teachers had limited coursework or in-service training in economics. The researchers found over half of elementary teachers had taken no economics course work and another 25% had completed only one course (Walstad & Watts, 1985, p. 139). The picture may not be as bleak as the results of the 1985 survey suggested. Aske (2000) researched Colorado high school economics teachers of both separate and infused classes. Of the 106 respondents to his survey, only 11% of the teachers had taken fewer than two economics classes (p. 27). Walstad (2001) stated to be effective a teacher should take five to six economics courses. Bach and Saunders (1965) found to improve a teacher's score on a standardized assessment required five or more courses in economics. Additional research by Lynch (1990) and (Swinton, De Berry, Scafidi, & Woodard, 2010) found to increase a

standardized economic assessment score a teacher would need to complete four economics courses.

According to Valletta (2012) overall teacher characteristics other than coursework in economics had inconsistent or insignificant effects on student learning. Teacher characteristics included completion of noncredit workshops, years of teaching experience, length of times since completion of their last economics course or workshop, and economics course load as a percentage of total teaching load (Walstad, 1992; Watts, 1985). Another factor that affected student learning was a teacher's attitude toward economics and teaching economics. A teacher's attitude to economics and their student's economic literacy achievement are beyond the established scope of this current research.

Professional development activities.

An alternative method to college courses used to increase a teacher's human capital investment in economics is teachers is in-service and summer workshops. Schug and Walstad (1991) listed no fewer than 11 studies conducted to determine success of a teachers' attendance at an economic workshops and improved student TEL scores. Attendance at workshops had a positive impact on economic knowledge of teachers and subsequently student test scores (Rebeck, 2002). Providing in-service and summer workshops was a primary function of the CEE. The workshops provided hands-on experience with grade-appropriate curriculum available from CEE. Many CEE workshops were led by economics master teachers. Additionally, the Federal Reserve System provided workshops on economic content, especially designed for infusion classes, with accompanying curriculum to K-12 grade-level teachers. Junior Achievement also provided curriculum to K-12 grade-level teachers. All three organizations function to increase investment in economic human capital of K-12 grade-level teachers. In

addition, there are numerous organizations and websites designed to provide economic resources to K-12 grade-level teachers. Harris and Sass (2007) and Valleta (2012) "found that professional development in the form of content specific training raise student achievement for students in Florida" (p. 4).

Measuring Teachers Economics Human Capital Investment

Human capital is defined 'as the knowledge and skills that people accumulate through education, training, or experience that enabled them to supply valuable productive services to others" (Heyne, Boettke, & Prychitko, 2014, p. 425). Miller and VanFossen (2008) and Schug and Walstad (1991) discussed the human capital investment in economics of teachers measured by a proxy of self-reported number of economics classes completed. A majority of research studies were designed to measure an increase in student economic achievement scores; researchers have measured the teachers' economic literacy using TEL or TUCE exams (Butters and Fischer, 2011; Grimes, 2010; Walstad and Watts, 1985). My review of the literature found limited research specifically designed to test the economic human capital of K-12 teachers (Grimes, 2010; Lynch, 1990; Ross, 1980). A review of the literature resulted in only one paper, unpublished (Logan, 2011), regarding human capital investment in economics of Arkansas K-12 teachers. Logan (2011) measured the increase in test scores for teachers attending an Economics Arkansas Workshop used TEL scores for all grade-level teachers. A review of the literature found no systemic research of current Arkansas K-12 grade-level teachers' economics literacy. Without knowledge of current economic literacy levels of current Arkansas K -12 grade-level economic teachers, how can effective in-service, workshops, or even licensure requirements be implemented to increase the human capital investment in economics of all teachers?

Conclusion

Chapter 2 presented a review of economic education literature. Discussing the importance of inclusion of economic content in the K-12 curriculum and properly trained teachers of economics. Chapter 3 will discuss the methodology used to measure teacher human capital investment in economics and economic literacy.

Chapter 3: Methodology

Methodology and research design are presented in chapter 3. The research design follows in part methods used by Allgood and Walstad (1999); Bosshardt and Watts (1990); Grimes, Millea, and Thomas (2010); Thornton and Vredeveld (1977); Walstad and Soper (1989); Watts (1985); and Weaver, Deaton, and Reach (1987). My research is grounded in a belief that student learning is affected by quality of instruction, and one influencing factor on quality of instruction is content knowledge of teachers. Thornton and Vreheveld (1977) stated "the teacher's knowledge of economics is an important ingredient in a students' learning of economics" (p. 96). Grimes et al. (2010), Weaver et al. (1987), and Watts (1985) all stressed the importance of teacher content knowledge and student learning. My research focused on factors that influence a gain in human capital investment in economics as measured by an economic literacy test. Human capital is defined as the knowledge and skills that people accumulate through education, training, or experience that enable them to supply valuable productive services to others (Heyne, Boettke, & Prychitko, 2014). Rohlf (2011) stated human capital is acquired through education and training (p. 508). Watts (1985) points to level of human capital as an input to student learning.

Measurement of economic literacy levels of Arkansas K-12 grade level teachers was one focus of my research. Secondly, my research predicted characteristics of human capital resulting in a higher teacher economic literacy score. Chapter 3 describes the methods and models used, data sampling technique, data collection, testing instrument, survey instruments, data coding, and data analysis methods.

Measuring Economic Knowledge

The Arkansas curriculum guidelines include economic curriculum frameworks for kindergarten through 12th-grade social studies and high school economics. Additionally**,** the state adopted a graduation requirement of a one-semester high school economics course effective in 2010. The question is, how prepared are Arkansas teachers to infuse or teach economic content in kindergarten through 12th grade?

Through the years, a large amount of research has been conducted regarding the economic knowledge of students and the significance of a teacher's human capital investment on student achievement. A majority of research conducted on teacher knowledge used high school teachers and a test of economic literacy. Research suggested economic knowledge must be obtained beginning in kindergarten and progress through subsequent years so students possess an appropriate level of economic content background for a capstone high school economics course. Thus, there is a need to measure the economic literacy of all teachers, regardless of grade level.

The primary tool for measuring a teachers' knowledge at all grade levels is the Test of Economic Knowledge (TEL). The TEL test was developed to measure content included in the 20 voluntary national content standards in economics. The 20 voluntary national content standards in economics defined an economically literate high school student. Butters and Fischer (2008) and Thornton and Vredeveld (1977) used the Test of Understanding College Economics (TUCE) to measure teachers' knowledge. The TUCE covered material that students completing a college economics course should comprehend.

My current research is different, as elementary, middle, and high school teachers will be tested on the same nationally normed economic literacy test their students would take. The research replicates, in part, research of Butters et al. (2011) and Grimes et al. (2010) in

measuring human capital investment in economics by teachers in Nebraska and Mississippi, respectively, and is an expansion on Logan's 2010 study to measure the economic literacy of Arkansas teachers. Previous research studied a teacher's education, training, and experience in relation to content covered by 20 national voluntary economic content standards (hereafter referred to as economic standards) and each state's curriculum standards. Soper and Brenneke (1981) studied teachers' scores on a specific TEL question and content categories to assess teachers' preparedness to teach specific content. As with Soper and Brenneke, focus for this study is to measure K-12 teachers' economic knowledge relative to grade-specific economic curriculum frameworks and content groups by using economic standards and either BET, TEK, or the third edition of TEL test.

Since my research question is concerned with preparation of grade-specific teachers to teach corresponding grade-level standards, teacher scores were analyzed for proficiency in the four concept groups of economic standards and each standard as related to Arkansas curriculum frameworks. Do teachers who possess specific education and training score significantly higher on standardized tests of economic knowledge? Do teachers in a specific geographic region of the state or a specific size of school score higher on a standardized economic literacy test? Pologeorgis (2002) and Watts (1985) found differences in school size related to higher literacy scores. To measure the economic literacy of K-12 teachers, three grade level tests were used; the Basic Economics Test (BET) (Walstad, Rebeck, & Butters, Basic economics test examiner's manual, 2010), Test of Economic Knowledge (TEK) (Walstad, Rebeck, & Butters, 2010), and Test of Economic Literacy (TEL) (Walstad & Rebeck, 2001).

Research Questions

1. What is the level of economic literacy of Arkansas teachers?

2. Is there a difference in economic literacy percentage score by grade level?

3. Is there a difference in economic content percentage score by:

    a. Grade level

    b. Within grade level elementary school teacher

    c. Within grade level middle school teachers

    d. Within grade level high school teachers

    e. By self-evaluation of economic content knowledge?

4. Is there a difference in economic literacy percentage score and economic content percentage score by human capital investment by:

    a. Undergraduate degree

    b. Graduate degree

    c. University attended

    d. Number of undergraduate economics courses completed

    e. Number of professional development workshops attended in the last five years

        i. Average length of professional development workshop in days

    f. Social studies Praxis exam

    g. Certification

    h. Number of years taught economics?

5. Is there a difference in economic literacy percentage score by school environment by:

    a. Size of school district

    b. Geographic location

    c. Economic content infused vs. stand-alone class

    d. Percentage of class time spent on economics content?

6. Is there a difference in 20 voluntary national standards in economic percentage score by grade level?
7. Which teacher characteristics best predict economic human capital investment
    a. By grade level?
    b. Within grade level?

The Econometric Model

The majority of research designed to mesure economic knowledge uses the education production function econometric model (Becker and Walstad, 1987; Butters, Asarta, & Fischer, 2011; Grimes, 1994; Hanushek, 1979; Rebeck, 2002). According to Rebeck (2002), "The education production function models factors hypothesised to influence economic literacy as 'inputs' and either the school, program or the student as the 'firm' that efficiently uses these inputs to produce achievement, or the firm's 'output'" (p. 66). The education production function is centered on a learner's accumulation of knowledge and is an appropriate model for this study as a teacher's accumlation of human capital investment in economics is measured through use of one of three economic literacy test. As stated in Butters, Asarta, & Fischer (2011) "student learning is critically impacted by teacher ability and preparation" (p. 48). According to Watts and Walstad (2011), a primary determinate in the production of high school students' economic knowledge is teacher training. My research project attempted to answer what type of training, personal, and school characteristics resulted in a high proficency level of economic knowledge for Arkansas teachers. Variables used in my model to define human capital investment included education background, teaching experience, attendance at professional development activities, and teaching environment.

The independent variables selected for modeling were based on a review of theoretical models of past research, specifically those of Allgood & Walstad (1999); Becker, Green & Rosen (1990); Bosshard & Watts (1990); Butters & Fishcer (2008); Grimes et al. (2010); Lynch (1990); Koshal, et al (2008); Swinton et al. (2010); Tabesh & Schultz (2007); Walstad & Soper (1982, 1989); and Watts (1885,2005).

To measure economic knowledge in terms of achievenment on a standardized test the education production function model used was:

$$U = f(E, T, P)$$

where

U = economic knowledge as measured by the appropriate grade-level test

E = educational background: undergraduate degree, graduate degree, economics courses graduate and undergraduate, university attended, certification, social studies Praxis, and self-evaluation of economic content knowledge

T = teaching environment: years taught economics, size of school district, geographic location of school district, type of economic content course taught, and percentage of time spent covering economics when infused into other subjects

P = professsional development activities: number of workshops attended in the last five years and length of workshop in days

The education production model provided the basic model for testing of statistically significant differences between categorical independent variables on achievement, to test for significant differences between the economic content groups and economic standards between categorical independent variables, and as the linear relationship to predict which independent variables best predicted success on economic literacy test as a measure of human capital

investment in economics. The model is defined as a stock model, an absolute mode of achievement where a test is used without a pretest (Walstad, 1990). A stock model is appropriate, as my research sought to measure a level of understanding.

The mutltiple regression model used, to predict human capital characteristics that resulted in a high economic literacy score, is an ordinary least square model. The economic knowledge score (U) is a measurement of economic knowledge at a specifice point in time and no prior knowledge measure is controlled for the model. (Rebeck, 2002, p 78). Multiple versions of the model are used.

$$U_i = \beta_0 + \beta_1 \text{ major } + \beta_2 \text{ courses } + \beta_3 \text{ yrteaching econ} + \beta_4 \text{workshops} + \beta_5 \text{ certification} + \varepsilon_i$$

$$U_i = \beta_0 + \beta_1 \, course + \beta_2 \, yrteaching \, econ + \beta_3 \text{ school size} + \beta_4 \text{ geograhpic} + \varepsilon_i$$

$$U_i = \beta_0 + \beta_1 \text{ course squared} + \beta_2 \text{ year teaching econ squared} + \beta_3 \text{ workshops squared} + \varepsilon_i$$

An analysis of variance (ANOVA) model was used to determine significant differences in a teacher's economic literacy score based on teacher educational background, teaching environment, professional development activities. I chose to use an ANOVA for comparison of group means instead of a mutliple regression, as the concern was not how well the independent variable predicted economic literacy score, but if there was a difference in how groups scored on achievement (Glass & Hoplins, 1996; Kirk,1995; O'Rourke, Hatcher, & Stepanski, 2005).

$$Y_{ij} = \mu + \alpha_i + \varepsilon_{ij}$$

A multivariate anlaysis of variance (MANOVA) model was used to determine differences in mean scores on four content groups, and scores on 20 volunatry national standards based on educational background, teaching environment, and professional development activities (Weaver, Deaton, & Reach, 1987). Steven (2009), in support of use of MANOVA in place of

univariate ANOVA, stated "the use of fragmented univariate tests leads to a greatly inflated overall type I error rate, that is, the probability of at least one false rejection" (p. 146).

$$Y_{ij} = \mu + \tau_{ij} + \varepsilon_{ij}$$

Variables

In addition to dependant variables of BET, TEK, and TEL test scores, the sub-category scores of the respective test, and the scores for each of the 20 standards described later in this chapter, the independent variables, logic for inclusion of variable and coding of each variable follow. For a detailed variable listing, see Appendix M.

1. Grade level taught – grade level primarily taught was coded kindergarten to sixth (elememtary) = 1, seventh to ninth (middle school) = 2, and tenth to twelfth (high school) = 3. Grade level was coded to correspond with grade levels as designated by the respective economic literacy test. A separate variable was created for each grade for use in the regression model in place of using dummy variables to better capture the results of each grade.
2. Gender – studies are mixed on the effect of gender on knowledge; research has shown males score higher on economic tests measuring stock economic knowledge (Siegfield, 1979; Watts, 1985). Data were coded 1 male, 0 female.
3. Age – the majority of research has hypothesized age a significant variable contributing to difference in literacy scores. Data were initially collected on age in categories 20-25=1, 26-30=2, 31-35=3, 36-40=4. 41-45=5, 46-50=6, 51-55 = 7, 56-60=8, over 60=9. The regression model used a continuous variable calculated as median age for each group; for the over 60 group I assumed a retirement age of 70 and used the median age to be 65. (Watts, 1985). The ANOVA and MANOVA analyses used age categories.

4. Age^2 – For the regression analysis, a quadratic variable was used to capture a non-linear relationship between age and economic understanding (Grimes et al, 2010; Koshal et al., 2008). The inclusion of age^2 allows for "learning by teaching" and is especially true for elementary teachers, who often lack course work in economics (Grimes et al., 2010, p. 15). It is hypothesized that by the mere fact of living, teachers would accumulate basic economic knowledge as they go through their daily lives. Exposure to newspapers, news shows, and political campaigns would provide basic economic content knowledge.
5. College undergraduate degree – As a proliferation of research dealt with high school economics students and teachers, a majority of studies found economics teachers have either a degree in history or social studies. Data were collected on undergraduate degrees earned, and each degree received a unique code; data were recoded into categories based on a frequency distribution for specific statistical test analysis. Regression anlaysis recoded data into a variable of degree in social studies (1) or other (0), and another variable degree in education (1) or other (0).
6. Undergraduate college/unviersity – Grimes et al. (2010) found the college or university attended influenced economic literacy scores. Data were collected on college/university atttended and each college/unversity received a unique code; data were recoded into categories based on frequency distributions for specific statistical test analysis. An additional degree variable code followed a coding scheme used by Grimes (2010); institutions were coded as in-state (0) and out-of-state (1).

7. Graduate degree - Sudies by Becker, Greene, and Rosen (1990), Walstand and Soper (1989), and Watts (1985) used graduate degree in place of undergraduate degree. Graduate degree was coded either yes (1) or no (0).
8. College graduate degree major – A majority of studies found economics teachers did not have a discipline-based master's degree but rather a master's in education. Participants were asked their specific graduate degrees, and each degree was given a specific code; data were recoded into categories based on frequency distributions for specific statistical test analysis. An additional graduate degree variable was coded as master's in education (1) or other (0).
9. Number of undergraduate economic courses – Allgood and Walstad (1999), Bosshardt and Watts (1985), Heath (1989), Marlin (1991), and Watts (1985) used credit hours in economics to predict economic literacy. Lynch (1990) and Walstad and Soper (1989) suggested the first few economics courses taken by a teacher did not have a significant effect on economic knowledge score; only after 4 courses was a significant effect found. In his research, Lynch (1990) used an exponential factor for number of economic courses completed in his econometric model. My research used both a linear and a quadratic regression model to test Lynch's hypothesis. Data collected the number of economics courses completed. Additional recoding of the variable occurred based on frequency distributions of actual data. Data were coded to 2 and fewer number of classes=0 and 3 and greater=1, based on the research by Grimes et al. (2010) and Lynch (1990), which found completing one or two economic courses had no significance on test scores and a higher test score required extensive economic course work.

10. Classes completed by teachers - Research by Watts (1985) found teachers who had completed specific economics course work scored higher on economic knowledge tests. Data were collected on the specific course(s) each teacher had completed; however, the full data set was not used in my research. Instead courses were coded as macroeconomics and microeconomic (1) or other (0).
11. Number of graduate economics classes – number of graduate economics course completed. As mentioned above, researchers found a better predictor of an economic literacy score was number of graduate hours completed as opposed to number of undergraduate classes completed.
12. Certification type –Reasearch by Butters and Fischer (2008) found a majority of economics teachers, at all grade levels, are certified in social studies with the primary emphasis history. Data on all certifications held by a teacher was collected and each certification was given a unique code. For analysis the data was recoded based on frequency distributions. For the regression model data was coded as social studies (1) or other (0).
13. Social studies Praxis – A majority of teachers either teaching or infusing economic content hold either history or social studies certifications (Ricker, 2002). The social studies Praxis exam is required by the State of Arkansas for social studies licensure (Arkansas test requirements, 2014). I hypothesized that having taken the Praxis exam would improve a teachers economic literacy score, since the social studies Praxis exam included economic content, The Praxis variable was code yes (1) or no (0).
14. Years of teaching economics – The longer a teacher studies and prepares to teach economics, the more self learning and knowledge accumulation occurs. Categorical

data were collected and each year of expercience received a coordinating categorical code for the first 10 years of expericence; teaching economics 11 to 15 years was coded as 11; the code for 16 to 20 years was 12; the code for 21-25 years was 13; and the code for more than 25 years code 14. The regression model used a continuous variable calcualted as integer year value for the first 10 years, and a median year used for range of years 11-18, 16-20, and 21-25; the value used for teachers over 25 years of experience is 26. The ANOVA and MANOVA anslyses used categorial code for age.

15. Years of teaching economics^2 - merely from the fact of teaching economics teachers would increase their self-taught knowledge (Kostal et al., 2008) which suggested years of teaching experience also has an quadratic effect on a teachers economic literacy scores. The variable used the converted integer years value.
16. Type of economics content course taught – type of course categorical codes are as follows: teach a stand-alone economics course code = 1, infuse economic content into other courses without teaching a stand-alone class = 2, teach no economic content = 3 (Allgood and Walstad, 1999; Bosshardt and Watts, 1990; Grimes et al., 2010; Walstad and Soper, 1989). For regression model analysis, I used a separate variable for each type of class: taught economics class yes = 0, no = 1; infused content yes = 0, no = 1; and no economic content yes = 0, no = 1.
17. Percentage of class time spent on infusion of economic content – Economic content is learned as more class time is devoted to teaching economic content (Allgood and Soper, 1999; Watts, 1985). It follows that if a teacher is spending larger chucks of time on economics he or she would gain increased economic knowledge as a result of

preparation time. Data were collect on time spent infusing economic content in categories of less than 12.5%, 12.5% to 25%, 26% to 33%, 24% to 50%, 51% to 66.7%, 67% to 75% and greater than 75% in the classes of civics, current events, general business, geography, government, language arts, mathematics, psychology, reading, sociology, social studies, U.S. history, world history, and other. Data were coded based on the percentage time ranges above with less than 12.5% = 1, 12.5% to 25% = 2, 26% to 33% = 3, 24% to 50% = 4, 51% to 66.7% = 5, 67% to 75% = 6, and greater than 75% = 7.

18. Number of professional development economic activities attended in last five years – respondents were asked how many professional workshops they had attended in last five years. By limiting the number of workshops to the last five years provide a more accurate count of professional development activites (Butters et al., 2011; Grimes et al., 2010; Swinton et.al., 2010). Watts (1985) hypothesized retention of economic knowledge may decay overtime unless the teachers take refresher courses; this is consistent with research of Saunders (1980) and Kohen and Kipps (1979). Thorton and Vredeveld (1977) found workshops have an impact on teachers' grasp of basic economic concepts. As a majority of teachers completed less than two economics courses, economic content workshops act to supplement lack of college economic courses (Swinton et al., 2010).
19. Number of professional development economic activities attended^2 - to allow for a non-linear return for workshops a squared value of number of workshops attended was used (Swinton et al., 2010).

20. Sponsoring organization of professional development workshops – respondants indicated if the workshop was sponsored by Economics Arkansas, a regional economic education center, Federal Reserve Bank, Foundation for Economic Education, a school district in-service workshop, educational cooperative, Jump$tart Coalition, Junior Achievement, university/college, or other.
21. Average length of workshops - To master economic content requires adequate time to assimilate information. It was hypothesized attendance at a professional development workshop of greater length would be more beneficial (Butters & Fischer, 2008). Data were collected as to length in days of workshops attended. For ANOVA and MANOVA analyses, the data were coded based on frequency distributions.
22. School district – Data as to each teachers school districts were collected and assigned a code; the code was assigned alphabetically. School district codes were then used to assist in coding other data. The school district code is not used in the analysis due to the small number of teachers per school in the data sample.
23. School district size – Butters et. al. (2011), Storm (1979), Walstad and Soper (1982), and Watts (1985) suggested students' economic knowledge scores are higher in larger school systems as larger districts provided for subject specialization, more instructional support, and professional developement. To account for school size, each district was classified 1A to 7A based on the Arkansas Athletic Association classification of schools (2013), with 1 being the smallest classification with a high school size less than 300 pupils and 7 being the largest classification with a high school size of over 1,000 pupils (see Appendix E).

24. Geographic location – Butter et al. (2011), Pologergis (2002), and Walstad and Soper (1989) found geographic location had a positive affect on economic knowedge. To measure for geographic location I initially used each school district's Arkansas state congressional district. However, for data analysis I recoded the school districts into five categories of northwest, northeast, central, and south and the counties of Benton and Washington in Northwest Arkansas to allow a balanced and more equal distribution of schools in each geographic area. See Appendix E.
25. Teachers self reported evaluation of their economic knowledge – a teacher ranked their economic content knowledge as very good=5, good=4, fair=3, poor=2, and very poor=1 (Grimes et al., 2010)

Population and Sample

The population of concern is all Arkansas K-12 teachers regardless of teaching discipline. The sample is a voluntary sample of teachers from across the state. The sample was collected with the assistance of Economics Arkansas. Initially, letters were sent to regional educational cooperatives asking for their assistance in reaching teachers of all subjects. Two educational cooperatives replied, both in Northern Arkansas; as the research needed a broad georgraphic representation, another method to obtain data was sought. Economics Arkansas and the Little Rock Federal Reserve Banks education department were contacted. The Little Rock Federal Reserve referred the request to Economics Arkansas. Economic Arkansas agreed to distribute the research teacher characteristic survey and test link using a Economic Arkansas's email distribution list of 1,000 plus names. The email included a cover letter explaining the research and a link to Survey Monkey website where the actual research survey instrument and grade-level test resided. The first email distribution was in May 2013, with a return rate of 93

responses. A follow-up email request was sent in September 2013, resulting in an additional 112 responses which resulted in a total of 205 completed surveys an approximate 20% response rate.

Measure Instruments

Three tests of economic knowledge and a teacher characteristic survey were used as the data instruments.

Teacher survey.

The teacher characteristic survey was developed after reviewing economic education research studies, teacher surveys, and questionaires. A review of the literature provided the basis for inclusion of each of the sruvey questions. Construct validity resulted from the use of survey questions modeled after questions used by prominent economic education researchers. (Allgood and Soper, 1999; Grimes et al., 2010; Koshal et al., 2008; Lynch, 1990; Swinton et al., 2010; Tabesh and Schultz, 2007; Walstad and Soper, 1989). See Appendix F for the survey instrument.

Economic literacy (knowledge) tests.

The economic knowledge tests are nationally normed tests by the Council for Economic Education and all align with the 20 voluntary national content standards in economics. As the Arkansas K-12 economic curriculum frameworks correlate to the 20 voluntary national content standards in economics (see Appendix B) the three tests will assess Arkansas teachers' economic knowledge over content they are expected to teach in their respective grade-level classes. The Arkansas economic curriculum standards were developed by a committee of Arkansas teachers, college professors, an economic education specialist from the Little Rock Federal Reserve, and a representive from Economics Arkansas. Walstad and Soper (1988) stated "nationally normed test provide reliable measurement of stock achievement scores" (p. 26). The test questions also

measure the economic knowledge based on four subtest groups of basic economic fundamentals, microeconomics, macroeconomics and international economics as defined in the Test of Economic Literacy (TEL) Examiners Handbook (Walstad and Rebeck, 2001). The items included in each of the tests were designed to differentiate between students who understood economic concepts and those who did not. Per each tests examiners manual item, discrimination results from the norming process verifed each test could discriminate between students with more or less economic knowledge. All three of the tests, the Basic Economics Test (BET), Test of Economic Knowledge (TEK), and the Test of Economic Literacy (TEL), are paper-and-pencil tests; however, permission was received from CEE to covert the test to an electronic form for this research (see Appendix O). All three tests are designed as achievement tests to assess the recognition and understanding of economic concepts and the ability to apply economic principles to real-life situations (Pologeorgis, 2002, Saunders, Fels & Welsh, 1981). Each test also measures the cognitive level of learning as defined by Bloom's taxonomy.

Pre-kndergarten to sixth grade teachers were tested using the third edition of the BET Form A (Walstad, Rebeck, and Butters, 2010). The BET was "designed to measure the economic understanding of upper elementary and lower middle school students" (Walstad, Rebeck, & Butters, 2010, p. 1). The test measures cognitive levels of knowledge, comprehension, and application (Walstad, Rebeck & Butters, 2010, p. 7). The nationally normed test was developed to be completed in 30 minutes. The maximum score is 30. Schools from Little Rock, Rogers, Forrest City, Mountain View, and Bentonville, Arkansas, participated in the norming process. All except Mountion View are school districts represented in the current research data base.

The norming process provided statistical data on reliability and validity of the BET. If a test has reliability, the same student should receive about the same score each time he or she takes the test if no other instruction occurred. The measure for reliability is Cronbach alpha; the BET Form A's Cronback alpha is .78 and the standard error of measurement is 2.49, which reflect good internal consistency (Walstad, Rebeck & Butters, 2010, p. 22).

Content validity indicates whether a test measures what it is suppose to measure. According to Walstad, Rebeck, and Butters (2010),

> The BET covers economic content that is considered to be important in instruction for students in elementary school or the beginning of middle school….items on the BET contain valid content as oulined in the *Standard*….the test developers also evaluated the content of questions for potential bias or reading problems that would affect the performance by different types of fifth and sixth grade students. The BET content validity was determined by comparing the test questions with the content judged to be important by authoriatative academic experts and sources in economic education. (p. 23)

Experts in the discplines of economic education, curriculum development, teacher training, and test development composed the committee writing and norming the BET. Evidence for the content validity comes from the norming process.

Construct validity is the ability of the test to measure economic understanding. The norming process provided information on construct validity. According to Walstad and Rebeck (2010), "On form A, the students with economic instruction scored +2.4 points higher, compared to to students without economics instruction" (p. 23). See Appendix G.

Teachers of students in grades seventh to ninth used the second edition of the TEK Form A. The nationally normed TEK was "designed to measure the economic understanding of students near the end of middle school years and at the beginning of high school" (Walstad, Rebeck, Butters, 2010b, p. 1). The TEK used Bloom's taxomony to measure cognitive levels of learning of knowledge, comprehension, and application. The TEK test consists of 40 multiple-

choice questions, designed to be completed in 40 minutes. The TEK test, developed for the CEE, is designed to measure the content of the 20 voluntary national content standards in economics to be introduced during the upper middle school years. A committee of experts in economic education, teacher training, and test development designed the TEK test. Arkansas school districts involved in the norming process were Fort Smith, Fayetteville, Mountain View, and Springdale. All except Mountain View are included in the current research database.

The norming process provided the statistical data on the reliability and validity of the TEK. If a test has reliability the same student should receive about the same score each time they take the test if no other instruction occurred. The measure for reliability is Cronbach's alpha, the TEK test's Cronbach's A alpha is .86 and the standard error of the measurement is 2.85, which reflect good internal consistency (Walstad, Rebeck, Butters, 2010b, p. 16).

Content validity indicates the test measures what it is suppose to measure. According to Walstad, Rebeck, and Butters (2010b),

> The TEK covers economic content that is considered to be important in instruction for students in middle school or the beginning of high school. The process used in test development ensured that the items on the TEK would contain valid content as outlined in the twenty voluntary national standards in economics. The content validity of the TEK was determined by comparing the test questions with content judged to be important by authoritative academic experts and sources in economics and economics education. (p. 23).

The committee writing and norming the TEK included experts in economic education, teaching and curriculum development, training teachers, and test development. Evidence for the content validity comes from the norming process.

Construct validity is the ability of the test to measure economic understanding. The norming process provided the information on construct validity. According to Walstad, Rebeck,

and Butters (2010b), "Students with economics instruction scored 3.95 points higher on Form A, compared to students without economics instruction" (p. 23). See Appendix H.

Teachers of grades 10 to 12 were tested using the TEL third edition Form A. The TEL is "a nationally normed and standardized test for measuring the achievement of high school students in economics" (Walstad & Rebeck, 2001). The test also measures the cognitive levels of knowledge, comprehension, and application (Walstad, Rebeck, 2001, pg 7). In addition to alignment with the 20 voluntary national standards in economics, the TEL measured students' knowledge in four content categories: fundamentals of economics, microeconomics, macroeconomics, and international economics as defined by the Framework for Teaching Basic Economic concepts developed by Saunders and Gilliard (Walstad and Rebeck, 2001). The nationally normed TEL test consisted of 40 multiple choice questions with a maximum score of 40. One Arkansas school, Conway High School, was included in the norming group and is included in the current research database.

The norming process provided the statistical data on the reliability and validity of the TEL. If a test has reliability, the same student should receive about the same score each time they take the test if no other instruction occurred. The measure of relaibility is Cronbach's alpha; the Tel Form A's Cronbach alpha is .89 and the standard error of measurement is 2.76, which reflect good internal consistency (Walstad, Rebeck, 2001, p. 17). Additionally, the test-retest Pearson correlation was .94 (Walstad, Rebeck, 2001, p. 28).

Content validity indicates the test measures what it is suppose to measure. According to Walstad and Rebeck (2001),

> The economic content that should be represented on the TEL was explained in two national guidelines for the teaching of economics… (1) A framework for teaching basic economic concepts (2) voluntary national content standards…the content validity of the TEL was determined by comparing the test questions with the content judged to be

> important by authoritative academic experts and sources in economics and economic education. (p. 29)

The three committees that developed the TEL were: 1) teachers of high school economics, 2) college and university professors who serve as Directors of Economic Education Centers, and 3) prominent economists with an interest in economic education. Evidence for content validity comes from the norming process.

Construct validity is the ability of the test to measure economic understanding. The norming processs provided information on construct validity. According to Walstad and Receck (2001), "On Form A, the students with economic instruction scored 6.02 point higher than students without economic instruction" (p. 29). See Appendix I.

Data coding of test items and content group scores.

The literacy score was calculated by creating a data variable, economic literacy score, and recording the multiple choice answer for each question (1 for correct and 0 for incorrect) based on the answer key provided in the examiner's copy for each of the three economic literacy tests. Economic literacy scores were calculate by raw score and percentage score.

The four economic content sub-category scores were constructed using information provided in the TEL examiner's manual. The four subcategories are economic fundamentals, the essential prinicples of economics; microeconomics, interactions within the market system; macroeconomics, measuring a nations economic activity; and international economics, globalization and trade (Walstad & Rebeck, 2001, p. 6). The BET and TEK sub-category scores required the researcher's subjective evaluation of test question items to include in each sub-category based on the TEL guidelines; see Appendix J for assignement of question items to content sub-category group per grade level.

Assignment of BET, TEK, and TEL questions to each of the 20 volunatry national content standards in economics used information provided by each economic literacy test examiner's manual see appendix K.

Data processing and analysis

Data analysis, data re-coding, and data extraction used the Statistical Package for Social Studies (SPSS) version 20.

Conclusion

Chapter 3 presented the methodology used in my research. Data instruments were explained and reliability and validity of each item were presented. Data coding schemes and logic for each coding scheme were presented. The statistical models of regression, ANOVA, and MANOVA were presented. Results of the data analysis and statistical findings are presented in chapter 4.

Chapter 4: Results of the Study

The analysis of research results is presented in Chapter 4. The study was undertaken to determine the level of economic literacy and human capital investment in economics of Arkansas K-12 grade-level teachers, as measured by nationally normed tests correlated to the 20 voluntary national standards in economics and state economic curriculum frameworks (see Appendix B). Economic literacy scores were analyzed based on educational background, professional development, teaching experience, and type of courses taught as a measure of human capital investment. Where data permitted, data were analyzed within grade levels. Human capital is the "knowledge and skills that people accumulate through education, training, or experience that enable them to supply valuable productive services to others" (Heyne, Boettke, & Prychitko, 2014, p. 425). To determine the teachers' economic knowledge and economic human capital investment, they were tested using the same grade-level economic knowledge test that their students would have taken. While a specific economics course is required for graduation, economic concepts are part of the curriculum frameworks beginning in kindergarten. According to Walstad (2001),

> Economics can also be taught by infusing economics concepts into other courses. This approach is especially appealing in the middle school and elementary grades. Another promise of the infusion approach is that students learn throughout their education the basic economic concepts that prepare them for a culminating, capstone high school economics course. (p. 203)

As teachers at each grade level need to be fluent in the concepts designated for their respective grades, it was important to gauge their economic knowledge of those grade-specific concepts. Teacher scores were also analyzed based on four economic content categories: economic fundamentals, microeconomic, macroeconomic, and international economic concepts.

The purpose of this research was to provide a base-line assessment of the level and nature of economic knowledge of Arkansas K-12 grade-level teachers based on Arkansas grade-level economic curriculum benchmarks. However, the study is not just about a score but also the amount and type of human capital investment economics teachers make in their own economic knowledge. Furthermore, the research provided an assessment of teacher characteristics that resulted in higher economic literacy scores. Additionally, the research provided an analysis of economic content in which K-12 teachers lack mastery, suggesting possible areas of need for professional development.

Research Questions

1. What is the level of economic literacy of Arkansas Teachers?
2. Is there a difference in economic literacy percentage score of teachers by grade level?
3. Is there a difference in economic content percentage score by:
    a. Grade level teachers
    b. Within grade level elementary school
    c. Within grade level middle school
    d. Within grade level high school
    e. By self-evaluation of economic content knowledge?
4. Is there a difference in economic literacy percentage score and economic content percentage score by human capital investment:
    a. Undergraduate degree
    b. Graduate degree
    c. University attended
    d. Number of undergraduate economics courses completed

    e. Number of professional development workshops attended in the last five years
        i. Average length of professional development workshop in days
    f. Social studies Praxis exam
    g. Certification
    h. Number of years taught economics?
5. Is there a difference in economic literacy percentage score by school environment
    a. Size of school district
    b. Geographic location
    c. Economic content infused vs stand-alone class
    d. Percentage of class time spent on economics content?
6. Is there a difference in twenty voluntary national standards in economic percentage score by grade level?
7. Which teacher characteristics best predict economic human capital investment
    a. By grade level?
    b. Within grade level?

Summary of the Teacher Data Set

A sample of 205 teachers submitted the electronic survey and economic literacy test from an email listing of 1000 plus names, an approximate 20.5% response rate. The data included K-12 grade teachers, non-teaching staff, and a college professor. Omitting the 10 administrative staff resulted in 195 K-12 teacher surveys, providing sufficient demographic, educational background, licensure, and economic education professional development information to be included in the study. However, of the 195 teachers only 182 teachers completed the grade-level economic literacy test. As grade-level economic literacy tests were used as the measure of

economic literacy and human capital investment, only 182 teacher surveys and matching grade-level economic literacy test provided valid data for use in this research, resulting in a response rate of 18.2%.

Gender and grade level participants.

Teacher data was grouped into grade-level breakdown as used by the three literacy tests. The data set included 68 (37.4%) elementary teachers, 47 (25.8%) middle school teachers, and 67 (36.8%) high school teachers. The gender breakdown was 32 (17.6%) male and 150 (82.4%) female.

Table 1

Participants Frequency by Gender and Grade level, percentage in parentheses

Gender	Elementary school	Middle school	High school
Male	3	10	19
Female	65	37	48
Total	68 (37.3)	47 (25.9)	67 (36.8)

Age and teaching experience by the participants.

The age of participants ranged from 25 years or under (2.2%) to over 60 (7.7%) years. The median age category was the 46- to 50-year-old age group. Years of teaching experience ranged from teachers waiting to be assigned to their first positions to teachers with more than 25 years of experience. The median years of teaching experience were 11 to 15 years.

Economic teaching experience by the participants.

Forty-one percent of teachers in the sample either were currently or had previously taught a class in economics. Of teachers assigned to teach economics in Arkansas, 66.7% have taught economics for four or fewer years; see Table 2 for years of experience teaching economics by grade level. Of the teachers in the survey indicating they had previously or were currently teaching economics, 18% indicated they had no coursework in undergraduate economics. The

18% of teachers with no economics coursework is not consistent with past research findings (Butters et al., 2011; Grimes et al., 2010; Watts & Walstad, 2011; Walstad and Soper, 1982). A low percentage of those in the study who had not taken an economic course may be attributed to the data collection method of using the database of Economics Arkansas.

Table 2

Number of Years Participant has Taught Economics

Years teaching Economics	Pre K – 6th grade	7 – 9th grade	10-12th grade	total
1	1	4	4	9
2	1	3	7	11
3	1	8	3	12
4	3	8	6	17
5	0	2	3	5
6	3	0	0	3
7	2	0	2	4
8	0	0	0	0
9	0	1	1	2
10	1	0	1	2
11 – 15	0	0	2	2
16 – 20	2	0	1	3
21 – 25	1	0	0	1
26 +	0	0	3	3
Total	15	26	33	74

A large number of participants, 73.6%, indicated they had taken an economics course; however, the average number of classes completed were 1.7 for current teachers of economics and 1.5 for non-economics teachers. Macroeconomics was taken by 41.8% of the survey participants, followed by microeconomics at 35.7%; see Table 3 for a complete listing of economic courses. Interestingly, given a renewed emphasis in personal finance inclusion in economic literacy, only 1.6% of the survey participants had completed a course in personal finance. Becker, Greene, and Rosen (1990), Walstad and Soper (1989), and Watts (1985) suggested the number of graduate economic classes taken by a teacher is a better predictor of his

or her students' economic achievement scores; nine of the study participants indicated they had taken a graduate economics course, but only seven of those participants previously or currently were teaching an economics course. The mean number of graduate economic courses for those currently teaching or having previously taught economics is less than one economic course.

Table 3

Percentage of Economic Courses Completed by Participants

Course	percentage
Macroeconomics	41.8
Microeconomics	35.7
A survey of economics	23.6
Economics for elementary teachers	15.9
Business finance	8.8
Money and banking	8.2
Other	3.8
Economics for secondary teachers	3.3
Public finance	2.7
International trade	2.7
Intermediate microeconomics	2.2
Global issues	2.2
Economic history	2.2
Personal finance	1.6
Economic thought	1.6
International economics	1.1

Note: other category included family economics, forestry economics, marketing, accounting, economic business ethics, business law, modern political economics, and farm business management.

While only 41% of teachers in the sample taught economics classes, an additional 52.2% infused economic content in classes they taught. Table 4 reflects the time spent infusing economics content into specific courses; in parenthesis is the percentage of the total respondents for each subject. Also included in the table is the mean number of undergraduate economics courses completed by instructors. On average, teachers infusing economics content into their classes completed one to two economics classes.

Table 4

Percentage of Time Economic Content is Infused in Other Social Studies Courses

Subject	Median Time spent on economic content (percentage of respondents)		Teachers' Mean number of under graduate economic courses
Civics	12.5% - 25%	(52.8%)	1.67
Current events	26% - 33%	(58.5%)	1.68
General Business	12.5% - 25%	(55.3%)	2.34
Geography	12.5% - 25%	(51.2%)	1.51
Government	26% - 33%	(62.5%)	1.50
Language Arts	12.5% - 25%	(55.8%)	1.06
Mathematics	26% - 33%	(57.1%)	1.34
Psychology	Less than 12.5%	(72%)	1.68
Reading	26% - 33%	(50.0%)	1.20
Sociology	Less than 12.5%	(60%)	1.72
Social Studies	26% - 33%	(56.1%)	1.38
U.S. History	26% - 33%	(69.1%)	1.32
World History	26% - 33%	(79.6%)	1.63
Other	12.5% - 25%	(63%)	1.62

Note: The other courses that infused economic content included Arkansas history, business subject, family and consumer sciences, foreign languages, personal finance, and studio art.

Teacher degrees and certification.

Teachers earned degrees in 38 majors awarded from 51 different Universities. Out-of-state institutions represented 22% of the sample. For institutions representing Arkansas colleges and universities, the University of Arkansas, Fayetteville, represented 15.4% of sample. The mean number of undergraduate economics courses completed ranged from 1.47 to 2.67 courses per institution; see table 5 for the mean number of economics courses taken at each university.

Table 5

Average Number of Economic Courses Completed by University

University	Mean number of Economic Courses
Arkansas State University	2.50
Arkansas Tech	2.67
Henderson State University	2.07
Ouachita Baptist	2.25
University of Arkansas, Little Rock	2.28
University of Arkansas, Fayetteville	2.27
University of Arkansas, system	2.00
University of Central Arkansas	1.47
Other Arkansas Universities/colleges	2.41
Out of State Schools	2.07
No School Listed	2.50

Elementary education majors represented 25.8% of the participants, which was the largest percentage by majors. Social studies education majors represented 18.1% of participants. According to Butters and Fischer (1997), a majority of certifications in social studies had an emphasis in history; for participants in this study, 9.3% of the participants held bachelor's of arts degrees in history. Regardless of the degree earned, 73.6% of the participants took an undergraduate economics course. However, for elementary education majors, 48.9% took an economics course versus 51.1% who did not take an economic course; see Table 6 below. Elementary education majors were more likely to have completed an economics course if they attended Arkansas State University, Henderson State University, or Ouachita Baptist University.

The lack of economic course work by the majority of elementary education majors is of concern, as economic content is included in Arkansas elementary social studies curriculum frameworks. Of the participants with the majors of business and vocational education, 100% were most likely to have taken an economics course. Middle and secondary social studies majors represented the second largest number of participants completing economics courses at

96%. Of participants who completed an economics courses only 21.6% had taken 3 or more economics classes, see table 7 for number of economics courses completed by undergraduate degree. Lynch (1990), Watts (1985) and Walstad & Soper (1989) indicated teachers needed three or more classes to have an effect on student achievement.

Table 6

Number of Teachers Completing an Undergraduate Economics Course

Grade level	Yes	No
K - 6	38	30
7-9	37	10
10-12	59	8

Research by Becker, Greene, and Rosen (1990) emphasized the importance of a graduate degree to student achievement. Of the participants, 61.5% held a graduate degree; however, only 7% of teachers holding graduate degrees had taken an economics course. It has been hypothesized the reason so few teachers with graduate degrees complete an economics course is for the most part graduate degrees for teachers are not a discipline degree but a generalized Masters in Education degree. Current research would support the hypothesis, as 52% of graduate degrees were reported as master's in education, of which only one individual had taken a graduate economics course. Interestingly, the highest number of teachers who had completed a graduate class in economics taught in grades seventh through ninth.

Traditionally, those teaching economics hold social studies certification. Participants held various certifications (see table 8), providing a diverse sample population. Licensed social studies teachers accounted for 69% of teachers of economic content, and 92% completed an economics course. Table 9 details the certification of participants' currently teaching economics within Arkansas K-12 schools. Please note teachers could hold certification in more than one area.

Table 7

Number and Percentage of Participants Completing Economic Courses and Mean Number of Courses by Degree

Degree	Economics	No Economics	Mean number of classes
Elementary education	21	23	1.29
Elementary social studies	7	1	1.57
Secondary education	8	4	2.88
Middle school	2	1	2.00
Middle / secondary social studies education	24	1	1.92
BA history	16	1	1.25
BA social science disciplines	6	4	1.83
Business	18	1	4.33
Business education / vocational education	25	0	2.00
Family and consumer science	2	0	2.00
Other	5	12	2.00

Note: other majors included art, biblical studies, chemistry, drama, English, English literature, journalism, liberal arts, mathematics speech, theatre

Table 8

Percentage of participants completed economics by certification type

Certification / endorsement	Economics	No economics
Age 3 & 4 Endorsement (Pre K)	73	27
Business Technology (4-12)	95	5
Career Orientation (7-12)	95	5
Elementary (K-6)	52	48
Family Consumer Science (7-12)	88	13
Gifted & talented (K-12)	59	41
Marketing	100	0
MCH social studies	74	26
Middle childhood (4-8)	57	43
Social studies (7-12)	93	7
Special education (K-12)	82	18
Other	52	48

Other includes administration, art (K-12), career orientation (4-8, K-12), drama, earth science, English (7-12), English language arts (7-12), journalism, library media, life science, mathematics, physical education (K-12), speech

Table 9

Number of Participants Teach Economics by Certification Completed Economic and Number of Classes

Certification / endorsement	Teach	Economics	Mean number of classes
Age 3 & 4 Endorsement (Pre K)	1	0	1.36
Business Technology (4-12)	11	10	2.60
Career Orientation (7-12)	3	3	2.36
Elementary (K-6)	8	4	0.80
Family Consumer Science (7-12)	1	1	2.00
Gifted & talented (K-12)	8	4	0.94
Marketing	1	1	3.20
MCH social studies	11	10	1.47
Middle childhood (4-8)	1	0	1.86
Social studies (7-12)	40	37	1.79
Special education (K-12)	2	2	1.90
Other	8	4	1.33

Other included, career orientation (4-8, K-12), administration, drama, English, journalism, library media, mathematics, physical education (K-12). Teachers may hold more than one certification.

School districts represented.

The teachers who participated in this study taught in 83 school districts. The school districts were grouped by size using the Arkansas Athletic Association (AAA) classification based on high school enrollment. Per the AAA, the districts represented ranged from the lowest classification 1A (133 to 19 enrollment) to the largest 7A (2591 to 1290 enrollment; Schools and clasifications, 2014). School districts from all classifications are represented within each grade level in the survey data. Classification 7A accounted for 32% of the school classifications, while classifications 1A and 2A combined accounted for 11% of the sample data (see Table 10). To assist policy makers in using research results, it was important for the sample to be representative of the entire state. School districts represented a geographically diverse population from 64% of the state's counties. The percentages of participants from each region, respectively, were:

northeast 20%, northwest 20%, Pulaski county 18%, south 20%, and Benton and Washington counties in northwest Arkansas 22%. See Appendix E for a map of the geographic distribution and classification of school districts within each county and region of the state.

Table 10

School Districts by Geographic Location and Size Classification by Range of High School Enrollment in Parenthesis

classification	Northeast	Northwest	Pulaski Cty	South	Benton/Washington Ctys
One (133 - 19)	2	3	1	1	0
Two (190 - 84)	7	0	0	2	0
Three (295 - 192)	5	6	1	2	1
Four (483 - 296)	3	3	0	6	4
Five (805 - 493)	5	5	2	6	1
Six (1203 - 811)	2	0	1	4	1
Seven (2591 - 1291)	2	2	3	1	4

Note: range of high school enrollment used to classify school districts

Professional development by participants

In addition to university classes, 149 teachers attended professional development economics education workshops, hereafter referred to as workshops (see table 11). The median length of the workshops was one day, with the shortest workshop lasting a half day and the longest seven days. The median number of workshops attended by teachers in last five years was three workshops, with the maximum being 21 workshops and minimum being one workshop. The last date of attendance at a workshop on average was 2012. Watts (2005), suggested, like college classes taken decades in the past, information gained at workshop is forgotten the longer the time span from attendance. Workshop attendance provides a refresher course on economic content and new pedagogical techniques Participants attended workshops presented by Economics Arkansas at a higher frequency than other sponsors; the next most frequented workshops were sponsored by the Federal Reserve Bank of Little Rock/St. Louis.

The high attendance at Economics Arkansas workshops was to be expected, as Economics Arkansas assisted in the collection of the research data. A teacher's attendance at professional development workshops was hypothesized (Swinton, De Berry, Scafidi, & Woodard, 2010) to result in higher student test scores than completing a college course. Teachers saw a higher correlation between curriculum materials and instruction methods received at workshops and improved classroom instruction efficiency than from enrolling in another college economics course.

Table 11

Number of Teachers Attending a Professional Development Workshop

Grade level	Yes	No
K-6	61	7
7-9	35	12
10-12	53	14

Answers to Research Questions

Research Question 1.

What is the level of economic knowledge (human capital investment) of Arkansas K-12 teachers as measured by BET, TEK, and TEL standardized economic literary tests?

Table 12

Economic Knowledge Test Results by Grade Level Taught: (percentage scores and standard deviations in parentheses)

variable	*n*	*M*	*SD*
BET (K - 6)	68	26.41 (88.04)	4.303 (14.34)
TEK (7 - 9)	47	33.83 (84.51)	7.227 (18.17)
TEL (10 - 12)	67	28.72 (71.49)	9.835 (24.57)

Note: The BET contained 30 questions compared to the 40 questions on TEK and TEL.

The percentage score was used as the measure to compare how each grade-level teacher performed on his or her respective test score, as number of test items varied between economic

literacy tests. Comparing the percentage scores for each grade level, teachers in grades 10 and 12 received a grade of C-. Elementary and middle school teachers have grades equivalent to B+ and B, respectively.

The higher scores for the BET are expected, as test questions are easier and should be answered correctly by adults merely from exposure to news media and life experiences, as supported by Watts's (1985) research. The BET test covered 16 of the voluntary national content standards in economics,

> standard 1 scarcity, choice and productive resources; standard 2 decision making and marginal analysis; standard 3 economic systems; standard 4 economic incentives; standard 5 voluntary exchange and trade; standard 6 specialization and comparative advantage; standard 7 markets and prices; standard 8 supply and demand; standard 9 competition; standard 10 economic institutions; standard 11 money and inflation; standard labor 13 markets and income; standard 14 entrepreneurship; standard 15 physical and human capital investment; standard 16 economic role of government; and standard 19 unemployment and inflation. (Walstad, Rebeck, & Butters, 2010, p. 5)

For an explanation of each standard, see Appendix A.

The high BET scores occurred even with only 55.8% of elementary teachers completing an economics course; a mediating factor maybe 89.7% of elementary teachers had attended an economic content professional development workshop. See appendix L for item analysis of missed questions by elementary teachers compared to a normed sample of sixth grade students.

A review of the BET results require comment on a few observations. Questions on purchasing power of the dollar, and productivity of workers were missed most frequently by teachers regardless of economic training. See Appendix L for percentages of those who answered correctly. Perhaps more concerning is 50% of teachers without economics and 42.9% of teachers without professional development correctly answered the question on purchasing power of a dollar compared to the 55.5% of the normed group of sixth grade students who had

completed economics and 50.1% who had not completed economics class. Teachers with no attendance at a professional development workshop correctly answered the question over productivity of workers at 28.6% compared to 34% of sixth grade students who had taken an economics course and 31.7 % with no economics.

Given early grade levels are when the foundation of economics is established, any misconceptions established at early grades are difficult to overcome in later grade-level instruction (VanFossen, 2011). It is worrisome only 63.2% of teachers with economics and 65.6% of teachers with professional development workshop attendance correctly answered a question on how the price system works to eliminate shortages and surplus—the very essence of market economies.

The results of the BET suggest that while elementary teachers average a 88.04 % score, the mean score might hide deficient content in need of improvement by teachers, specifically in fundamentals of supply and demand, money and inflation, and specialization and comparative advantage, e.g. trade, all of which are foundations of economic thinking. One explanation for the deficient areas might be that even though over half the teachers had completed an economics course, the average number of classes for elementary teachers is less than two classes, a superficial introduction.

The economic knowledge scores on the TEK (84.51%) by middle school teachers were lower than BET (88.04%) by elementary teachers, but this is to be expected as content difficulty

increased from the elementary grade level to middle school grade level. Additionally, two additional challenging economic standards were tested, business cycles and their measurement (standard 18) and fiscal and monetary policy of the federal government and Federal Reserve System (standard 20). A contributing factor to a score of 84.51% on the TEK test is 78.7% of middle school teachers completed an economics class. An equal percentage, 74.5%, of teachers attended professional development workshops. However, middle school teachers were less likely to attend a professional development work than elementary teachers, at 89.7%. See Appendix M for item analysis of missed questions by middle school teachers compared to a normed sample of eighth and ninth grade students.

A few observations regarding the TEK results. For all teachers, regardless of training, a low percentage of teachers could correctly answer a question on how specialization and trade will benefit the economy through lower prices and more choices for society, nor could the teachers correctly answer a question about GDP and GDP per capita. Additionally, only 41.7% of teachers who did not attend a professional development workshop correctly answered the GDP question compared to 52.6% of eighth and ninth grade students who had completed an economics course and 48.3% of eighth and ninth grade students without economics.

As scarcity is the first economic concept introduced, it is concerning that only 33.3% of teachers without professional development workshops and 60% without economics could correctly answer a question over opportunity cost. Knowledge of supply and demand is essential in teaching economics, yet only 60% of teachers without economics could correctly answer questions over changes in supply and demand and resulting effect on prices. As with elementary teachers, middle school teachers without economics could not correctly answer questions concerning functions of money.

Results from the TEL economic literacy test suggest introduction of fiscal and monetary policy content resulted in lower aggregate scores. More concerning was the low percentage of "teachers who had not taken an economics course" that could correctly answer questions on opportunity cost and supply and demand—two topics that form the foundation of economic principles.

The topics included on the TEL test are complex and designed to test comprehensive economic knowledge by students after they completed their capstone (required) economic course. Economic content tested by the TEL are the topics often infused by teachers of other social studies high school courses. Even with the increased difficulty of the test, higher TEL scores were expected, as 88% of high school teachers completed an economics course and 79.1% attended professional development workshops.

I would refer readers to Appendix N for item analysis of missed questions by high school teachers compared to the normed sample of ninth to twelfth grade students. While the sample size for teachers who had not taken an economics course nor attended a professional workshop is small, if the results are representative of the larger population there should be concern when assigning a teacher who did not complete an economics course or attend professional workshops to teach economics. Teachers with no economics course work could only answer 11 of 40 questions at a proficient level, as measured by 70% answered correctly. A teacher's lack of attendance at professional development workshops resulted in a similar ability to answer at a proficient level for only 11 of 40 questions.

A few observations of the TEL results and lack of proficiency of high school teachers to correctly answer questions on specific economic standards. Teachers, regardless of training,

failed to correctly answer a question over Federal Reserve open market policies and a question over exchange rates.

In comparison to "teachers with economics training" "teachers without economics training" answered correctly at a significantly lower percentage the following questions: what is meant by competition, what is a tariff, how the money supply is expanded, international trade, and measurement of standard of living over time. The lower ability to correctly answer each question is a concern as all topics were listed in the Arkansas economic curriculum framework standards. The most alarming finding was teachers without economics training could not answer a question on over marginal cost – marginal benefit analysis a basic economic fundamental.

TEL results suggest high school teachers without economics training either through college course work or professional development activities are at a disadvantage in mastery of economics content to be taught in the curriculum standards. This should be a concern for teachers assigned to an economics course or who infuse content into other subjects, especially in subjects focusing on the economics of trade or macroeconomic policy included in Arkansas high school framework standards (see Appendix N and Appendix B).

What is the level of economic literacy of K-12 teachers in Arkansas? Using only the economic literacy test scores, the mean score of 70%, or a C-, would indicate a level of proficiency. With the introduction of additional complexity in economic content from grade level to grade level, it appears lack of economic training lowers a teacher's ability to answer economic literacy test questions correctly.

Research Question 2.

Is there a difference in economic literacy test percentage score by grade level?

Null hypothesis: H_o: $M_a = M_2 = M_3$

There is no difference in mean economic literacy test percentage scores on grade-level economic knowledge test.

A General Linear Model (GLM) one-way analysis of variance (ANOVA) was conducted to evaluate the relationship between grade level taught and economic literacy test percentage score, hereafter referred to as score. The independent variable, grade level, included three categories: elementary teachers, middle school teachers, and high school teachers. The dependent variable is percentage score on grade-level economic literacy test. The ANOVA was significant at $\alpha = .01$, $F\ (2,179) = 12.511$, $p = .001$. The null hypothesis that there is no difference in percentage score between groups is rejected. The effect size, assessed by $\acute{\eta}^2$, was .123, a medium strength of relationship between grade level and economic literacy score. The mean score and standard deviation for each grade level are shown in table 13.

Post hoc comparisons were conducted to evaluate pairwise differences among the means. Because the variances among the three groups ranged from 205.74 to 604.51, I chose not to assume the variances were homogeneous and conducted post hoc comparisons with the use of the Dunnett's C test, a test that does not assume equal variances among the three groups. A significant difference existed in mean score between high school teachers ($M = 71.79$, $SD = 24.57$) and both elementary teachers ($M = 88.04$, $SD = 14.34$) and middle school teachers ($M = 84.51$, $SD = 18.17$) but no significant difference between elementary school and middle school teachers.

Table 13

Table Economic Knowledge Test Percentage Score by Grade Level Taught

Test	*N*	*M*	*SD*
BET (K - 6)	68	88.04	14.34
TEK (7 - 9)	47	84.51	18.17
TEL (10 - 12)	67	71.79	24.57

Research Question 3.

Is there a difference in economic literacy test percentage scores by content groups: a) economic fundamentals b) microeconomics c) macroeconomics, and d) international economics content?

Hypothesis 3a.

Is there a difference in economic literacy test percentage scores by content groups: a) economic fundamentals b) microeconomics c) macroeconomics and d) international economics content between grade-level teachers?

Null hypothesis: $H_o : \begin{pmatrix} M_{11} \\ M_{21} \\ M_{31} \\ M_{41} \end{pmatrix} = \begin{pmatrix} M_{12} \\ M_{22} \\ M_{32} \\ M_{42} \end{pmatrix} = \begin{pmatrix} M_{13} \\ M_{23} \\ M_{33} \\ M_{43} \end{pmatrix}$

There is no difference in economic content percentage scores across groups, grade-level teachers, when compared simultaneously by economic content groups.

The use of percentage test scores allowed for a comparison across grade level, as each grade level took a different test. The comparison is not concerned with test-item-to-test-item analysis; what is relevant is a difference in ability to answer questions over four economic content groups.

Because a significant difference was found in grade-level economic literacy scores (research question 2), a general linear model (GLM) one-way multivariate analysis of variance (MANOVA) was conducted to investigate effect of grade level taught (k-6, 7-8, 9-12) on four dependent variables: economic fundamentals content, microeconomics content, macroeconomics content, and international economics content test scores. Statistically significant differences were found among the grade-level teachers on the dependent measures $\alpha = .01$, Wilks's Lambda = .728, $F(8, 352) = 7.582$, $p < .001$. The multivariate partial eta squared based on Wilks's

Lambda was strong at .147. The null hypothesis that there is no difference between grade-level teacher scores on four economic content groups is rejected. Table 14 shows the means and standard deviations on the dependent variables for each of the three groups.

A general linear model (GLM) analyses of variance (ANOVA) on the dependent variables were conducted as follow-up tests to the MANOVA. Using the Bonferroni method, each ANOVA was tested at .0125 level, .05/4. The ANOVA on economic fundamentals score was significant at $F(2,179) = 7.75$, $p < .001$, $\acute{\eta}^2 = .08$. The ANOVA on microeconomics score was significant at $F(2,179) = 8.75$, $p < .001$, $\acute{\eta}^2 = .09$. The ANOVA on international score was significant at $F(2,179) = 24.6$, $p < .001$, $\acute{\eta}^2 = .216$. The ANOVA on macroeconomics score was not significant at $F(2,179) = 2.702$, $p = .070$, $\acute{\eta}^2 = .03$.

Post hoc analyses to the univariate ANOVA for economic literacy test scores consisted of conducting pairwise comparisons to find which grade level had higher scores. Due to the large range in variance of three of the four groups, I choose to run both Tukey HSD and Dunnett's T3 tests. Each pairwise comparison was tested at.0125 divided by 3 or 0.0042 level. Results from both post hoc comparisons reflected that elementary teachers and middle school teachers scored significantly higher on economic fundamentals when compared with high school teachers. There were no significant differences in scores between elementary teachers and middle school teachers. Elementary teachers scored significantly higher on microeconomics in comparison with high school teachers; there were no significant differences in microeconomic scores between elementary teachers and middle school teachers or middle school teachers and high school teachers. Elementary teachers and middle school teachers scored significantly higher on international economic concepts in comparison to high school teachers. There were no significant differences between elementary teachers and middle school teachers with regard to

international economic content. The grade level teachers did not score significantly different on macroeconomic concepts regardless of grade level difficulty.

A word of caution when interpreting the ANOVA results which only state an elementary teacher scored significantly higher or lower on their grade level content that did a high school teacher on their grade level content. It should be noted again that elementary teachers have a lower level of economic content complexity. Still, one would hope grade level teachers' demonstrated similar mastery of their respective economic content, regardless of complexity, that is teachers in each grade level would score 90%.

Table 14

Percentage Means and Standard Deviations on the Dependent Variables for the three groups

	Economic Fundamental		Microeconomics		Macroeconomics		International	
Grade level taught	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Gradel level K - 6	89.43	13.71	90.34	18.71	77.57	25.60	89.22	22.63
Grade level 7 - 9	89.54	15.49	84.04	20.39	79.43	24.40	82.98	22.92
Grade level 10 - 12	78.78	22.10	74.03	27.64	68.66	30.94	57.46	34.12

***Hypothesis 3b*.**

Is there a difference in the four content group percentage test scores (economic fundamentals, microeconomics, macroeconomics, or international economics) between elementary school teachers?

Null hypothesis: H_o: $M_1 = M_2 = M_3 = M_4$

There is no difference between the mean scores of economic fundamentals percentage scores, microeconomics percentage scores, macroeconomics percentage scores, and international economics percentage scores of elementary teacher.

A repeated measures ANOVA was run to determine if elementary teachers scored differently on the four economic content groups, economic fundamentals, microeconomics,

macroeconomics, and international economics. The four economic content groups mean and standard deviation are presented in Table 15. The results of the ANOVA indicated a significant content group score effect at $\alpha = .01$. Wilks' Lambda = .669, $F(3, 65) = 9.313$, $p < .0001$, multivariate $\acute{\eta} = .301$, which is strong. The null hypothesis that there is no difference in mean scores of the four content group test scores is rejected.

Follow-up tests were conducted to evaluate pairwise differences among the means. The smallest *p* value for a comparison is between macroeconomics content and economic fundamentals and macroeconomics and microeconomics the *p* value of .001 is less than $\alpha = .05/6 = .0083$; therefore, the difference between the mean for economic fundamentals and macroeconomics and the mean for microeconomics and macroeconomics is significant. The score for macroeconomics was significantly lower than the score for microeconomics and economic fundamentals. The next smallest *p* value is for a comparison between macroeconomics and international content, and its *p* value of .005 is less than $\alpha = .05/4 = .0125$; therefore, the difference between the mean for macroeconomics and international are significant. The score for macroeconomics was significantly lower than the score for international economics.

The data were also analyzed using paired-sample *t* tests to evaluate whether teachers scored significantly different on economic content groups. The *t* test result indicated the mean for economic fundamentals ($M = 89.43$, $SD = 13.71$) was significantly greater than the mean for macroeconomics ($M = 77.57$, $SD = 25.60$), $t(67) = 4.50$, $p = .001$. The 99% confidence interval for mean difference between the two scores was 4.88 to 18.84.

The *t* test indicated the mean for microeconomics ($M = 90.34$, $SD = 18.71$) was significantly greater than the mean for macroeconomics ($M = 77.57$, $SD = 25.60$), $t(67) = 5.258$,

p = .001. The 99% confidence interval for mean difference between the two scores was 6.33 to 19.20.

The t test indicated the mean for international (M = 89.22, SD = 22.63) was significantly greater than the mean for macroeconomics (M = 77.57, SD = 25.60), $t(67) = 3.475$, p = .001. The 99% confidence interval for mean difference between the two scores was 2.76 to 20.52.

Table 15

Means and Standard Deviation of Economic Content Scores Elementary School Teachers

Content	*M*	*SD*
Economic Fundamentals	89.43	13.74
Microeconomics	90.34	18.71
Macroeconomics	77.57	25.60
International economics	89.22	22.63

Hypothesis 3c.

Is there a difference in the percentage test scores for the four content groups, economic fundamentals, microeconomics, macroeconomics, or international economics, between middle school grade teachers?

Null hypothesis: H_o: $M_1 = M_2 = M_3 = M_4$

There is no difference between the mean score of economic fundamentals percentage score, microeconomics percentage score, macroeconomics percentage score, and international economics percentage score of middle school teachers

A repeated measures ANOVA was run to determine if middle school teachers scored differently on four economic content groups, economic fundamentals, microeconomics, macroeconomics, and international economics. Economic sub-category content score mean and standard deviation are presented in Table 16. The results of the ANOVA indicated a significant content group scores effect at $\alpha = .01$. Wilks' Lambda = .632, $F(3,44) = 8.522$, $p < .0001$,

multivariate ή = .368, which is strong strength of relationship. The null hypothesis that there is no difference in mean scores of the four content group test scores is rejected.

Follow-up tests were conducted to evaluate pairwise differences among the means. The smallest *p* value is for a comparison between economic fundaments and macroeconomics, a *p* value = .001 is less than α = .05/6 = .0083; therefore, the difference between the mean for economic fundamentals and macroeconomics is significant. The next smallest *p* value was a comparison between economic fundamentals and microeconomics content, and its *p* value of .016 is not less than α = .05/5 = .01, which is not significant, and therefore none of the remaining comparisons are significant.

The results indicated that the mean for economic fundamentals (*M* =89.54, *SD* = 15.49) was significantly greater than the mean for macroeconomics (*M* = 79.43, *SD* = 24.41), *t*(46) = 4.47, *p* = .001. The 99% confidence interval for the mean difference between the two scores was 4.03 to 16.19.

Table 16

Means and Standard Deviation of Economic Content Scores Middle School Grade Teachers

Content	*M*	*SD*
Economic Fundamentals	89.54	15.49
Microeconomics	84.04	20.39
Macroeconomics	79.43	24.41
International economics	82.98	22.92

Hypothesis 3d.

Is there a difference in the percentage test scores for the four content group, economic fundamentals, microeconomics, macroeconomics, or international economics between tenth to twelfth grade teachers?

Null hypothesis: H_o: $M_1 = M_2 = M_3 = M_4$

There is no difference between economic fundamental percentage scores, microeconomic percentage scores, macroeconomic percentage scores, and international percentage scores of tenth to twelfth grade teachers.

A repeated measures ANOVA was run to determine if tenth to twelfth grade teachers scored differently on the four economic content groups, economic fundamentals, microeconomics, macroeconomics, and international economics. Economic content score means and standard deviations are presented in Table 17. Results of the ANOVA indicated a significant content group scores effect at $\alpha = .01$. Wilks' lambda = .619, $F(3, 64) =$, $p < .0001$, multivariate $\acute{\eta} = .381$ which is strong. The null hypothesis that there is no difference in mean scores of the four content group test scores is rejected.

Follow-up tests were conducted to evaluate pairwise differences among means. The smallest *p* value is for a comparison between international economics content and economic fundamentals, microeconomics and macroeconomics with a *p* value of .0001 that is less than $\alpha = .05/6 = .0083$; therefore, the differences between the means for economic fundamentals and international economics, microeconomics and international economics, and macroeconomics and international economics are significant. The next smallest *p* value is for a comparison between macroeconomics an economic fundamentals content and its *p* value of .001 is less than $\alpha = .05/3 = .017$; therefore, the difference between the means for macroeconomics and economic fundamentals is significant. The next smallest *p* value was a comparison between economic fundamentals and microeconomics content, and its *p* value of .078 is not less than $\alpha = .05/2 = .025$, so it is not significant, and therefore none of the remaining comparisons are significant.

The data were also analyzed using paired-sample *t* tests to evaluate whether teachers scored significantly differently on each economic content group. Results indicated the mean for

economic fundamentals (M = 78.78, SD = 22.10) was significantly greater than the mean for macroeconomics = .01 (M = 68.66, SD = 30.94), $t(66) = 3.98$, p = .0001. The 99% confidence interval for the mean difference between the two scores was 3.37 to 16.88.

The results indicated that the mean for economic fundamentals (M = 78.78, SD = 22.10) was significantly greater than the mean for international economics (M = 57.46, SD = 34.12), $t(66) = 6.33$, p = .0001. The 99% confidence interval for the mean difference between the two scores was 12.38 to 30.26.

The results indicated the mean for microeconomics (M = 74.03, SD = 27.64) was significantly greater, $\alpha = .01$, than the mean for international economics (M = 57.46), SD = 34.12), $t(66) = 4.95$, p = .0001. The 99% confidence interval for the mean difference between the two scores was 7.68 to 25.45.

The results indicated the mean for macroeconomics (M = 68.66, SD = 30.94) was significantly greater, $\alpha = .01$, than the mean for international economics (M = 57.46), SD = 34.12), $t(66) = 4.27$, p = .0001. The 99% confidence interval for the mean difference between the two scores was 4.25 to 18.14.

Table 17

Means and Standard Deviation of Economic Content scores Tenth to Twelfth Grade Teachers

Content	*M*	*SD*
Economic Fundamentals	78.78	22.10
Microeconomics	74.03	27.64
Macroeconomics	68.66	30.94
International	57.46	34.12

Hypothesis 3e.

There is a difference in percentage economic content score by a teacher's self-evaluation of their economic content knowledge.

Null Hypothesis: $H_o : \begin{pmatrix} M_{11} \\ M_{21} \\ M_{31} \\ M_{41} \end{pmatrix} = \begin{pmatrix} M_{12} \\ M_{22} \\ M_{32} \\ M_{42} \end{pmatrix} = \begin{pmatrix} M_{13} \\ M_{23} \\ M_{33} \\ M_{43} \end{pmatrix} = \begin{pmatrix} M_{14} \\ M_{24} \\ M_{34} \\ M_{44} \end{pmatrix}$

There is no difference in the percentage test scores for the four content group, economic fundamentals, microeconomics, macroeconomics, or international economics between a teachers self-evaluation of their economic content knowledge.

A one-way GLM MANOVA was conducted to investigate the effect of rating on self-evaluation (very good, good, fair, and poor) on the four dependent variables, economic fundamentals, microeconomics, macroeconomics, and international economics content percentage test scores. No statistical significance were found, $\alpha = .01$, among the self-evaluation ranking on the dependent measures, Wilk's Lambda = .901, $F(12,463.30) = 1.55$, $p = .103$. The multivariate $\acute{\eta}^2 = .034$ was week. Table 18 shows the mean and standard deviation by economic sub-category for each of the teacher self-evaluation ranking.

Table 18

Percentage Means and Standard Deviation on the Dependent Variables for the Four Groups

		Economic Fundamentals		Microeconomics		Macroeconomics		International	
Evaluation ranking	*n*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
very good	30	93.86	8.79	92.63	15.00	89.46	22.10	86.67	19.28
good	84	84.93	19.17	81.49	23.94	69.54	28.67	74.60	33.98
fair	62	82.65	19.39	79.41	26.13	74.78	26.14	72.13	30.32
poor	6	82.34	21.67	84.17	22.74	74.44	33.76	77.78	32.77

Research question 4

Is there a difference in economic literacy percentage scores and economic content percentage score by human capital investment, e.g. education, training, and experience?

Hypothesis 4a.

Is there a difference in percentage in economic literacy scores based on the teacher's undergraduate major?

Hypothesis: $H_{0:}\ M_1 = M_2 = M_{3\ldots}M_n$

There is no difference in economic literacy percentage scores based on the undergraduate major of Arkansas teachers.

A GLM ANOVA was conducted to evaluate the relationship between undergraduate major and percentage score on economic literacy test. Three separate categorizations of the independent variable, college major, were analyzed, none of which resulted in a statistical difference.

The first model included nine categories of majors: elementary education, elementary social studies emphasis, secondary education, middle/secondary social studies education, BA history, BA social sciences, business, business, and vocational education, and other for the independent variable college major. The dependent variable is the percentage score on grade-level economic literacy tests. The ANOVA was not significant at $\alpha = .01$, $F(8,173) = .687$, $p = .703$, $\acute{\eta}^2 = .031$. Table 19 shows the economic literacy score mean and standard deviation by undergraduate degree.

The second hypothesis there is a difference in economic literacy score between teachers majoring in social studies and teachers with other majors. The independent variable, college degree, included two levels: a social studies major and other majors. The dependent variable is the percentage score on grade-level economic literacy tests. The ANOVA was not significant at $\alpha = .01$, $F(1,180) = .631$, $p = .428$, $\acute{\eta}^2 = .003$. The low eta squared represents a week relationship

between the dependent variable economic literacy score and the independent variables of degrees earned.

Table 19

Percentage Means and Standard deviations on the Dependent Variable for Degree

Degree	*n*	*M*	*SD*
BA History	17	81.47	15.50
BA Social Science	10	85.33	16.79
Business	19	80.44	24.95
Business/Vocational Education	25	82.87	18.02
Elementary Education	47	82.38	20.20
Elementary Social Studies emphasis	8	91.25	10.38
Other	17	79.67	25.06
Secondary Education	14	73.16	29.49
Secondary/Middle Social Studies	25	80.03	20.24

Other: studio art, chemistry, drama, English, mathematics, journalism, radio/television

Although no statistically significant difference in economic literacy score was found, it is important to note teachers with elementary social studies emphasis and bachelor of arts in a social science field recorded the highest scores. Administrators should be concerned by the relatively low economic literacy score of secondary and middle school social studies majors given social studies teachers are most likely to be assigned to teach an economics classes. The economic literacy score mean and standard deviation by social studies degree or other degree is shown in table 20.

Table 20

Percentage Means and Standard deviations on the Dependent Variable for Degree

Degree	*n*	*M*	*SD*
Social Studies	43	83.35	18.21
Other	139	80.46	21.58

The final hypothesis regarding major sought to measure a difference between education majors and other majors on the economic literacy test. The independent variable, college major,

included two levels, education degree, and other degree. The dependent variable is the percentage score on grade-level economic literacy tests. The ANOVA was not significant, $F(1,180) = .099$, $p = .75$, $\acute{\eta}^2 = .001$. Table 21 shows the economic literacy mean and standard deviation by education degree or other degree.

Table 21

Percentage Means and Standard deviations on the Dependent Variable for Degree

Degree	*n*	*M*	*SD*
Education	119	81.50	20.65
Other	63	80.48	21.3

Hypothesis 4b.

Is there a difference in percentage in economic literacy scores based on having a graduate degree?

Null hypothesis: $H_{0:}\ M_1 = M_2$

There is no difference in mean economic literacy percentage scores based on the teacher having a graduate degree.

A GLM ANOVA was conducted to evaluate the relationship between graduate degree and percentage score on economic literacy test. The independent variable, graduate degree, included two levels: yes, graduate degree, and no, does not have a graduate degree. The dependent variable is the percentage score on grade-level economic literacy tests. The ANOVA was not significant, $F\ (1,181) = 1.996$, $p = .159$. Table 22 shows the economic literacy mean and standard deviation for graduate degree or no graduate degree. The strength of the relationship between having a graduate degree and the economic literacy test percentage score, as assessed by $\acute{\eta}^2$ of .011, was small.

Table 22

Economic Literacy Test Percentage Score by Graduate degree

	n	*M*	*SD*
Graduate degree	112	79.43	23.62
No graduate degree	70	83.90	15.10

A follow up hypothesis: is there a difference in percentage economic literacy score based on graduate degree major?

Null hypothesis: $H_{0:}$ $M_1 = M_2 = M_n$

There is no difference in percentage economic literacy scores based on the graduate degree earned.

A GLM ANOVA was conducted to evaluate the relationship between graduate degree and percentage score on economic literacy tests. The independent variable, graduate degree, included seven levels: master in education, master of arts teaching, arts and sciences, library and instructional technology, educational administration, other, and no graduate degree. The dependent variable is the percentage score on grade-level economic literacy tests. The ANOVA was not significant, F (6,175) = 1.077, p = .378. The economic literacy score mean and standard deviation by type of master's degree is shown in table 23. The strength of the relationship between having a graduate degree and the economic literacy test percentage score, as assessed by $\acute{\eta}^2$ of .036, was weak.

Table 23

Percentage Means and Standard Deviations on the Dependent Variable for Graduate Degree

Degree	*n*	*M*	*SD*
Masters Education	67	77.04	26.73
Masters Art Teaching	8	86.25	8.76
Arts and Science	10	89.17	10.93
Library and Instructural Technology	9	79.44	21.18
Education Administration	8	75.83	23.46
Other	10	83.58	20.69
No graduate degree	70	83.83	15.06

Hypothesis 4c.

As this research was concerned with preparation of Arkansas teachers and 77.4% of teachers surveyed received their undergraduate degree from an Arkansas university, I wondered: Is there a difference in the economic literacy test scores of teachers with degrees from an Arkansas university or college?

Null Hypothesis: $M_1 = M_2$

There is no difference in mean scores between attendance at an in-state university and an out-of-state university.

A GLM one-way ANOVA was conducted to evaluate the relationship between undergraduate university or college attended and percentage economic literacy scores. The independent variable, university or college attended, included two groups: in-state universities and colleges and out-of-state universities and colleges. The dependent variable is percentage score on economic literacy tests. The ANOVA was not significant at $\alpha = .01$, $F\ (1,175) = 3.125$, $p = .079$, $\acute{\eta}^2 = .018$. Table 24 shows the economic literacy test mean and standard deviation for teachers who attended in-state and out-of-state universities. Students who attended out-of-state

universities or colleges scored higher economic literacy scores than did students who attended Arkansas universities and colleges, although the difference is not statistically significant.

Table 24

Percentage Means and Standard Deviations on the Dependent Variable for Graduate Degree

University / College	*n*	*M*	*SD*
In-State	137	79.92	22.00
Out-of-State	40	86.44	14.05

As over 75% of the students attended an Arkansas university or college, a second null hypothesis was tested to determine the relationship between Arkansas universities or colleges the student attended and economic literacy test scores.

Null hypothesis: $H_{0:}\ M_1 = M_2 = M_{3\ldots}M_n$

There is no difference between mean percentage literacy test score on Arkansas universities or colleges attended.

A GLM one-way ANOVA was conducted to evaluate the relationship between Arkansas undergraduate university or college attended and percentage economic literacy scores. The independent variable, Arkansas universities or colleges attended, included seven groups: Arkansas State University, Arkansas Tech, Henderson State University, ULAR, University of Arkansas – Fayetteville, University of Central Arkansas, and other Arkansas Schools. The dependent variable is percentage score on economic literacy tests. The ANOVA was not significant at $\alpha = .01$, $F\ (6,130) = .664$, $p = .679$, $\acute{\eta}^2 = .030$. Table 25 shows the economic literacy test mean and standard deviation for select Arkansas colleges and universities.

Table 25

Percentage Means and Standard Deviations on the Dependent Variable for Arkansas Universities/Colleges

University / College	*n*	*M*	*SD*
Arkansas State	20	74.56	26.32
Arkansas Tech	11	89.77	8.52
Henderson	14	81.85	11.28
UALR	13	78.21	22.47
University of Arkansas	28	81.55	23.76
University of Central Arkansas	22	77.31	28.08
Other Arkansas schools	29	80.14	19.37

Hypothesis 4d.

Is there a difference in percentage economic literacy scores based on the number of undergraduate economics course completed?

Null hypothesis: $H_{0:}\ M_1 = M_2 = M_3 \ldots M_n$

There is no difference in percentage economic literacy test scores based on the number of economics courses completed by the teacher.

Since the grade-level teachers took different tests, I chose to analyze the data based by grade-level test as the difficulty and complexity increased from the elementary teachers', middle school teachers', and high school teachers' economic literacy tests.

An ANOVA was conducted to evaluate the relationship between undergraduate economic courses completed by elementary teachers and their percentage economic literacy scores. The independent variable, number of undergraduate college economics courses completed, included five levels: zero classes, one class, two classes, three classes, and four or greater number of classes. The dependent variable was percentage economic literacy test score. The ANOVA was not significant at the $\alpha = .01$, $F(4, 63) = .228$, $p = .228$, $\acute{\eta}^2 = .014$. Table 26 shows the economic literacy test mean and standard deviation based on number of economics classes completed by

elementary teachers. Students who had completed three or more undergraduate economics class did score higher on the economic literacy tests; however, there was no statistical difference in the scores. If the alpha level had been reduced to .05 the relationship would have been significant; however, I choose to use a higher alpha level to account for large variance within some groups and unequal group sizes.

Table 26

Percentage Means and Standard deviations on the Dependent Variable for Number of Economics Courses by K- 6 Grade Teachers

Number of courses	*n*	*M*	*SD*
zero	30	88.33	13.07
one	19	86.49	19.70
two	12	87.22	11.96
three	3	91.11	5.09
Four or greater	4	93.33	2.72

A GLM ANOVA was conducted to evaluate the relationship between undergraduate economics courses completed by middle school teachers and their percentage economic literacy scores. The independent variable, number of undergraduate college economics courses completed, included five levels: zero classes, one class, two classes, three classes, and four or greater number of classes. The dependent variable was percentage economic literacy test scores. The ANOVA was not significant at the $\alpha = .01$, $F(3, 43) = 1.115$, $p = .353$, $\acute{\eta}^2 = .072$. Table 27 shows the economic literacy test mean and standard deviation by number of economics course taken by middle school teachers.

Table 27

Percentage Means and Standard deviations on the Dependent Variable for Number of Economics Courses by 7-9 Grade Teachers

Number of courses	*n*	*M*	*SD*
zero	10	76.95	25.51
one	46	83.13	22.65
two	18	88.61	5.40
Four or greater	3	92.50	5.00

Note; no teacher had completed 3 classes.

A GLM ANOVA was conducted to evaluate the relationship between undergraduate economic courses completed by tenth to twelfth grade teachers' percentage economic literacy score. The independent variable, number of undergraduate college economics courses completed, included five levels: zero classes, one class, two classes, three classes, and four or greater number of classes. The dependent variable was percentage economic literacy test score. The ANOVA was significant at the $\alpha = .01$, $F(4, 62) = 3.577$, $p = .01$, $\acute{\eta}^2 = .188$. The economic literacy test mean and standard deviation by number of economics course taken by high school teachers is shown in table 28.

Follow-up tests were conducted to evaluate pairwise differences among the means. Because the variances among the groups varied widely, the Dunnett T3 test was used at $\alpha = .01$. The pairwise comparisons indicated that there was a significant difference in means for both teachers with no economics courses ($M = 56.88$, $SD = 22.31$) and teachers with one economics course ($M = 59.56$, $SD = 25.97$) with teachers who had taken three economics courses ($M = 87.5$, $SD = 7.42$). Teachers with three economics courses scored higher on the economic literacy test, while teachers with two economics courses ($M = 79.89$, $SD = 19.46$) and teachers with four or more economics courses ($M = 75.38$, $SD = 28.19$) did not score significantly different than either teachers with zero hours, one economics course, or three economics courses. The differentiating

point in relation to this group of teachers in terms of economics courses and percentage scores appears to be three courses, which is consistent with past research.

Table 28

Percentage Means and Standard deviations on the Dependent Variable for Number of Economics Courses tenth to twelfth grade

Number of courses	*n*	*M*	*SD*
zero	8	56.88	22.31
one	17	59.56	25.97
two	23	79.89	19.46
three	6	87.50	7.40
four or greater	13	75.39	28.19

***Hypothesis 4e*.**

One method used to gain economic content knowledge, other than to take a college economics course, is to attend professional development workshops. How effective are the workshops in increasing economic knowledge? Is there a difference in economic literacy percentage score based on number or professional development workshops attended in the last five years?

Null Hypothesis: $H_o: M_1 = M_2$

There is no difference in percentage economic literacy scores based on a teacher attending a professional development workshop.

A GLM ANOVA was conducted to evaluate a relationship between attending a professional development workshop and percentage score on economic literacy tests. The independent variable, attending a professional development workshop, included two levels: yes, attended a professional workshop in the last five years, and no, did not attend a professional workshop in the last five years. The dependent variable is the percentage score on grade-level economic literacy tests. The ANOVA was significant at $\alpha = .01$, $F\ (1, 180) = 8.934$, $p = .003$.

However, strength of the relationship between attending a professional development workshop in the last five years and the economic literacy test percentage score was quite small, as the $\acute{\eta}^2$ was .011. Attending a professional development workshop resulted in a higher mean percentage economic literacy score. Table 29 shows the economic literacy test mean and standard deviation by attendance at a professional development workshop.

Table: 29

Economic Literacy Test Percentage Score by Attendance at Professional Workshops

	n	*M*	*SD*
Attended Workshop	149	83.27	19.53
Did not attend workshop	33	71.55	23.93

Because the one way ANOVA was significant, I chose to run an additional test on attendance at professional development workshops to test the effect of the number of professional development workshops attended and a measure for interaction with length of professional development workshops. I hypothesized that the longer a professional development workshop, the more intense the workshop and increased learning.

Null hypothesis: $H_o = M_{11} = M_{12} = M_{ij}$

There is no difference in economic literacy percentage scores based number of economic professional development workshops attended in the last five years and average length of professional development workshop.

A two-way between groups ANOVA was conducted to explore the number of professional development workshops attended in the last five years and the length of professional workshops in days on economic literacy percentage scores. The first independent variable, number of professional development workshops attended in last five years, included six levels: no workshops, one workshop, two workshops, three workshops, four to ten workshops, and

greater than ten workshops. The second independent variable, length of professional development workshops in days, included five levels: zero days, one half to one day, more than 1day to 2 days, more than two days to three days, and greater than three days. The interaction effect between number of professional development workshops and length of professional development workshops in days was not statistically significant at $\alpha = .01$, $F(12, 161) = 1.534$, $p = .117$, $\acute{\eta}^2 = .103$, the eta squared indicated a medium strength of relationship. Table 30 shows the economic literacy test means and standard deviation of professional development attendance and length of workshops.

The main effect for number of professional development workshops attended, $F(4, 161) = 1.791$, $p = .133$, $\acute{\eta}^2 = .043$ did not reach statistical significance at $\alpha = .01$.

The second main effect, average length of professional development workshop attended $F(3, 161) = 1.278$, $p = .284$, $\acute{\eta}^2 = .023$ did not reach statistical significance at $\alpha = .01$. The average length of professional workshops attended would have been significant at $\alpha = .05$.

Table 30

Percentage Means and Standard Deviations on the Dependent Variable for Number of Professional Development Workshops Attended by Average Length of Workshop

Number of Workshops	Average Length of Workshop	*n*	*M*	*SD*
Did not attend a workshop	No days	33	71.55	23.93
1 workshop	Half to full day	18	81.85	22.64
	Great than 1 day to 2 days	7	76.78	26.30
	Greater than 2 days to 3 days	1	73.33	
	Greater than 3 days	1	92.50	
2 workshops	Half to full day	10	84.67	15.28
	Great than 1 day to 2 days	7	75.95	12.53

Table 30 Cont.

Number of Workshops	Average Length of Workshops	*n*	*M*	*SD*
	Greater than 2 days to 3 days	4	35.50	42.28
	Greater than 3 days	1	95.00	
3 workshops	Half to full day	7	86.31	5.35
	Great than 1 day to 2 days	3	83.89	6.73
	Greater than 2 days to 3 days	4	84.17	11.73
	Greater than 3 days	2	85.00	7.07
4 to 10 workshops	Half to full day	14	84.76	14.64
	Great than 1 day to 2 days	18	84.76	18.42
	Greater than 2 days to 3 days	8	80.21	20.14
	Greater than 3 days	2	77.09	27.70
Greater than 10 workshops	Half to full day	9	87.13	14.39
	Great than 1 day to 2 days	11	96.67	3.54
	Greater than 2 days to 3 days	7	94.05	8.49
	Greater than 3 days	15	82.06	23.02

However, a word of caution concerning the use of the average length of workshops and number of workshops attended interactions effect results. The interaction effect should be re-visited with a larger sample size as cell sizes did not meet the established level for a valid test. The results were included to start a conversation about what is the best length in days of a workshop to assure understanding of economic concepts occurs.

An additional question regarding the effect of professional development workshops on economic sub-category content resulted in an additional research questions: is there a difference in economic sub-category content scores based on attendance at a professional development workshop in the last five years and the length of the professional workshop in days?

Null Hypothesis: $H_o: \begin{pmatrix} M_{11} \\ M_{21} \\ M_{31} \\ M_{ij} \end{pmatrix} = \begin{pmatrix} M_{12} \\ M_{22} \\ M_{32} \\ M_{ik} \end{pmatrix} = \begin{pmatrix} M_{13} \\ M_{23} \\ M_{33} \\ M_{ik} \end{pmatrix} = \begin{pmatrix} M_{14} \\ M_{24} \\ M_{35} \\ M_{ik} \end{pmatrix}$

There is no difference in economic sub-category content group percentage scores across number of professional development workshops attended in the last five years.

A MANOVA was conducted to investigate the effect on the four economic content percentage scores and number of professional development workshops attended in the past five years. Statistically significant differences found among the number of workshops on the dependent measures at $\alpha = .0125$, Wilks Lambda = .796, $F(20, 575) = 2.049$, $p = .005$. The multivariate partial eta squared based on Wilks's Lambda was large, 0.56, thus reject the null hypothesis that there is no difference in means of number professional development workshops attended on the four content group percentage scores. Table 31 shows the economic sub-category content mean and standard deviations by number of workshops attended.

A one-way ANOVA was run on the dependent variables as a follow-up test to the MANOVA. Using the Bonferroni method, each ANOVA was tested at the .0125 level, .05/4. The ANOVA on economic fundamentals content score was significant, $F(5, 176) = 4.359$, $p = .001$, $\acute{\eta}^2 = .110$. The ANOVA on international economics content score was significant, $F(5, 176) = 3.161$, $p = .009$, $\acute{\eta}^2 = .082$. The ANOVA on microeconomics content score was nonsignificant, $F(5, 176) = 2.808$, $p = .018$, $\acute{\eta}^2 = .074$, and the ANOVA on macroeconomics content score was nonsignificant, $F(5, 176) = 1.542$, $p = .179$, $\acute{\eta}^2 = .042$.

Post hoc analyses to the univariate ANOVA for the economic fundamental content scores consisted of pairwise comparisons to find which number of professional development workshops had the higher score. Each pairwise comparison was tested at the .0125 divided by 6 or 0.002 level. Teachers who had attended 11 or more professional development workshops in the last five years scored significantly higher on economic fundamentals content in comparison to teachers who had attend no professional development workshops. There was no significant difference between economic fundamentals content scores for teachers who had attended no workshops or attended between 1 and 10 professional development workshops. There was no significant difference in number of professional workshops attended and scores on microeconomics, macroeconomics, and international economics content at the .002 level.

Table 31

Percentage Means and Standard Deviation on the Dependent Variable for Number of Professional Workshops Attended

		Economic Fundamental		Microeconomics		Macroeconomics		International	
Number of workshps	*n*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
No workshops	33	75.40	21.93	76.16	25.28	65.96	28.85	92.63	33.60
One	27	84.77	19.92	79.01	27.27	75.16	29.73	77.79	33.01
Two	22	79.48	22.12	73.25	29.97	71.74	30.99	65.91	33.52
Three	16	89.08	8.60	91.24	11.82	72.40	16.44	79.17	33.61
Four to ten workshops	42	89.94	13.96	84.15	20.32	75.58	28.41	77.38	28.94
Eleven or more	42	91.43	14.77	90.49	20.27	83.12	25.09	87.70	21.48

A logical hypothesis is that the number of college courses and the number of workshops attended would interact to affect the percentage economic literacy score. There would be a difference in percentage economic literacy scores based on that interaction.

Null hypothesis: $H_o = M_{11} = M_{12} = M_{ij}$

There is no difference in mean score on an interaction of number of economic course completed and number of workshops attended.

A GLM factorial ANOVA was conducted to evaluate the interaction and relationship between number of workshops attended and number of economics courses completed on

percentage economic literacy score. The independent variable, number of workshops attended, included six levels (as described above), and the other independent variable, number of economics courses completed, included 5 levels (as described above). The dependent variable was percentage economic literacy test scores. The ANOVA results for interaction between number of economics courses completed and number of workshops attended was not significant at $\alpha = .01$, $F(17, 155) = .577$, $p = .905$, $\acute{\eta}^2 = .059$. Table 32 shows the economic literacy test means and standard deviations by number of economics classes and number of workshops attended. The results provide little useful information given the large variance in cell sizes; however, it should be noted that the lowest mean score resulted from having no economics classes and no workshop attendance. The results suggest the need for further research into the interaction effect of number of economic classes completed and in-service to determine the optimal mix of pre-service college economics classes and in-service workshops on economic literacy of Arkansas teachers.

Hypothesis 4f.

A social studies Praxis exam is currently required for social studies licensure in Arkansas, though teaching economics does not require social studies license. It was hypothesized that those who took the Praxis exam, which includes economic content, would score higher on the economic literacy test. Is there a difference in percentage economic literacy scores based on having taken the social studied Praxis exam?

Null hypothesis: H_o: $M_{1=} M_2$

There is no difference in the mean percentage economic literacy score for those who have taken the social studies Praxis exam.

A one-way GLM ANOVA was conducted to evaluate the relationship between having taken the Praxis exam and percentage economic literacy test scores. The independent variable, having taken the social studies Praxis exam, included two levels, yes took social studies praxis exam, and no did not take the social studies praxis exam. The dependent variable is the percentage score on economic literacy tests. The ANOVA was not significant $\alpha = .01$, $F(1, 180) = .347$, $p = .557$, $\acute{\eta}^2 = .002$. Table 33 show the economic literacy test mean and standard deviation by Praxis exam.

Table: 33

Percentage Means and Standard Deviations on the Dependent Variable for Praxis Exam

Exam	*n*	*M*	*SD*
Praxis	48	79.63	18.71
No Praxis	134	81.69	21.57

Hypothesis 4g.

Those teaching economics are primarily certified in social studies. Does certification in social studies result in a higher economic literacy score?

Null hypothesis: H_o: $M_{1=} M_2$

There is no difference in the mean percentage economic literacy scores for those with certification in social studies.

A one-way GLM ANOVA was conducted to evaluate the relationship between having taken the social studies certification and percentage economic literacy test score. The independent variable, social studies certification, had two levels: yes, social studies certified, and no, not social studies certified. The dependent variable is the percentage score on economic

literacy tests. The ANOVA was not significant $\alpha = .01$, $F(1, 180) = 1.284$, $p = .259$, $\acute{\eta}^2 = .007$. Social Studies certification $M = 83.35$, $SD = 15.98$ and other certification $M = 79.77$, SD = 23.31

Table 32

Percentage Means and Standard Deviations on the Dependent Variable for Number of Professional Development Workshops Attended by Number of Economic Courses

Number of Economics Classes	Number of Workshops	*n*	*M*	*SD*
No economic classes	No workshops	9	71.61	25.33
	One	10	75.67	20.48
	Two	7	72.50	29.37
	Three	4	86.88	2.75
	Four to Ten	8	84.59	18.94
	Eleven and greater	10	94.17	7.83
	No workshops	1	63.11	6.99
One	One	9	76.95	31.89
	Two	9	68.15	32.43
	Three	5	83.17	11.03
	Four to Ten	11	85.08	17.67
	Eleven and greater	7	90.59	8.99
Two	No workshops	7	78.57	18.42
	One	4	90.21	3.75
	Two	5	83.17	14.55
	Three	4	87.92	4.58
	Four to Ten	14	80.18	19.20

Table 32 Cont.

Number of Economics Classes	Number of Workshops	*n*	*M*	*SD*
	Eleven and greater	19	88.33	14.73
Three	No workshops	0		
	One	1	90.00	
	Two	1	86.67	
	Three	3	82.50	6.61
	Four to Ten	3	93.06	4.88
	Eleven and greater	1	95.00	
Four or more	No workshops	6	78.75	22.07
	One	3	92.22	1.92
	Two	0		
	Three	0		
	Four to Ten	6	82.36	16.96

Hypothesis 4h.

Additional years of teaching economics provides opportunities to master economic content; therefore the hypothesis is that there is a difference in percentage economic literacy scores based on the number of years teaching economics.

Null hypothesis: H_o: $M_{1=} M_2 = M_3 = M_j$

There is no difference in economic literacy percentage scores by number of years taught economics of Arkansas teachers.

A GLM ANOVA was conducted to evaluate the relationship between number of years teaching economics and economic literacy percentage score. The independent variable, years of teaching economics, included six levels: one year, two years, three years, four years, five to ten years, and eleven plus years. The dependent variable was percentage economic literacy score. The ANOVA was significant at $\alpha = .01$, $F(5, 68) = 3.387$, $p = .009$, $\acute{\eta}^2 = .199$ a strong relationship. Table 34 shows the economic literacy score means and standard deviation by number of years taught economics.

Table 34

Percentage Means and Standard Deviation on the Dependent by Number of Years Taught Economics

Number of years taught economics	*n*	*M*	*SD*
One year	9	66.57	28.89
Two years	11	74.24	20.78
Three years	12	77.85	21.76
Four years	17	82.20	19.63
Five to ten years	16	91.09	7.99
Eleven plus year	9	95.00	4.58

Follow-up tests were conducted to evaluate pairwise differences among the means. Because of the large range in variances between variances among the four groups, I chose not to assume that the variances were homogeneous and conducted post hoc comparisons with the Dunnett's C test, a test that does not assume equal variances among the three groups. The post hoc comparisons indicated no significant difference between the group means. The non-significant result is due to large differences in variances scores, as a Tukey HSD indicated

significant difference between Group 1 and Group 6 at the α = .01 level and between Group 1 and Groups 5 and 6 at the α = .05. While no significant difference existed between the groups using the Dunnetts C, the correct test, there appears to be a relationship between years taught economics and a teacher's percentage economic literacy test given the strong eta squared.

As the ANOVA on percentage economic literacy score and number of years taught economics reflected a significant result yet the pairwise comparisons failed to reflect a significant difference, I chose to run a MANOVA to determine if there was a difference in the economic content group scores by the number of years of economics taught.

Null Hypothesis: $H_o: \begin{pmatrix} M_{11} \\ M_{21} \\ M_{31} \\ M_{ij} \end{pmatrix} = \begin{pmatrix} M_{12} \\ M_{22} \\ M_{32} \\ M_{ik} \end{pmatrix} = \begin{pmatrix} M_{13} \\ M_{23} \\ M_{33} \\ M_{ik} \end{pmatrix} = \begin{pmatrix} M_{14} \\ M_{24} \\ M_{35} \\ M_{ik} \end{pmatrix}$

There is no difference in economic sub-category content score based on the number of years a teacher has taught economics.

A one-way MANOVA was conducted to investigate the effect of number of years teaching economics (one year, two years, three years, four years, five to ten years, or eleven plus years) on the four dependent variables, economic fundaments, microeconomics, macroeconomics, and international economics. No statistically significant difference was found among number of years teaching economics on the dependent measures at α = .0125, Wilks Lambda = .601, $F(20, 216.53) = 1.798$, $p = .022$. The multivariate partial eta squared based on Wilks's Lambda was medium, 0.12. The mean and standard deviation for each economic sub-content category by number of years taught economics is shown in table 35.

A one-way MANOVA was conducted to investigate the effect of number of years teaching economics (one year, two years, three years, four years, five to ten years, or eleven plus years) on the four dependent variables, economic fundaments, microeconomics,

macroeconomics, and international economics. No statistically significant difference was found among number of years teaching economics on the dependent measures at $\alpha = .0125$, Wilks Lambda = .601, $F(20, 216.53) = 1.798$, $p = .022$. The multivariate partial eta squared based on Wilks's Lambda was medium, 0.12, which is a medium relationship between variables.

Table: 35

Percentage Means and Standard Deviation on the Dependent Variable for Number of Years Taught Economics

		Economic Fundamental		Microeconomics		Macroeconomics		International	
Number years having taught economics	*n*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
One	9	71.06	22.70	68.55	31.58	68.19	41.06	53.70	42.30
Two	11	87.04	20.50	77.16	29.27	57.93	31.69	60.61	29.12
Three	12	84.94	18.24	74.60	21.07	74.26	28.00	75.00	35.88
Four	17	88.21	16.35	81.88	22.24	72.14	24.16	81.37	28.18
Five to 10	16	93.73	6.41	93.87	10.26	85.14	21.91	86.46	16.35
Eleven plus	9	96.03	8.07	96.67	7.07	90.56	17.40	90.74	18.83

Research question 5

Is there a difference in percentage economic literacy scores based on school environment?

Hypothesis 5a.

It is hypothesized that rural or small school districts have fewer resources with which to assist teachers in supplementing resources and training. Additionally, teachers in rural schools are less likely to specialize in a particular subject and more often required to teach subjects outside their professional training. It follows that there would be a difference in percentage economic literacy test scores based on the size of the school district.

Null hypothesis: H_o: $M_{1=} M_2 = M_3 = M_j$

There is no difference in mean percentage economic literacy score on size of school district.

A one-way GLM ANOVA was conducted to evaluate the relationship between size of school district and the percentage economic literacy test score. Size of school district was

defined by the Arkansas Athletic Associations division model. The independent variable school district included seven levels, classification one & two, three, four, five, six, the largest seven, and a group for missing classifications. The dependent variable is the percentage score on economic literacy test. The ANOVA was not significant $\alpha = .01$, $F(6, 175) = 1.069$, $p = .383$, $\acute{\eta}^2 = .035$. The economic literacy score mean and standard deviation for school district size are shown in table 36.

Table 36

Percentage Means and Standard Deviations on the Dependent Variable for School District Size

School district size	*n*	*M*	*SD*
One and Two	18	71.99	27.36
Three	22	78.33	21.83
Four	30	81.28	20.75
Five	37	82.10	19.16
Six	13	77.56	18.78
Seven	57	85.03	19.75

Hypothesis 5b.

Does the location of a teacher in an urban area of the state versus a rural area affect the percentage economic literacy score? Is there a difference in percentage economic literacy scores by teachers in specific geographic locations of the state?

Null hypothesis: H_o: $M_{1=} M_2 = M_3 = M_j$

There is no difference in percentage economic literacy scores by geographic location of the state.

A one-way GLM ANOVA was conducted to evaluate the relationship between geographic location within state and the percentage economic literacy test score. Initially, the state was divided geographically by Arkansas congressional districts; then, a new group was created by separating Benton and Washington counties in northwest Arkansas. The remaining congressional districts were then reassigned to achieve a more balanced distribution of school districts. The independent variable, geographic region of the state, has five levels: northeast, northwest, Pulaski County, south, and a level for Benton and Washington counties in northwest Arkansas. Benton and Washington counties were separated from the other northwestern Arkansas counties as Wal-Mart Corporate Headquarters and supporting commercial business are located in Benton County and the University of Arkansas is located in Washington County. The dependent variable is the percentage score on economic literacy test. The ANOVA was not significant $\alpha = .01$, $F(4, 177) = 1.826$, $p = .126$, $\eta^2 = .040$. The economic literacy score mean and standard deviation for each geographic area of the state of Arkansas are shown in table 37.

Table 37

Percentage Means and Standard Deviations on the Dependent Variable for Geographic Region

Geographic region	*n*	*M*	*SD*
Northeast	36	74.18	25.44
Northwest	36	83.31	19.69
Pulaski County	33	79.34	20.24
South	37	81.85	17.37
Benton and Washington Counties	40	86.31	19.71

After reviewing the information for size of school district and geographic location, I hypothesized that there could be an interaction effect of geographic location and size of school districts. Would smaller schools in rural areas score differently than smaller schools in urban areas of the state? The model was re-run to include geographic region, school size, and interaction between school size and geographic region.

Null hypothesis: $H_o = M_{11} = M_{12} = M_{ij}$

There is no different in mean percentage economic literacy test scores based on the interaction of school size and geographic location.

A one-way GLM ANOVA was conducted to evaluate the relationship between geographic position in the state and size of school district and the percentage economic literacy test score. The ANOVA was not significant $\alpha = .01$, $F(18, 153) = .746$, $p = .759$, $\acute{\eta}^2 = .081$. While the present test was insignificant, I believe it would be beneficial to rerun the test with a larger sample size to allow form a more equal distribution across school classification and geographic location within the state. Table 38 contains the economic literacy score mean and standard deviation for each of the school classifications by geographic region.

Table 38

Percentage Means and Standard Deviation on the Dependent Variable for School Size and Geographic Location

School Size	Geographic Location	*n*	*M*	*SD*
Classification one and two	Northeast	8	92.39	33.41
	Northwest	5	78.33	27.41
	Pulaski County	1	90.00	
	South	4	78.75	12.33
	Benton, Washington Cty	0		

Table 38 Cont.

School Size	Geographic Location	*n*	*M*	*SD*
Classification three	Northeast	7	78.09	28.85
	Northwest	6	85.83	15.58
	Pulaski County	5	60.50	17.26
	South	3	88.06	7.56
	Benton, Washington Cty	1	95.00	
Classification four	Northeast	3	85.83	6.29
	Northwest	3	77.50	6.61
	Pulaski County	0		
	South	14	83.29	21.06
	Benton, Washington Cty	10	78.08	26.41
Classification five	Northeast	9	75.87	23.45
	Northwest	8	87.81	10.59
	Pulaski County	13	76.61	23.30
	South	6	86.66	9.57
	Benton, Washington Cty	1	97.50	
Classification six	Northeast	2	62.08	34.76
	Northwest	1	77.50	
	Pulaski County	0		
	South	9	79.63	17.13
	Benton, Washington Cty	1	90.00	
Classification seven	Northeast	6	77.91	19.93

Table 38 Cont.

School Size	Geographic Location	*n*	*M*	*SD*
	Northwest	13	83.07	25.86
	Pulaski County	10	86.50	14.34
	South	1	45.00	
	Benton, Washington Cty	27	88.48	17.38

Hypothesis 5c.

Economic content is not just taught in stand-alone economics classes but is infused into other classes, from history to mathematics. Is there a difference in percentage economic literacy scores based on teaching a stand-alone economics course, infusing economics content into a course, or not teaching economics or infusing economics content?

Null hypothesis: H_o: $M_1 = M_2 = M_3$

There is no difference in percentage economic literacy scores based on teaching economics, infusing economics content, or not teaching or infusing economics.

A GLM one-way ANOVA was conducted to evaluate the relationship between infusing or stand-alone course and percentage score on economic literacy test. The independent variable, infusion, included three levels: infuse economic content only, teach a stand-alone economics course, and neither teach economics nor infuse economic content. The dependent variable is percentage economic literacy score. The ANOVA was not significant at $\alpha = .01$, $F(2, 179) = .217$, $p = .805$, $\acute{\eta}^2 = .002$. The mean economic literacy score and standard deviation for type of class in which economics is taught are shown in table 39.

Table 39

Percentage Means and Standard Deviation on the Dependent Variable by Infuse Economic Content or Teach a Stand-alone Economic Class

Type of class	*n*	*M*	*SD*
Infuse content	95	81.03	21.55
Stand-alone class	74	81.89	20.05
Neither infuse or teach course	13	77.78	20.92

While effect of type of course in which economics is taught was not significant on the economic literacy test in entirety, could the type of course taught have an effect on the four sub-category content group score?

Null Hypothesis: $H_o : \begin{pmatrix} M_{11} \\ M_{21} \\ M_{31} \\ M_{41} \end{pmatrix} = \begin{pmatrix} M_{12} \\ M_{22} \\ M_{32} \\ M_{42} \end{pmatrix} = \begin{pmatrix} M_{13} \\ M_{23} \\ M_{33} \\ M_{43} \end{pmatrix}$

There is no difference in mean scores of the four economic content groups based on economic content infused into a subject, a stand-alone course, or neither infused nor taught a stand-alone course.

A one-way MANOVA was conducted to investigate the effect of type of course taught (infuse content only, teach a stand-alone course, neither infuse nor teach a stand-alone course) on the four dependent variables: economic fundamentals, microeconomics, macroeconomics, and international economic content percentage scores. No statistical significance was found, $\alpha = .0125$, type of course taught, Wilk's Lambda = .961, $F(8, 352) = .879$, $p = .534$, $\acute{\eta}^2 = .02$, see table 40 for economic sub-category content mean and standard deviation by type of course in which economic is taught.

Table 40

Percentage Means and Standard Deviation on the Dependent Variable for Type of Course Taught

		Economic Fundamental		Microeconomics		Macroeconomics		International	
Type of course	*n*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Infuse content	95	84.83	19.24	82.70	24.37	75.01	27.47	76.14	31.57
Stand-alone course	74	87.57	17.04	82.77	22.82	75.00	28.35	76.13	30.48
neither infuse or teach course	13	79.14	17.84	82.43	26.12	71.71	27.04	73.07	30.07

Hypothesis 5d.

The amount of time a teacher spends researching and introducing topics within the course curriculum adds to the human capital or content knowledge of the teacher, which led to a hypothesis that the more time spent infusing economics into other subjects would increase a teacher's economic literacy scores. Is there a difference in economic literacy scores based on classroom time spent on economics?

Null hypothesis: H_o: $M_1 = M_2 = M_3$

There is no difference in percentage economic literacy scores based on amount of time spent infusing economic content into subjects.

A GLM one-way ANOVA was conducted to evaluate the relationship between percentage of class time spend to infuse economic content and percentage score on economic literacy test. The independent variable, percentage of time spent infusing economic content, had seven levels: 0 to 12.5%, 13 % to 25%, 26% to 33%, 34% to 50%, 51% to 66.7%, 67% to 75%, and 76% to 100%. For the analysis, no distinction was made between teachers who only infuse content and teachers who infuse content and also teach a stand-alone course. The dependent variable is percentage economic literacy score. The ANOVA was not statistically significant at $\alpha = .01$, $F(6, 165) = 2.576$, $p = .021$, $\acute{\eta}^2 = .089$, table 41 contains the economic literacy score mean and standard deviation by percentage time spent to infuse economic content.

Table 41

Percentage of Time Spent to Infuse Economic Content Economic Literacy Score Mean and Standard Deviation

Percentage of time	*n*	*M*	*SD*
0 - 12.5%	37	87.30	18.01
13 - 25%	34	78.65	22.73
26 - 33%	26	85.71	12.24
34 - 50%	21	79.96	21.98
51 - 66.7%	13	73.01	25.14
67 - 75%	16	88.02	10.54
76 - 100%	18	68.94	29.53

While effect of percentage of time spent infusing economic content into other subjects was not significant with regard to the economic literacy test in its entirety, did a difference exist based on economic sub-category content score based on time spent infusing content into other subjects exist?

Null Hypothesis: $H_o : \begin{pmatrix} M_{11} \\ M_{21} \\ M_{31} \\ M_{41} \end{pmatrix} = \begin{pmatrix} M_{12} \\ M_{22} \\ M_{32} \\ M_{42} \end{pmatrix} = \begin{pmatrix} M_{13} \\ M_{23} \\ M_{33} \\ M_{43} \end{pmatrix}$

There is no difference in mean scores of the four economic content groups based on time spent infusing economic content into other subjects.

A one-way MANOVA was conducted to investigate the effect of percentage of time spent infusing economic concepts into other subjects on the four dependent variables: percentage scores on economic fundamentals, microeconomics, macroeconomics, and international

economic content. No statistical significance was found at α = .0125, Wilk's Lambda = .813, $F(24, 541.940) = .1.38$, $p = .109$, $ή^2 = .05$. Table 42 shows the economic sub-category content mean and standard deviation by percentage of time spent infusing economic content. While there was no significant difference, it was noted that teachers who indicated less time spent infusing content scored higher on all content categories than did teachers spending a larger percentage of class time on economics. Teachers spending 75% or more of class time on macroeconomics and international issues scored in the 60% range on economic literacy test. Table 42 contains the economic sub-category content mean score and standards deviation by percentage of time spent infusing economic content in other subjects.

Table 42

Percentage Means and Standard Deviation on the Dependent Variable for Percentage of Time Spent on Infusing Economic Content

		Economic Fundamental		Microeconomics		Macroeconomics		International	
Percentage of time spent	*n*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
0 - 12.5%	37	90.52	17.65	89.30	18.30	82.27	22.46	82.43	25.74
13 - 25%	34	86.38	16.32	79.75	26.10	68.40	33.06	73.53	36.26
26 - 33%	26	88.90	12.67	87.39	12.29	82.44	17.41	78.85	20.30
34 - 50%	21	85.33	19.55	78.55	26.47	76.75	24.22	73.02	29.56
51 - 66.7%	13	75.73	24.97	78.32	29.39	64.52	32.80	69.23	35.25
67 - 75%	16	90.49	10.33	90.92	10.56	76.42	22.91	88.54	26.33
76 - 100%	18	75.03	24.45	66.78	34.48	63.64	38.72	63.89	39.29

Research question 6.

Arkansas teachers are expected to teach or infuse economics content and concepts from kindergarten to high school and the required capstone course. While the previous research questions have focused on percentage scores representing total knowledge and knowledge on economic fundamentals, microeconomics, macroeconomics, and international economics content as measure of economic human capital investment, no previous hypothesis dealt specifically with a teacher's performance on the specific 20 national economic voluntary standards (economic standards).

It is the 20 voluntary national standards in economics this study is using to correlate with Arkansas social studies curriculum frameworks (see Appendix B). Is there any difference how teachers score on the 20 voluntary standards?

Hypothesis 6a.

Is there a difference in the 20 economic standards percentage scores by grade-level teachers? The percentage score was used to allow comparison between the grade-level scores, as the grade-level test consisted of a different number of question items.

Null Hypothesis: $H_o : \begin{pmatrix} M_{11} \\ M_{21} \\ M_{31} \\ M_{41} \end{pmatrix} = \begin{pmatrix} M_{12} \\ M_{22} \\ M_{32} \\ M_{42} \end{pmatrix} = \begin{pmatrix} M_{13} \\ M_{23} \\ M_{33} \\ M_{43} \end{pmatrix}$

There is no difference in economic standards percentage scores between grade-level teachers.

A GLM one-way MANOVA was conducted to investigate the effect of grade level taught (k-6, 7-8, 9-12) on the 20 voluntary national standards in economic (economic standards) scores. See appendix B for economic standards and corresponding Arkansas grade-level frameworks. As a result of the large number of economic standards (20), the model analyses were conducted by dividing the economic standards into smaller groups to improve the power of the statistical test (Stevens, 2009). Of the 20 economic standards, 16 are tested at all grade levels, kindergarten to twelfth. The 16 economic standards were divided into three groups and a final group consisted of two standards tested only in grades 7 to 12. An additional two economic standards are tested only at the tenth to twelfth grade level and thus were omitted from analysis.

Group 1 consisted of economic standards one through five. The economic standards are: standard 1, scarcity, choice, and productive resources; standard 2, decision making and marginal analysis; standard 3, economic systems and allocation mechanism; standard 4 economic

incentives; and standard 5, trade. Statistically significant differences were found among the grade-level teachers on the dependent measures, Wilks's Lambda = .509, F (10, 350) = 14.057, p < .001. The multivariate partial eta squared based on Wilks's Lambda was strong, .287. The null hypothesis that there is no difference in means scores between grade level teachers on five economic standards is rejected. Table 43 contains the economic standard mean and standard deviations by grade level group.

A one-way ANOVA was conducted on the dependent variables as a follow-up test to the MANOVA. Using the Bonferroni method, each ANOVA was tested at the .01 level, .05/5. The univariate ANOVA for economic standard 2 score was significant, F(2, 179) = 62.896, p < .001, $\acute{\eta}^2$ = .413. The ANOVA for economic standard 5 score was significant, F(2, 179) = 18.686, p = .001, $\acute{\eta}^2$ = .173. The ANOVA for economic standard1 percentage score was not significant, F(2, 179) = 3.642, p < .028, $\acute{\eta}^2$ = .0.39. The ANOVA for economic standard 3 score was not significant, F(2, 179) = 2.831, p = .062, $\acute{\eta}^2$ = .031., and the ANOVA for economic standard 4 score was not significant, F(2, 179) = 3.627, p = .029, $\acute{\eta}^2$ = .039.

Post hoc analyses to the univariate ANOVA for the economic standards scores consisted of conducting pairwise comparisons to find which grade level had the higher scores. Each pairwise comparison was tested at the .01 divided by 3 or 0.0033 level. For economic standard 2, high school teachers scored significantly lower than either elementary teachers or middle school teachers; there were no significant difference between elementary teachers and middle school teachers. For economic standard 5, high school teachers scored significantly lower than either elementary teachers or middle school grade teachers; there were no significant difference between elementary teachers and middle school teachers. For economic standard 1, standard 3 and standard 4, there were no significant difference between grade level teachers.

Group 2 consisted of economic standards six through ten. The economic standards are standard 6, specialization and comparative advantage; standard 7, markets and prices; standard 8, supply and demand; standard 9, competition and market structure; and standard 10, economic institutions. Statistically significant differences were found among the grade-level teachers on the dependent measures, Wilks's Lambda = .734, F (10, 350) = 5.847, $p < .001$. The multivariate partial eta squared based on Wilks's Lambda was strong, .143. The null hypothesis that there is no difference in means between grade level teachers on the five economic standards is rejected.

A one-way ANOVA was conducted on the dependent variables as a follow-up test to the MANOVA. Using the Bonferroni method, each ANOVA was tested at $\alpha = .01$ level, .05/5. The ANOVA for economic standard 6 score was significant, $F(2, 179) = 8.760$, $p < .001$, $\acute{\eta}^2 = .089$. The ANOVA for economic standard 7 score was significant, $F(2, 179) = 16.496$, $p < .001$, $\acute{\eta}^2 = .156$. The ANOVA for economic standard 9 score was significant, $F(2, 179) = 7.393$, $p < .001$, $\acute{\eta}^2 = .076$. The ANOVA for economic standard 8 score was not significant, $F(2, 179) = 1.479$, $p = .231$, $\acute{\eta}^2 = .016$, and economic standard 10 score was not significant, $F(2.179) = 1.976$, $p = .142$, $\acute{\eta}^2 = .022$.

Post hoc analyses to the univariate ANOVA for economic standards scores consisted of conducting pairwise comparisons to find which grade level had the higher scores. Each pairwise comparison was tested at the .01 divided by 3 or 0.0033. For standard 6, elementary teachers scored significantly higher than both middle school and high school teachers; there were no significant differences between middle school and high school teachers. For standard 7, high school teachers scored significantly lower than both elementary teachers and middle school teachers; there were no significant differences between elementary teachers and middle school

teachers. For standard 9, high school teachers scored significantly lower than elementary teachers; there were no significant differences in scores between elementary teachers and middle school teachers or between middle school teachers and high school teachers. For standards 8 and 10, there were no significant differences between the grade-level teachers.

Group 3 consist of six of the 20 economic standards: standard 11, money and money supply; standard 13, labor markets and income; standard 14, entrepreneurship; standard 15, physical and human capital investment; standard 16, economic role of government; and standard 19, unemployment and inflation. Statistically significant differences were found among grade-level teachers on the dependent measures, Wilks's Lambda = .701, F (12, 348) = 5.641, $p < .001$. The multivariate partial eta squared based on Wilks's Lambda was strong, .163. The null hypothesis that there is no difference between grade-level teachers on the five economic standards is rejected. Table 43 contains the means and the standard deviations on the dependent variables for the three groups.

A one-way ANOVA was conducted on the dependent variables as a follow-up test to the MANOVA. Using the Bonferroni method, each ANOVA was tested at the .008 level, .05/6. The ANOVA for economic standard 13 score was significant, $F(2, 179) = 15.821$, $p < .001$, $\acute{\eta}^2 = .15$. The ANOVA for economic standard 16 score was significant, $F(2, 179) = 8.141$, $p < .001$, $\acute{\eta}^2 = .083$, The ANOVA for economic standard 11 score was not significant, $F(2, 179) = 3.715$, $p < .026$, $\acute{\eta}^2 = .040$. The ANOVA for standard 14 score was not significant $F(2, 179) = 0.673$, $p = .512$ $\acute{\eta}^2 = .007$. The ANOVA for economic standard 15 score was not significant, $F(2, 179) = 3.152$, $p < .045$, $\acute{\eta}^2 = .083$, and the ANOVA for economic standard 19 score was not significant, $F(2, 179) = 1.155$, $p = .317$, $\acute{\eta}^2 = .013$.

Post hoc analyses to the univariate ANOVA for the economic standards scores consisted of conducting pairwise comparisons to find which grade level had the higher scores. Each pairwise comparison was tested at the .008 divided by 3 or 0.0026. For standard 13, elementary teachers scored significantly higher than high school teachers; no other grade-level comparison met the 0.0026 level of significance. For standard 16, elementary teachers scored significant higher than high school teachers; there were no significant differences between elementary teachers and middle school teachers or middle school teachers and high school teachers. For standard 11, no grade-level comparison met the significance level of .0026; there were no significant differences between grade-level scores. For standard 14, there were no significance differences between grade level teachers. For standard 15, no grade-level comparison met significance level of .0026; there were no significant differences between grade level scores. Finally, for standard 19, there were no significant differences between the scores of grade-level teacher.

Group 4 consisted of two of the 20 economic standards: economic standard 18, economic fluctuations, and economic standard 20, fiscal and monetary policy. Statistically significant differences were found among the grade-level teachers on the dependent measures, Wilks's Lambda = .872, F (2, 111) = 0.872, $p < .001$. The multivariate partial eta squared based on Wilks's Lambda was medium, .128. The null hypothesis that there is no difference between grade level teachers on the two economic standards is rejected. Table 42 contains the means and the standard deviations on the dependent variables for the three groups.

A one-way ANOVA was conducted on the dependent variables as a follow-up test to the MANOVA. Using the Bonferroni method, each ANOVA was tested at the .025 level, .05/2. The ANOVA for economic standard 20 score was significant, $F(1, 112) = 7.751$, $p < .006$, $\acute{\eta}^2 =$

.065, while the ANOVA for economic standard 18 was nonsignificant, $F(2, 179) = .749$, $p = .389$, $\acute{\eta}^2 = .007$.

Post hoc analyses to the univariate ANOVA for the economic standards scores consisted of pairwise comparison to find which grade level had the higher scores. Each pairwise comparison was tested at the .025 divided by 3 or 0.0083. For economic standard 18, there was no significant difference in the economic standard scores between groups. For economic standard 20, middle school teachers scored significantly higher than high school teachers. Elementary teachers were not tested over either standard 18 or standard 20. See table 42 for standard mean and standard deviation scores by grade level.

Table 43

Percentage Mean and Standard Deviation of Economic Standards score by Grade Level

	Standard One			Standard Two		Standard Three		Standard Four	
Grade level	*n*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
K - 6	68	88.53	20.24	100.00	0.00	97.05	17.02	89.71	30.61
7 -9	47	88.83	16.32	97.87	14.58	86.17	28.93	97.87	15.58
10-12	67	79.10	28.91	55.97	39.43	92.54	26.47	82.09	38.63
	Standard Five			Standard Six		Standard Seven		Standard Eight	
Grade level	*n*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
K - 6	68	93.63	16.55	86.76	26.79	66.18	47.66	89.71	30.61
7 -9	47	93.62	19.82	61.70	49.13	85.11	23.69	81.56	29.33
10-12	67	70.15	33.77	63.68	37.03	38.81	49.09	82.09	29.20

Table 43
Cont.

	Standard Nine			Standard Ten		Standard Eleven		Standard Twelve	
Grade level	*n*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
K - 6	68	95.59	18.79	94.12	20.31	77.94	26.77	--	--
7 -9	47	91.49	26.20	85.11	31.12	85.11	25.82	--	--
10-12	67	78.61	32.67	85.07	35.90	69.40	36.88	76.12	42.95
	Standard Thirteen			Standard Fourteen		Standard Fifteen		Standard Sixteen	
Grade level	*n*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
K - 6	68	95.59	20.69	93.38	22.69	69.85	34.70	94.12	23.70
7 -9	47	80.14	28.36	87.23	33.73	87.23	28.49	85.11	26.74
10-12	67	66.41	38.32	89.55	30.81	74.63	43.84	73.88	35.20
	Standard Seventeen			Standard Eighteen		Standard Nineteen		Standard Twenty	
Grade level	*n*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
K - 6	68	--	--	--	--	76.47	42.73	--	--
7 -9	47	--	--	67.02	36.52	81.91	30.26	80.85	33.86
10-12	67	61.19	49.09	72.76	33.63	71.14	36.18	62.69	34.58

Research question 7.

The final research question attempted to predict which of the human capital investment elements best predicted a high economic literacy test. Based on a review of the literature and results from the means analysis, I formulated the following characteristics would best predict success on an economic literacy test. I tested the model on the entire sample and by grade-level data.

Regression model all grades.

Three multiple regression analyses were conducted to predict economic literacy scores. Model one used human capital investment characteristics related to economic training and experience as predictors, number of undergraduate economics course completed, number of graduate economics, percentage time spent to infuse economic content into other subjects, number of years teacher has taught an economics class, number professional development workshops attended, and last date attended professional workshop. The regression equation was not significant, $R^2 = .10$, adjusted $R^2 = .065$, $F(6, 154) = 2.848$, $p = .012$. Had the significance level been relaxed, the equation would have been significant at $\alpha = .05$. Table 44 contains the three regression models used to predict K-12 teachers economic literacy scores. Only two of the variables contributed significantly to the model predictability, number of workshops attend beta = .185, $p = .036$, significant at the .05 level, with a part correlation of .161, indicating that number or workshops uniquely explained 2.6% of the variance. Last date attended a professional development workshop, beta = -.156, $p = .048$, significant at the .05 level, a part correlation of -.152 indicating last date attended a workshop uniquely explained 2.3% of the variance. Model one explained 10% of the variance in economic literacy scores. Model one regression equation:

Economic literacy score = 79.75 + 0.334 #workshops + 0.037 %infuse + -1.275 lastdate + 0.376 yrtaughtec + 0.966 #econclass + 0.403 #gradclass.

Model two added categorical educational variables, graduate degree, social studies degree, Praxis exam, attended in-state or out-of-state university, and social studies licensure. Regression equation was significant, $R^2 = .144$, adjusted $R^2 = .081$, R^2 change = .044, $F(11, 149) = 2.279$, $p = .013$. The addition of variables relating to major, university, and licensure appears to add little to model. Only one additional variable added to models predictability whether a

teacher attended an in-state or out-of-state university, beta = .157, p = .048, significant at the .05 level, a part correlation of .152 indicating attending an in-state or out-of-state uniquely explained 2.3% of variance. Model two regression equation:

Economic literacy score = 77.589 + 0.322 #workshops + 0.019 %infuse + -1.220 lastdate + - 0.388 yrtaughtec + 1.971 #econclass + -0.980 #gradclass + 1.055 socstdegree + -5.000 Praxis + 7.779 instateoutstate + 4.394 sslic.

Model three added a quadratic function to the model. Past research had hypothesized an accumulative effect of number of economics courses, years teaching, and number of workshops better explained gains in economic literacy scores than merely taking or attending a course would indicate (Lynch, 1990; Grimes et. al., 2010; Koshal et. al., 2008; Swinton, 2010). Variables added number of workshops squared, number of economics classes squared, number of graduate economics classes squared, number of years taught economics squared, and percentage of time spent infusing economic content into other subjects squared. The regression equation was significant, R^2 = 0.163, adjusted R^2 = 0.070, R^2 change = .019, $F(16, 144) = 1.757$, p = .043. No additional variables were statistical significant predictors. The increase in R squared of only 1.9% suggest the addition of a quadratic function did not appear to add an increase in predictive ability of model.

Model three regression equation:

Economic literacy score = 73.713 + 0.218 #workshops +0.302 %infuse + -1.464 lastdate + -.232 yrtaughtec +0.781 #econclass + -14.592 #gradclass + 0.814 graduatedegree + 0.425 socstdegree + -5.707 Praxis + 7.540 instateoutstate + 4.944 sslic + 0.003 #workshop2 + 0.026 #econclass2 + 4.152 #gradclass2 + 0.034 yrtaughtec2 + -0.004 %infuse2.

Over all the selected teacher human capital in economics characteristics were significant predictors of economic literacy. Key contributors were number of workshops attended and the last date of attendance of a workshop, the only other major contributors was the addition of university attended.

Regression model elementary teachers.

Three multiple regression analyses were conducted to predict economic literacy scores. Model one used human capital investment characteristics related to economic training and experience as predictors, number of undergraduate economics course completed, number of graduate economics, percentage of time spent to infuse economic content into other subjects, number of years a teacher has taught an economics class, number professional development workshops attended, and last date attended professional workshop. Table 45 shows the three elementary regression model results. The regression equation was not significant, $R^2 = 0.21$, adjusted $R^2 = 0.12$, $F(6, 53) = 2.368$, $p = .042$. Had the significance level been relaxed the equation would have been significant at $\alpha = .05$. Only two of the variables contributed significantly to the model predictability, number of workshops attended beta = .278, $p = .050$, significant at the .05 level, with a part correlation of .245, indicating that number or workshops uniquely explained 6% of the variance. Number of graduate hours in economics, beta = -0.347, $p = .008$, significant at the .01 level, a part correlation of -0.336 indicating number of graduate hours uniquely explained 11.29% of the variance. Model one explained 21% of the variance in economic literacy scores. A word of caution in interpreting the results, only one student had completed graduate hours in economics so the results to an extent are misleading. Model one regression equation:

Economic literacy score = 86.337 + 0.291 #workshops + 0.055 %infuse + -0.224 lastdate + 0.186 yrtaughtec + 1.612 #econclass + -13.689 #gradclass.

Model two added categorical educational variables, graduate degree, social studies degree, Praxis exam, attended in-state or out-of-state university, and social studies licensure. Regression equation was not significant, $R^2 = 0.239$, adjusted $R^2 = 0.084$, R^2 change = 0.028, $F(10, 49) = 1.541$, $p = .153$. The addition of variables relating to major, university, and licensure appears to add little to the model. No additional variables added statistical significance to the model's predictability. The additional variables only added 2.8% predictability of the model. Model two regression equation:

Economic literacy score = 83.362 + 0.321 #workshops + -0.068 %infuse + -0.214 lastdate + - 0.221 yrtaughtec + 1.520 #econclass + -14.027 #gradclass + 0.497 graduate degree + 4.253 socstdegree + 1.712 Praxis + -0.136 sslic.

Model three added a quadratic function to the model. Past research had hypothesized an accumulative effect of number of economics courses, years teaching, and number of workshops better explained gains in economic literacy scores than merely taking or attending a course would indicate (Lynch, 1990; Grimes et. al., 2010; Koshal et. al., 2008; Swinton, 2010). Variables added number of workshops squared, number of economics classes squared, number of graduate economics classes squared, number of years taught economics squared, and percentage of time spent infusing economics content into other subjects squared. The regression equation was not significant, $R^2 = 0.263$, adjusted $R^2 = 0.033$, R^2 change =0 .024, $F(4, 46) = .406$, $p = .803$. The only significant variable was number of graduate economics classes, beta = -0.363, $p = .016$, significant at .05 level, a part correlation of .321 indicating completing graduate economics course uniquely explained 10.3% of the variance. The results for number of graduate

economics courses is suspect as a result of sample size and should be re-tested with a larger data set before a definitive conclusion is suggested. Graduate economics hours squared was an excluded item, using pairwise comparisons, from the model. Model three regression equation:

Economic literacy score = 83.113 + 0.673 #workshops + -0.054 %infuse + -0.068 lastdate + 1.016 yrtaughtec + -1.089 #econclass + -14.314 #gradclass + 0.444 graduate degree + 5.147 socstdegree + 0.906 Praxis + 0.300 sslic + -0.008 #workshop2 + 0.528 #econclass2 + -0.048 yrtaughtecon2 + -0.00 %infuse2.

The basic model was the best predictor of elementary teachers economic literacy score. The importance of attendance at professional development workshops should be noted by curriculum directors especially given the low percentage of teachers who enter the profession with no college economics coursework.

Regression model middle school grade teachers.

Three multiple regression analyses were conducted to predict economic literacy scores. Model one used human capital investment characteristics related to economic training and experience as predictors, number of undergraduate economics courses completed, number of graduate economics, percentage time spent infusing economic content into other subjects, number of years teacher has taught an economics class, number of professional development workshops attended, and last date attended a professional workshop. For the middle school regression model see table 46 for the regression coefficients and significant levels. The regression equation was not significant, $R^2 = .08$, adjusted $R^2 = .08$, $F(6, 34) = .514$, $p = .793$. No variables contributed significantly to the model predictability. The regression model was not a good fit for predicting economic literacy scores. A result of the small sample size, the findings

suggest the need for future research with regard to middle school teachers' human capital investment in teaching economics and economic literacy scores. Model one regression equation:

Economic literacy score = 73.62 + 0.240 #workshops + 0.115 %infuse + 0.343 lastdate + 0.376 yrtaughtec + 2.643 #econclass + 2.106 #gradclass.

Model two added categorical educational variables, graduate degree, social studies degree, Praxis exam, attended in-state or out-of-state university, and social studies licensure. Regression equation was not significant, R^2 = .273, adjusted R^2 = .003, R^2 change = .190, $F(11,29) = 1.989$, p = .479. While the additional variables added to the models ability to predict economic literacy score only two variables were significantly at the p =.10 level. With the addition of social studies licensure beta = 0.427, p = .094, and part correlation = .275 indicate social studies licensure uniquely explained 7.5% of the variance in economic literacy score. Another variable added to model two which was statistically significant was teachers attended an in-state university versus out-of-state university beta = 0.376, p =0.97, part correlation = 0.272 which indicate the variable unique explained 7.39% of variance in score. Model two added R^2 by 19.0% to the predictability of model one. Model two regression equation:

Economic literacy score = 64.445 + 0.162 #workshops + -0.020 %infuse + 0.325 lastdate + - 2.260 yrtaughtec + 3.177 #econclass + -1.968 #gradclass + 6.959 socstdegree + -2.180 Praxis + 17.164 instateoutstate + 15.441 sslic.

Model three added a quadratic function to the model. Past research had hypothesized an accumulative effect of number of economics courses, years teaching, and number of workshops better explain gains in economic literacy scores than merely taking or attending a course would indicate (Lynch, 1990; Grimes et. al., 2010; Koshal et. al., 2008; Swinton, 2010). Variables added were number of workshops squared, number of economics classes squared, number of

graduate economics classes squared, number of years teaching economics squared, and percentage of time spent infusing economics content into other subjects squared. The regression equation was not significant, R^2 = .342, adjusted R^2 = -.096, R^2 change = .070, $F(16, 24)$ = .781, p = .691. While not significant, the addition of variables relating to major, university, and licensure appear to add predictability by increasing the R^2 by 7%. No one variable uniquely added to the models predictability and the two significant variables from model two dropped out of significance. The results of the three middle school regression models suggest future research is needed, with a larger data set, to understand middle school teacher characteristics that significantly predict teacher economic literacy. Model three regression equation:

Economic literacy score = 58.572 + 0.3501 #workshops +0.535 %infuse + 0.030 lastdate + -3.476 yrtaughtec +10.319 #econclass + -21.881 #gradclass + 0.796 graduate degree, 5.552 socstdegree + -0.208 Praxis + 17.031 instateoutstate + 10.566 sslic + 0.004 #workshop2 + -1.158 #econclass2 + 6.278 #gradclass2 + 0.195 yrtaughtec2 + -0.0080 %infuse2.

Regression model high school grade teachers.

Three multiple regression analyses were conducted to predict economic literacy scores. Model one used human capital investment characteristics related to economic training and experience as predictors, number of undergraduate economics courses completed, number of graduate economics, percentage of time spent infusing economic content into other subjects, number of years teacher has taught an economics class, number professional development workshops attended, and last date attended a professional workshop. Table 47 contains the regressions coefficients and significant levels for the three high school regression models. Model one regression equation was significant, R^2 = .273, adjusted R^2 = .195, $F(6, 56)$ = 3.503, p = .005. Three variables contributed significantly to the model predictability. Last date

attended a professional development workshop, beta = -.253, p = .031, significant at p = .05 level, a part correlation of -.252 indicating last date attended a workshop uniquely explained 6.3% of the variance. Number of economic classes completed was significant at the p = .10, beta = .207, p = .10, part correlation of .190 indicate number of economic classes completed uniquely explained 3.61% of variance in score. Years of teaching economics was significant at p = .10 level, beta = .253, p =.089, part correlation of .197 indicating number of years taught economics uniquely explained 3.88% of variance in score. Model one regression equation:

Economic literacy score = 67.07 + 0.242 #workshops + 0.113 %infuse + -2.503 lastdate + 1.016 yrtaughtec + 2.817 #econclass + 2.074 #gradclass.

Model two added categorical educational variables, graduate degree, social studies degree, Praxis exam, attended in-state or out-of-state university, and social studies licensure. Regression equation was significant, R^2 = .354, adjusted R^2 = .214, R^2 change = .081, $F(11, 51)$ = 2.536, p = .012. The model retained number of economic classes, p =.086, and last date attended a professional development workshop, p = .068, as significant at p = .10. In addition the added variable attending an in-state university versus out of state university was significant at p = .10, beta = .222, p = .065, part correlation of .212 indicates the variable uniquely explained 4.49% variance in score. Model two regression equation:

Economic literacy score = 57.520 + 0.143 #workshops + 0.121 %infuse + -2.146 lastdate + 1.181 yrtaughtec + 2.975 #econclass + 1.139 #gradclass + 0.970 graduate degree + -7.824 socstdegree + -3.959 Praxis + 12.654 instateoutstate + 8.215 sslic.

Model three added a quadratic function to the model. Past research had hypothesized an accumulative effect of number of economics courses, years teaching, and number of workshops better explain gains in economic literacy scores than merely taking or attending a course would

indicate (Lynch, 1990; Grimes et. al., 2010; Koshal et. al., 2008; Swinton, 2010). Variables added were number of workshops squared, number of economics classes squared, number of graduate economics classes squared, number of years taught economics squared, and percentage of time spent infuse economic content into other subjects squared. The regression equation was significant at the $p = .05$ level, $R^2 = .429$, adjusted $R^2 = .231$, R^2 change = .075, $F(16, 46) = 2.161$, $p = .021$. The model retained the significant predictors number of economic classes, $p = .05$, and last date attended a professional development workshop, $p = .081$. The model added two additional significant variables percentage of time spent infusing economics content and the quadratic percentage of time spent infusing economic content. Significant at $p = .05$ level was percentage of time spent infusing economic content into other subjects beta = .888, $p = .046$, part correlation of .229 indicates a unique contribution of 5.24%. While the quadratic percentage of time spent infusing economics content in other topics was also significant beta = -0.823, $p = .065$, a part correlation of -.211 indicates a unique contribution of 4.45%. However number of years taught economics significant in model 2 dropped from model three as a significant predictor. The addition of quadratic variables added 7.5% to power of model. Model three regression equation:

Economic literacy score = 38.140 + 0.382 #workshops + 1.024 %infuse + -2.214 lastdate + 0.154 yrtaughtec + 8.431 #econclass + 7.479 #gradclass + 1.606 graduate degree + -8.442 socstdegree + -4.394 Praxis + 11.376 instateoutstate + 10.517 sslic + -0.005 #workshop2 + -0.694 #econclass2 + -1.751 #gradclass2 + 0.030 yrtaughtec2 + -0.012 %infuse2.

The high school regression models to determine the human capital characteristic which best predict a teachers economic literacy score suggest that educational curriculum and licensure

staff should pay attention to the importance of number of economic classes completed as a prerequisite to teaching high school economics.

Table 44

Multiple Regression Predictors of Economic Literacy Score K -12

	Grade Level Economic Literacy Score		
Variable	Model 1	Model 2	Model 3
constant	79.750**	74.589**	73.713**
number of economics classes	0.966	0.971	0.781
graduate economics classes	0.403	-0.980	-14.592
number of workshops	0.334**	.322**	0.218
% time infuse	0.037	0.019	0.302
last date attended workshop	-1.275**	-1.220***	-1.464**
years taught economics	0.376	0.388	0.232
graduate degree		0.747	0.814
social studies degree		1.055	0.425
social studies licensure		4.394	4.944
praxis		-5.000	-5.707
in-state, out-of-state		7.779**	7.54***
number of workshops squared			0.003
economics classes squared			0.026
economics graduate classes squared			4.152
years taught economics squared			0.034
% time infused squared			0.004
R^2	0.100	0.144	0.163
Adjusted R^2	0.065	0.081	0.070
F statistic	2.848**	2.279**	1.757**
ΔR^2		0.044	0.019
Δ F		1.537	0.651

*** $p < .10$, ** $p < .05$, * $p < .01$

Table 45

Multiple Regression Predictors of Economic Literacy Score K-6

	Grade Level Economic Literacy Score		
Variable	Model 1	Model 2	Model 3
constant	86.337*	83.362*	83.113*
number of economics classes	1.612	1.520	-1.089
graduate economics classes	-13.689*	-14.027*	-14.314**
number of workshops	.291**	.321**	0.673
% time infuse	-0.055	-0.068	-0.054
last date attended workshop	-0.224	-0.214	-0.068
years taught economics	0.186	0.221	1.016
graduate degree		0.497	0.444
social studies degree		4.253	5.147
social studies licensure		-0.136	0.300
praxis		1.712	0.906
in-state, out-of-state		n/a	n/a
number of workshops squared			0.008
economics classes squared			0.528
economics graduate classes squared			n/a
years taught economics squared			-0.048
% time infused squared			0.000
R^2	0.211	0.239	0.263
Adjusted R^2	0.122	0.084	0.033
F statistic	2.368**	1.541	1.146
ΔR^2		0.028	0.024
Δ F		0.448	0.359

*** $p < .10$, ** $p < .05$, * $p < .01$

n/a in-state/out-of-state and number of graduate classes squared removed from model

Table 46

Multiple Regression Predictors of Economic Literacy Score 7-9

	Grade Level Economic Literacy Score		
Variable	Model 1	Model 2	Model 3
constant	73.621*	64.445*	58.572*
number of economics classes	2.643	3.177	10.319
graduate economics classes	2.106	-1.968	-21.881
number of workshops	0.240	0.162	0.350
% time infuse	0.115	-0.020	0.535
last date attended workshop	0.343	0.235	0.030
years taught economics	0.376	-2.260	-3.476
graduate degree		1.278	0.796
social studies degree		6.959	5.552
social studies licensure		15.441***	10.566
praxis		-2.180	-0.208
in-state, out-of-state		17.164***	17.031
number of workshops squared			-0.004
economics classes squared			-1.158
economics graduate classes squared			6.278
years taught economics squared			0.195
% time infused squared			-0.008
R^2	0.083	0.273	0.342
Adjusted R^2	-0.079	-0.003	-0.096
F statistic	0.514	0.989	0.781
ΔR^2		0.190	0.070
Δ F		1.512	0.508

*** $p < .10$, ** $p < .05$, * $p < .01$

Table 47

Multiple Regression Predictors of Economic Literacy Score 10-12

	Grade Level Economic Literacy Score		
Variable	Model 1	Model 2	Model 3
constant	67.074*	57.520*	38.140*
number of economics classes	2.817***	2.975***	8.431**
graduate economics classes	2.074	1.139	7.479
number of workshops	0.242	0.143	0.382
% time infuse	0.113	0.121	1.024**
last date attended workshop	-2.503**	-2.146***	-2.214***
years taught economics	1.016***	1.181***	0.154
graduate degree		0.970	1.606
social studies degree		-7.824	-8.442
social studies licensure		8.215	10.517
praxis		-3.959	-4.394
in-state, out-of-state		12.654***	11.376
number of workshops squared			-0.005
economics classes squared			-0.694
economics graduate classes squared			-1.751
years taught economics squared			0.030
% time infused squared			-.012***
R^2	0.273	0.354	0.429
Adjusted R^2	0.195	0.214	0.231
F statistic	3.503*	2.536**	2.161**
ΔR^2		0.081	0.075
Δ F		1.273	1.216

*** $p < .10$, ** $p < .05$, * $p < .01$

Conclusion

Chapter 4 presented results of an analysis of the data. An overview of sample participants were presented to paint a picture not only of the sample but an indication of teachers of economics in the state of Arkansas. Results of the economic literacy test were presented by grade level and in aggregate. Economic literacy scores reflected an aggregate literacy score and scores for each of four economic content groups. A statistical analysis followed utilizing ANOVA for comparison of group means by content group score, economic standards, human capital characteristics, and school characteristics. A regression model provided a predictive model of human capital investment to achievement score. Chapter 5 will discuss the findings and recommendations for future research.

Chapter 5: Discussion and Conclusion

Chapter 5 presents a discussion of the findings presented in Chapter 4 with an emphasis on Arkansas K-12 teachers' preparedness to teach economics to their respective grade levels. Special attention will be paid to specific economic content mastery as measured by three nationally normed grade-level economic literacy test correlated to Arkansas curriculum standards.

Discussion of Findings

In 2009, Arkansas implemented a graduation requirement of a one-semester economics course, in addition to already established economic curriculum frameworks embedded in social studies courses. My research assessed Arkansas teachers' knowledge of economic content through grade-level economic literacy tests. The approach used differed from past research in that teachers were assessed based on grade-level standards economics content for their respective student age group. Data analyses occurred on aggregate, sub-category content group, and national voluntary standards as correlated to Arkansas K-12 social studies curriculum framework level. I chose to evaluate Arkansas curriculum frameworks based on new social studies frameworks to be implemented in 2015. The analysis provided a benchmark of grade-level framework proficiency and provided a base-line measurement for use in future research. Grade-level framework economic content in need of improvement was identified. In addition, research addressed human capital characteristics associated with a high economic literacy score. The purpose of my research was to provide education policy makers an assessment of Arkansas teachers' current level of economic content preparedness, deficient economic content areas, and past economic training with regard to future economic education policy.

Why is economic education in the K-12 school system important? For a functioning democratic society, citizens need an understanding of how their daily working, buying, savings, investing, and voting decisions affect others and, in turn, the economy. The K-12 educational system is one institution through which all citizens are assured access to economic education. The foundation of economic thinking and reasoning should begin in kindergarten and progress through high school and beyond, whether by additional formal education or life-long learning

How do Arkansas teachers view inclusion of economics in the K-12 curriculum? Here are a few comments submitted anonymously,

> Economics should be a standard of business classes particularly as it relates to current issues, and the global economy. Economics is part of life. It can be infused in math, social studies, literacy very easily. Most teachers are not trained to do this. Most people do not understand economics much less how to teach it. I can balance my budget and write up ideas on how to stay within that budget. But if you want me to explain GDP and government economics then I am lost because it is backwards from everything I know as the money manager. New teachers need more training than just an introductory course in college.

Arkansas teachers scored at a proficient level on a nationally normed economic literacy tests (BET, TEK, TEL), using a score of 70% as proficient. Mean scores by grade level were: elementary teachers 88.04%, middle school teachers 84.51%, and high school teachers 71.79%. The score for each grade level while reflecting proficiency does not meet an accepted level for mastery learning. Grimes et al. (2010, p. 11) stated "to effectively teach a relatively difficult subject such as economics, we should expect to find a large positive difference between teachers' test scores and those of their prospective students". It appears this would not be the case in the current study based on the percentage of teachers which correctly answered their respective grade level test question compared to the percentage of normed grade level students who correctly answered each question. Caution should be exercised on grade-level comparisons, as the score only indicates teachers scored higher or lower on grade-appropriate content. For

example, elementary teachers demonstrated an overall higher mastery of their grade level microeconomics curriculum content than high school teachers did of their grade level microeconomics curriculum content. However, high school teachers in my sample scored lower on the TEL than teachers in Mississippi (Grimes et al., 2010) and Arkansas (Logan, 2010). As grade level economic literacy tests, BET and TEK, were used by elementary and middle school teachers no comparison to other research results were possible.

Atypical to past research, teachers in my study were more likely to have completed a college economics course. The sample was typical of past research as teachers completed on average two or less economics courses. Sample teachers attended professional development workshops in the last five years at an average rate of, by group: elementary teachers 10, middle school teachers 4.89, and high school teachers 8.7. Swinton et al. (2010) found attendance at three economic professional development workshops resulted in a statistically significant difference in student economic literacy scores.

Before a grade level discussion of the disaggregation of the economic literacy score, one comment needs made. The recent economic downturn of 2008 reinforced the importance for individuals and businesses to understand macroeconomic policy. Yet regardless of grade level taught Arkansas teachers do not understand macroeconomics or personal finance concepts. An interesting finding since macroeconomics was the most frequently reported college economics course taken by teachers and 16% of teachers rated their knowledge of macroeconomic content as very good and another 46% rated their knowledge as good. The findings support the contention that one class in economics, in this case macroeconomics, is not sufficient to truly understand economic concepts. A teacher's macroeconomic content understanding is relevant as

a majority of Arkansas social studies curriculum framework standards focus on macroeconomic issues.

Elementary teachers' high economic literacy scores were to be expected given the economic content is less complex and test questions are likely to be answered correctly based on life experiences. Grimes et al. (2010) stated

> It can be argued that a thorough knowledge and understanding of advanced economic concepts is not needed to teach the basic principles of economics at the elementary level. Indeed, what is the degree of economic literacy required to competently teach the economic principles suggested for the elementary grades by the National Standards? While more knowledge is clearly preferred to less knowledge, this question is left for future researchers to answer (pp. 17-18).

My research is a first attempt to define what the level of economic literacy is for elementary teachers based on state social studies curriculum frameworks as measured by a nationally normed economic literacy test of elementary grade level national standards. The importance of elementary teachers' understanding basic economic concepts cannot be overstated, as economic content learned in early elementary grades establishes the foundation for economic literacy. False or misleading information about economics either learned or not corrected at the elementary grade level could have consequences in later classes or in life.

Elementary teachers scored significantly higher than high school teachers on all content areas, with the exception of macroeconomics. Elementary and middle school teachers did not score significantly differently on economics content. Elementary teachers scored significantly lower on their macroeconomics content than the other economic content groups. A review of Arkansas elementary grade social studies curriculum framework standards revealed areas of concern. For example Arkansas social studies K-6 framework standard 5, exchange and markets, elementary teachers did not demonstrate proficiency on the topic of how the market system sets prices through the operation of supply, demand, and price pressures. Arkansas social studies

framework grades K-6 standard five covers essential economic principles and the foundation building blocks of economic understanding. Without providing a solid understanding of supply and demand, students will be at a disadvantage in understanding economic thought and applying economics in their real-life experiences. Elementary teachers struggled with macroeconomic concepts of functions of money, money supply, inflation, price stability, and the business cycles effect on unemployment and inflation topics they must teach in grade K-6 social studies framework standard 6. The elementary teacher, often with no economic training, is expected to cover approximately the same amount of economic content, 17 of the 20 voluntary national standards, as does a high school teacher.

A final evaluation suggest elementary teachers maybe ill equipped to teach the basic economic fundamentals required by Arkansas K-6 social studies framework economic standards without formal training in economics. Teachers who learned economics by life experience may develop misconceptions of basic economic principles and thereby present misinformation to their students.

The findings suggest elementary education teacher preparation programs require a minimum of two "economics for elementary teachers" courses. The State Department of Education should consider an in-service requirement of attendance of three professional development workshops specifically designed to address grade level economic standards over which teachers have below 90% content scores. It is as important elementary teachers have comprehensive economic training on their grade level economic content as would a high school teacher.

Middle school teachers scored significantly higher than high school teachers on economic fundamentals and international economics. No significant differences in scores were

found between middle school teachers and either elementary or high school teachers on microeconomics. While no significant difference in scores between grade levels were found on macroeconomics, middle school teachers recorded the highest macroeconomics score of the three grade levels. Within the grade level, there were significant differences between economic fundamentals and macroeconomics score, but no significant differences in other content area scores.

It should be noted middle school social studies curriculum frameworks consist of embedded economics content in two classes, grade seven geography, and grade eight United States history 1800-1900. Arkansas history grade seven and eight curriculum framework included an economics strand; however, the focus is a broad analysis and synthesis of economic impacts not specific economics content. There is no stand-alone economics class or curriculum for the middle grades. An example of economics embedded in a social studies standard is grade seven geography standard seven, analyze how access to factors of production is effected by location. Grade seven and eight Arkansas History economics content strand 3 includes, analyze the economic impact of transportation systems. Grade eight United States history curriculum includes a standard to analyze the purpose, implementation, and effects of public polices relating to currency and banking. Unfortunately a majority of middle school teachers could not answer questions over the functions of money or banking institutions.

Middle school students are expected to use economic principles learned in kindergarten through sixth grade to analyze the effects of economic actions and policy. This places added pressure on the earlier grade teachers to "get it right" and for middle school teachers to have a depth of economic understanding to assist students in the analysis of intended and unintended consequences of economic policy. Thus, suggesting the need for future research into a middle

school teacher's ability to evaluate economic policy which is beyond the scope of the current economic literacy tests. How effective middle grade economic education is remains to be determined if on average economics is infused into other courses at 12.5% to 33% of class time and the number of economics courses completed by the teachers of infused content classes is between 1.2 and 1.72.

On a whole middle school teachers appear to be best prepared to teach the economic content included at their grade level, with the exception of specialization and comparative advantage, which is included in grade seven and eight American History standard 4 and grade 8 social studies standard 1 and standard 2. As a number of high school social studies curriculum standards build on comparative advantage, a low score by middle school teachers is a concern. Middle school teachers were least likely to attended economic professional development workshops, on average 4.89 in the last five years compare to the ten for elementary teachers. Research findings suggest an emphasis should be placed on attendance at middle school level economic professional development workshops covering macroeconomics, and international economics. The workshops should focus not only on the economic content needed for the grade level standards on which the students had not previously been exposed e.g. government failure, but more importantly on synthesis of economic principles such as opportunity cost, marginal analysis, and unintended consequences used in analyze of economic scenarios. For example, "compare advantages and disadvantages of one location over another in the access to factors of production", Arkansas standard HS.7.7.2, or "analyze social and economic effects of the Civil War on America", Arkansas standard Era5.2.8.3 (Arkansas Standards, 2014).

One last statement regarding the Arkansas middle school social studies curriculum standards. After a review of the social curriculum standards amended in 2007 for grades 7-8 to

the new social studies curriculum standards amended in 2014, it appears the focus on economics has been reduced by the 2014 standards. The 2007 curriculum standards were more in-depth and focused on economic content for seventh and eighth grades. Additionally, the 2007 K-8 social studies curriculum standards provided middle grade students a specific foundation in personal finance omitted in the 2014 standards.

The high school teachers' mean TEL economic literacy score of 71.79 did not compare favorably with Logan's 2010 study of Arkansas high school teachers TEL score of 78.085. One explanation for the low TEL score can be found in an item analysis of the current results, high school teachers with no economic training, either college economics courses or professional development workshops, only answered 11 of 40 questions correct. The low TEL score, a C-, demonstrated a lack of sophistication to master the advanced concepts needed to cover the Arkansas economic curriculum framework, much less to infuse content into other secondary socials studies curriculum frameworks. The overall low economic literacy score by high school teachers is worrisome, as high school is when a synthesis of economic thinking occurs in both the capstone stand-alone class and through embedded content in other social studies courses.

Based on grade level economic content high school teachers scored significantly lower than elementary teachers scored on their grade level content in microeconomics, and significantly lower than both elementary and middle school teachers scored on grade level content in economic fundamentals and international economics. Granted the complexity level of content increased from grade level to grade level it is still desirable to have teachers master their respective grade level curriculum standards content, which for high school teachers is not currently the situation. At the same time, high school social studies teachers are expected to teach Arkansas economic curriculum standards content which is equivalent to a two-semester

college course sequence of introduction to microeconomics and introduction to macroeconomics. While college level economics teachers have at the minimum a masters in economics, high school teachers are expected to teach the same economic content with an average of two economics classes.

Of particular concern is lack of understanding by high school teachers over the basic economics principles of marginal analysis (55.97%) Arkansas economic curriculum standard 1, and supply, demand, and market price (38.81%) Arkansas economic curriculum standard 2. Without a sound understanding of economic fundamentals the various evaluations and analyze required in the high school economic standards will be impossible. For example Arkansas standard EDM.1.E.2, justify various economic solutions to problems affecting an individual or society using marginal cost and marginal benefit, or Arkansas standard EM.2.2., demonstrate changes in supply and demand that influence equilibrium price and quantity using a supply and demand model (Curriculum, 2014). As previously discussed macroeconomics (68.8%) and international economics (57.46%) are areas of deficient economic content by high school teachers. The low macroeconomics score is a major concern given six of the nine Arkansas economic standards (standards 3, 5, 6, 7, 8, and 9) either explicitly or implicitly involve macroeconomic analysis. For example, Arkansas standard NE.5.E.1, analyze economic indicators used to measure economic performance (Curriculum, 2014). High school teachers scored low (61.19) on evaluating the unintended consequences of government economic policy, Arkansas economic curriculum standard 3. For example, Arkansas standard EM.3.E.3, evaluate intended and unintended consequences of government policies created to improve market outcomes (Curriculum, 2014). The lack of knowledge with regard to trade, specialization, and comparative advantage is concerning not only as the content is included in Arkansas economic

curriculum standard 7, but more importantly the topic is embedded in a majority of the other social studies frameworks. For example, Arkansas standard GE.7.E.1, analyze the role of comparative advantage in trade and global markets using available data and a variety of sources (Curriculum, 2014). This lack of understanding as demonstrated by failing test scores, I would refer the reader to table 43, over the above topics draws into question the ability of social studies teachers to teach to the established standards.

The analysis of embedded economic content in high school social studies curriculum frameworks suggest teachers are expected to assist students in interpretation of economic public policy with extensive use of economic fundamentals. For example, Arkansas standard Era 8.3.USH.2, Analyze the federal government's fiscal responses to the Great Depression (Curriculum, 2014) or Arkansas standard SFG.6.USG.1, Analyze the impact of the federal government's fiscal policy on the economy (Curriculum, 2014). Yet teachers themselves score low on all macroeconomic content especially with regard to the effects of failed government economic policies. Testing of personal finance knowledge was outside the scope of current research, still high school teachers scored low on topics of interest rates, money supply and inflation, incomes and labor markets, and monetary policy. Topics I assert are the foundation of personal finance and included in Arkansas economic curriculum standards 8 and 9 as well as family and consumer science standard 7. For example, while the following standard PFM.8.E.1 is included in the personal financial management strand, analyze the impact of education, training, and other factors on productivity and income potential (Curriculum, 1204); the topic cannot be answered without an understanding of the fundamental economic concepts of factors of production, supply and demand, marginal cost/marginal benefit, capital, labor markets and economic growth. Lopus stated "Economist make decisions by weighing benefits and cost, on

the margin. The point is not to teach students about right or wrong decisions, but rather about using the analytical tools of economic decision-making correctly. Frame personal finance decisions in the economic way of thinking against economic concepts such as scarcity and opportunity cost." (2011, p. 99, 103).

To sufficiently study all the content required by the economic curriculum standards a high school economics teacher would need the equivalent of a minor in economics. Policy makers should reevaluate the requirements for certification of social studies teachers to include at a minimum four undergraduate classes in economics. Immediate concern for the Arkansas State Department of Education is remedial training for high school teachers on basic economic fundamentals, supply and demand, macroeconomics, and international economics through in-service professional development workshops aligned with the established curriculum economic standards. Yearly required in-service training for high school teachers of economic content both stand-alone and infused courses should be implemented to prevent learning decay of economic principles, if the goal of economic education is to provide quality instruction to assure an economic literate citizenry.

The function of economic education is to have economic content embedded into the fabric of K-12 education from kindergarten to twelfth grade. For this to occur it is imperative that teachers at each grade level instill the building blocks of economics at their grade level allowing future grade levels to enhance on the previous knowledge. An investigation of the grade level economic literacy standard scores revealed a serious problem, teachers at each grade level scored low on the same standards. The topics of scarcity, trade-offs, opportunity cost, and marginal analysis the basic elements of economic thinking were missed at both the middle school and the high school level. The low scores maybe due to two causes, first according to Walstad

and Watts (1985) teachers do not view the economic concepts of trade-offs and opportunity cost as important, and even though they are key to the economic way of thinking few junior or senior high school teachers emphasize them. Secondly, the way the current Arkansas standards are written for grades seven through twelfth teachers may not recognize the importance of the underlying use of trade-offs and opportunity cost to their broader focused topics. Equally concerning is teachers at all grade levels could not answer questions over supply and demand, and the role of price in the market system topics most often associated with economics. If a solid understanding of the price mechanism and supply and demand are not established at each grade level including high school then the evaluation of economic policy included in the middle school and high school curriculum standards will be faulty.

As mentioned previously in this paper, from elementary school through high school teachers do not understand macroeconomic issues of unemployment, inflation, the business cycles, taxes, and factors of economic growth causing serious reservation students would be able to examine the monetary and fiscal policies as required in the high school economics standard 6. Given the emphasis currently placed on personal finance with the inclusion of strand 8 personal financial management in the high school economics curriculum frameworks. School district curriculum specialist should be concerned teachers regardless of grade level could not answer questions over inflation and the purchasing power of the dollar, functions of money or the banking system.

It is imperative professional development workshops be offered over the topics missed sequentially by grade level teachers. The workshops should focus on the incremental nature of the economics topics e.g. inflation teachers should be are cognizant of how the topic will be

studied in later grade levels. For it appears subsequent grade level teachers are currently unprepared to correct misconception of economic thought developed at pervious grade levels.

Of the teachers of economics 41.9% earned degrees in middle or secondary education social studies. An additional, 14.9% of teachers of economics earned elementary education degrees. However, a teacher's undergraduate degree resulted in no statistical difference in economic literacy test scores. Holding other factors constant, the undergraduate degree earned by a teacher explained only three percent of the variance in economic literacy score. The non-significant effect of college degree on economic literacy test was a surprise as middle and secondary social studies education and secondary education majors completed 1.92 to 2.88 economics classes as opposed to the 1.29 to 1.57 economics classes for elementary education majors. Yet, middle and secondary social studies education majors scored 10 percentage points lower on their economic literacy test than did elementary education majors. Interesting, teachers with the primary responsibility of teaching economics completed the same amount of economics courses as a chemistry or drama major i.e. 1.92 to 2.00. Logic suggest it might not be only the number of economics course completed, but also the type of economics courses effecting the economic literacy of K-12 teachers. The findings suggest a need for teacher educator programs to revisit the number and type of economics courses required of secondary social studies majors.

As referenced above the number of economics classes completed by grade level teachers varied. The number of economics classes completed by elementary teachers were not a statistically significant indicator of economic literacy score. Logically, given the less complex nature of the elementary economic literacy test, teachers through life experience and professional development workshops could offset the effect from completion of economics classes. Completion of four plus economic classes compared to no economics class only increased the

economic literacy score by five percentage points or a letter grade from B+ to A-. As with elementary teachers, the number of economic classes completed by middle school teachers were not statistically significant even though the strength of the relationship was medium. Holding all other factors constant, the number of economics course completed accounted for seven percent of the variance in middle school teachers' economic literacy scores. Completion of four or more economics classes resulted in an increase of 15.15 percentage points of the economic literacy score over middle school teachers with no economics classes a letter grade of C to A -. Completion of two economics classes increased the middle school teachers' economic literacy score by 11.66 percentage points over middle school teachers with no economics courses, an increase of one letter grade C to B+. It should be noted that only three middle school teachers had completed more than two economics courses. The number of economics courses completed by high school teachers had a statistically significant effect on economic literacy score representing 18.8% of the variance in scores holding all other factors constant. A comparison of high school teachers who completed three economics classes to high school teachers with no economics classes reflected a 30.62 percentage point difference in score, and increase in letter grade from an F to a B+. One anomaly occurred suggesting additional research, high school teachers economic literacy scores dropped when four or more economics courses were completed a trend not observed for middle or elementary teachers. Regardless of significance, for each grade level a delimiting point of three or more undergraduate classes in economics resulted in a higher economic literacy score. As grade level increases so did the amount of variance in economic literacy score explained by completing economics courses. Yet to teach economics in Arkansas K-12 system there is no specific number of economics courses required, one could teach economics without ever having taken a college economics course. The State

Department of Education should investigate the addition of an economics course(s) requirement for certification to teach economics particularly at the high school level. Future research, with a larger data set, should be conducted to determine which specific classes account for higher economic literacy scores.

Teachers gain economic knowledge by college courses or professional development workshops. For my sample, attending a professional development workshop resulted in a significantly higher economic literacy score. Length of workshop did not significantly affect economic literacy score. The difference in economic literacy score from not attending a professional development workshop to attending ten plus professional development workshops was 17.41 percentage points. Merely attending three professional development workshops increase the economic literacy score by 13.6 percentage points. The effect of number of professional development workshops and economic literacy score was more pronounced for high school teachers increasing the economic literacy score from 58.93 for no professional workshops to 85.56 for ten plus professional development workshops. Just increasing high school teachers attendance at professional development workshops to three increased the economic literacy score to 80%. Elementary teachers were the most likely to attend a professional development workshop, 89.7%, while middle school teachers were the least likely to attend a professional development workshop at 74.5%. The majority of workshops, 70%, averaged a length of one to two days. High school teachers were the most likely to attend three plus day workshops; however, workshops of a longer duration did not significantly increase the high school teachers economic literacy score and in some cases actually lower the economic literacy score. Teachers' attendance at professional development workshops in the last three years resulted in an average economic literacy score of 85% compared to an average economic literacy score of 75.96 if the

last date of attendance was greater than three years. The results support Watts (1985) theory that there is knowledge decay the longer the time period from the last economic training and support the need for frequent professional development opportunities. Again, I emphasis strongly the need for annual attendance of professional development workshops especially for middle and high school teachers. No significant interaction effect was found between number of economics courses completed and number of professional development workshops attended on economic literacy score. However, the medium strength of association between number of economics courses completed and number of professional development workshops suggest a need for further research into what is the optional combination to increase the human capital of economics teachers.

Investigation of professional development workshops designed specifically to address the four economic content areas found a significant difference from attendance at professional development workshops covering economic fundamentals and international economics. While not significant there was a medium strength of association between number of professional development workshops and microeconomics. Only macroeconomics revealed no relationship between professional development workshops and economic literacy score. Current research findings identify professional development workshops significantly increase economic literacy. School districts and economic education agencies should question whether they are designing professional development workshops to meet the deficient areas identified by the low economic literacy scores on the national voluntary content standards and Arkansas social studies curriculum standards specifically international economics and supply and demand as previously discussed.

A third way to gain economic knowledge is "learning by doing" (Grimes, 2010; Butters, Asarta & Fischer, 2011) measured by a proxy of number of years a teacher taught has economics. While the longer a teacher had taught economics resulted in a higher overall economic literacy score, there was no significant difference. For economic content areas, again the results were not significant at .01 level but would have been at .05. An increase in economic literacy score was pronounced in macroeconomics and international economics for teachers who had taught economics for five or more years. For economic fundamentals and microeconomics the economic literacy scores were higher for teachers who had taught economics for four or more years. For all content areas the difference in economic literacy score form the first year of teaching economics to five plus years of teaching was on average 30 percentage points.

The last result I would like to discuss is infused versus stand-alone economics classes. Given the large amount of economics content infused in Arkansas social studies curriculum frameworks other than the stand-alone economics class, a base-line measure of economic knowledge needed to be established. To my surprise, there were no significant differences between economic literacy scores of teachers who infused economic content versus the scores of those teaching a stand-alone class. The homogeneous nature of the data set with regard to number of economics classes taken lead to the non-significant result. Of greater concern to economic literacy of Arkansas students, especially at the middle school level, is the effectiveness of the infusion method of economic instruction if 59% of economic infusion occurs in 33% or less of the course time.

Using the logic of learning by doing, I expected teachers who allocated a large amount of class time to economic content would have a higher economic literacy score. In fact, the opposite resulted; teachers who infused content 75% or more of class time scored lower on their

grade level economic literacy test. Learning by doing for these teachers was evident in their tenure longevity; however, they were relatively new, less than four years, to infusing economics into the curriculum.

Results from the multiple regression model to predict economic literacy scores using human capital factors were inconclusive. An interesting relationship did appear; number of professional workshops attended and last date attended did contribute significantly to economic literacy test scores. A model to predict a K-12 teachers economic literacy includes number of economics class completed + number of professional development workshops attended + last date of professional development workshop + number of years taught economics + graduate degree. The model reinforced the importance of professional workshops in conjunction with a minimum of 3 college economics courses to effect economic literacy. Last date attended at professional development workshop reinforced the need for refresher courses to prevent erosion of economic content knowledge.

Conclusion and Recommendations

The primary findings of my research suggest elementary teachers, with a few exceptions, are proficient in economic content necessary to meet state social studies curriculum standards for their grade level. Middle school teachers while scoring at a proficient level on voluntary national content standards in economic content may not be able to meet the grade 7-8 Arkansas social studies curriculum framework standards requiring high level analysis and synthesis of economic policy. The finding suggest future qualitative research of middle school teacher's ability to apply economic theory to satisfy middle school social studies curriculum frameworks. High school teachers scored low on macroeconomics and international trade topics included in seven of the nine Arkansas high school social studies curriculum framework standards. The study

resulted in an awareness of lack of understanding at the high school level of the economic content a teacher is expected to teach, a concern especially for the embedded economic content in other social studies subjects. The incremental introduction of economic way of thinking suggest that teachers regardless of grade level would benefit from professional development on the topics of supply and demand fundamentals, and the macroeconomic concepts of unemployment and inflation. Elementary and high school teachers would benefit from professional development workshops in the functions of money, inflation, purchasing power, and monetary policy. Middle school and high school teachers scored deficient on topics of opportunity cost, comparative advantage and trade, and macroeconomics measures of economic growth and standard of living. The sequential nature of the deficient content raise the odds students will leave the K-12 system illiterate on basic economic principles needed to make life long economic decisions unless teachers are better prepared to assist students in mastery of the economic concepts.

Elementary teachers tended to acquire economic content knowledge through professional development workshops rather than college economic courses. The more recent attendance at a professional development workshop resulted in higher economic literacy scores. Whichever means for obtaining economic content, either college classes or professional development workshops, is important as teachers without economic training consistently recorded lower economic literacy test scores even below those of their respective test-normed students.

The research suggest the following characteristics, while not statistically significant, resulted in a higher economic literacy score, years of teaching economics, number of professional workshops attended within the last three years, professional development workshops of more than one day, three or more undergraduate economics classes. Teachers

licensed in social studies were more likely to teach economic content. The Arkansas Department of Education policy makers might revisit the licensure requirements for social studies to include a minimum of two economics courses for elementary teachers and three economics courses for middle school teachers and pass the social studies Praxis exam and for high school economics teachers a minimum of a minor in economics and passage of the economic Praxis exam. Further research needs to be conducted to determine the college courses that best increase the economic literacy scores of at each grade level for K -12 teachers. Teachers of economic content should be required to attend annually a minimum of two three day professional development workshops. The three day requirement will allow for teachers to gain not only economic content but also economic pedagogical skills.

Teachers who participated in the research study had the following comments for policy maker in regard to economics training.

> In-services would be awesome. Techniques to teach economic principles in a way that students can easily grasp. Teacher-in-service to increase economic knowledge of teacher who are actually teaching economics. Additional lessons/activities for elementary age children. New teachers need more training than just an introductory course in college. Make sure the training is specific to the grade and maturity level of the students. Specific for classes, made easy to understand for students. I think teachers need to see this as something they already do, not something new to be added to their plates. More hands on for the students, make it real relevant, and engaging. And a final comment, I would like to attend a workshop that uses my field, agriculture, as one or more of the basis' of the training.

Policy makers might take a hint from teachers and provide economic training relevant to the classes they are asking teachers to teach. Teachers prefer a professional development workshop to a college economics course. The comments from teachers indicate a need for further research into the effect of pedagogical techniques on the mastery of economic content for both teachers as well as students. School administrators should also note that the longer a teachers has taught economics the "learning by doing" principle has a significant effect suggesting once

assigned an economics course either a stand-alone class or infusion of economic content that teacher should be reassigned their economics teaching responsibly.

The sequential nature of economic knowledge development suggest the middle grade level social studies curriculum standards be reevaluated as related to economics. The current economic standards for seventh and eighth grades are very broad in nature as opposed to the 2007 K-8 social studies standards. The 2007 Arkansas curriculum standards (Arkansas Standards, 2007) contained an economics strand and benchmarks which specifically addressed economic principles similar to the content in the current elementary socials studies frameworks. If the objective is to graduate an economic literate individual skipping a stand-alone strand in the middle grades put added pressure on the high school economics course, a course already overwhelmed with content. Additionally, I question the ability of the current middle grades approach to import meaningful economic instruction if the courses spend, based on current research data, approximately one-third of course time on economics in U. S. history and Arkansas history, and one-fourth of course time in Geography, the three class with economic content listed in the Grades 7- 8 Arkansas social studies frameworks.

The research revealed interesting insights into a teachers personal and school characteristics; however, do to the sample size no definitive determination was made as to their unique contribution to a teacher's economic literacy score. Future research is indicated with regard to school size and geographic location. Teachers in smaller school recorded lower economic literacy scores. While the current research study included participants from each geographic region of the state, replication of the research with a larger sample particular with regard to the southern region of the state is highly recommended. Additional research is needed to determine the interaction between geographic region and school size. Stand-alone economic

classes provided the most depth of economic content; however, future research is needed with regard to the effectiveness of the embedded economic content of the infusion method along with the analytical economic understanding of infused content teachers.

The current investigation provided insight to the level of Arkansas K-12 teachers' economic literacy and human capital investment in economics. The research provides a baseline but it would be beneficial to replicate the study with a larger data sample and a qualitative study of the teachers understanding of the application of economic principles.

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Appendix A

Summary of Voluntary National Content Standards in Economics (Siegried, et al., 2010) Adapted from Voluntary National Content Standards in Economics 2nd Edition, copyright © 2010, Council for Economic Education

Standard	Summary description
Standard 1 Scarcity (trade-offs, opportunity cost, factors of production) Benchmarks for grades 4, 8 12	Limited productive resources, limited resources vs. unlimited wants, choice and trade-off must be made, opportunity cost, factors of production (land, labor, physical capital, human capital), future unintended consequences of decisions
Standard 2 Decision making (cost benefit analysis) Benchmarks for grades 4, 8, 12	Decision are made at the margin, marginal cost, marginal benefit; cost is what you gave up, benefit is what you gained, spend now or save for the future; marginal cost verse marginal benefit in labor, production decisions, and public policy decisions; ignore sunk cost; risk and diversification of risk
Standard 3 Allocation (economic systems) Benchmarks for grades 4, 8, 12	Methods used to allocate goods and services (e.g. by price, command, lottery, contest, clan, first come, equal distribution); answering the three economic questions of all economic systems, how, what and for whom; redistribution of wealth or income
Standard 4 Incentives Benchmarks for grades 4, 8, 12	People respond to both negative and positive incentives
Standard 5 Trade Benchmarks for grades 4, 8, 12	Trade (voluntary exchange of goods/services) occurs when both parties expect to gain; trade barrier policies (e.g. tariffs, quotas); trade and benefits to standard of living;
Standard 6 Specialization and Comparative Advantage Benchmarks for grades 4, 8, 12	Specialization, division of labor, labor productivity, comparative advantage, global interdependence
Standard 7 Markets and Prices	Market a place where buyers and sellers come to interact; how interaction of buyers and sellers influence price; price affects

Benchmarks for grades 4, 8, 12	allocation of goods, services and resources; effect of shortages and surpluses on price; exchange rate is price of currency
Standard 8 Supply and Demand Benchmarks for grades 4, 8, 12	Supply, demand and price as a signal to economic activity; causes for changes in supply and/or demand and resulting price changes, how price changes affect incentive; effects of government price controls
Standard 9 Competition and Market Structure Benchmarks for grades 4, 8, 12	Competition between buyers and sellers, buyers, and sellers; characteristics of different market structures and resulting levels of competition; collusion; cartels; competition and price levels; competition results in innovation
Standard 10 Economic Institutions Benchmarks for grades 4, 8, 12	Describe function of Institutions, as described by CEE are banks, labor unions, household, corporations, judicial system in a market economy ; property rights
Standard 11 Money, Money Supply, and Inflation Benchmarks for grades 4, 8, 12	Three functions of money, money supply, inflation, money supply and inflation
Standard 12 Interest Rates Benchmarks for grades 8, 12	Interest rates, changes in interest rates, interest rates and speculation, interest rate is price set by supply and demand, interest effect on saving and borrowing, risk, future and present values
Standard 13 Income Benchmarks for grades 4, 8, 12	Incomes, income earned is dependent on derived demand of their skills, wages are affect by education, training, skill development, and career choices, supply and demand set wage rates, changes in the labor market affect earning potentials
Standard 14 Entrepreneurship Benchmarks for grades 4, 8, 12	Individuals who create new businesses, risk takers, innovators, identify risks and returns from starting a business, entrepreneurship and economic growth
Standard 15 Economic Growth Benchmarks for grades 4, 8, 12	Factors affecting economic growth, investment in physical and human capital, productivity, economic growth and the standard of living,

Standard 16 Role of Government and Market Failures Benchmarks for grades 4, 8, 12	Public goods, funding of public (economic) policy, social benefits and social costs of public policy, tax structures, protection of workers, protection of industries
Standard 17 Government failures Benchmarks for grades 8, 12	Unintended consequences of public (economic) policy, cost sometimes exceed benefits, cost of equity vs. economic efficiency, government economic policy evaluation
Standard 18 Economic Fluctuations (output, income, employment, price level) Benchmarks for grades 8, 12	Measures of economic activity, Gross Domestic Product, Gross Domestic Product component parts, national income accounting, business cycles, measures of current economic conditions
Standard 19 Unemployment and Inflation Benchmarks for grades 4, 8, 12	Related to business cycle; unemployment; unemployment rate; problems with current calculations of unemployment, types of unemployment, meaning of full employment; incomes, inflation, and purchasing power; anticipated vs unanticipated inflation and segments of economy hurt and helped; protection against inflation
Standard 20 Fiscal and Monetary Policy Benchmark for grade 12	Federal government fiscal policy (tax and spend) and Federal Reserve System's monetary policy to influence overall economic activity (employment, output and prices); understand macroeconomic policy; recognize not all government spending is for fiscal policy; budget deficit versus national debt; Federal Reserve System tools to control the money supply; Federal Reserve System open market operations;

Appendix B

Alignment of Arkansas Curriculum Frameworks to Voluntary National Standards in Economics

http://www.arkansased.gov/divisions/learning-services/curriculum-and-instruction/curriculum-framework-documents/social-studies-new-courses-valid-july-1-2015
http://www.councilforeconed.org/wp/wp-content/uploads/2012/03/voluntary-national-content-standards-2010.pdf

Arkansas Standard	National Standard	Arkansas description of standard
Grades K -4 Social Studies		
Standard 4 Decision making	1, 2	Scarcity, opportunity cost, trade-offs, cost benefit analysis
Standard 5 Exchange and markets	3, 6, 7, 8, 13, 14, 15	Factors of production, incomes earned by factors of production, entrepreneur, markets/exchange, supply/demand, supply/demand and price, specialization, production process
Standard 6 Growth/stability	10, 11, 16, 18, 19	Functions of money, savings, banks/financial institutions, public goods, taxes, unemployment, inflation, price stability (introduction of macroeconomics concepts)
Standard 7 Global economy	5, 6	Voluntary exchange, comparative advantage, trade creates interdependence, import, export, cost/benefit analysis
Standard 8 Geography	6	Comparative advantage
Grade 5-6 Social Studies		
Standard 4 Decision making	1, 2, 6, 10, 16	Trade-offs, specialization, cost/benefit analysis
Standard 5 Exchange and markets	1, 3, 5, 6, 14, 15	Specialization, factors of production, economic growth, entrepreneur, economic systems, supply and demand, production process
Standard 6	10, 11, 16, 18, 19	Functions of money, savings, banks/financial institutions, public goods, taxes, unemployment, inflation, price stability

Standard 7 Global economy	5, 6	Voluntary exchange, comparative advantage, trade creates interdependence, import, export, cost/benefit analysis
Grade 7 Geography Standard 7 Economic interdependence	1, 6, 15	Factors of production, comparative advantage,
Grades 7-8 Arkansas history		
Standard 3 Economic influences	1, 10, 14, 17	Factors of production, economic institutions e.g. railroads, entrepreneur
Standard 4 Economic impact	1, 2, 5, 6, 10, 14	Entrepreneurship, economic institutions, businesses, trade, globalization of markets, opportunity cost, decision making
Grade 8 Social studies		
Standard 1 Expansionism	1, 5, 6, 10, 11,	Trade, comparative advantage, money supply, banking, opportunity cost, factors of production
Standard 2 Civil War	1, 2, 4, 5, 6, 10, 15, 16	Decision making, opportunity cost, incentive, trade, specialization, comparative advantage, government institutions, role of government, economic growth
Economics Social Studies		
Standard 1 Decision making	1, 2, 4	Scarcity, incentives, trade-offs and opportunity cost, marginal cost/marginal benefit
Standard 2 Allocation methods	3, 7, 8	Economic systems, allocation of resources, supply and demand, establish market prices, equilibrium, shortage, and surplus
Standard 3 Producers, consumers, and government in a market economy	10, 14, 16, 17	Consumers, economic institutions, forms of business organization, role of government involvement in the market system, unintended consequences of public policy

Standard 4 Competition in the market	7, 8, 9,	Types of competition, market structure, how competition within market effects prices, quantity, and select of goods/service available
Standard 5 Measuring economic activity, business cycles	15, 18, 19	Gross domestic product, price indices, unemployment, human capital, capital investment, economic growth, standard of living
Standard 6 Fiscal and monetary policy	10, 11, 12, 17, 20	Financial institutions, monetary policies of Federal Reserve System, fiscal policy, national debt and budget deficits
Standard 7 Trade, globalization interdependence	5, 6, 7, 10, 13, 15, 16, 17	Comparative advantage; globalization affect income, technology, innovation;
Standard 8 Income, wealth	1, 8, 9, 12, 13, 15, 10	income, human capital, derived demand, factors of production, interest rate, risk aversion
Standard 9 Personal finance	2, 10, 11, 12	Economic institutions, cost benefit analysis of risk and reward, interest rates
U. S. History		
Standard 2 1890-1930	3, 15, 16	Allocation systems, economic institutions
Standard 3 Great depression	10, 16, 17, 18, 19, 20	Business cycles, unemployment, governments role, economic institutions, government solutions
Standard 6 1945 – 1970	6, 15, 16	Specialization and trade, role of government, business innovation
Standard 7 and 8 Since 1968	10, 11, 12, 16, 17, 18, 19, 20	Macroeconomic policy
Arkansas History 9-12		
Standard 3 Gilded Age	1, 2, 6, 10	Scarcity, decision making, specialization, comparative advantage, and economic institutions
Standard 4 Early 20th century	6, 10, 14, 16, 17	Specialization, comparative advantage, economic role of government, entrepreneurship, business institutions

Standard 5 WW II to civil rights	9, 13, 16, 17, 20	Government role, competition and market structure, labor markets, fiscal and monetary policy, government failures
Standard 6 Modern era	6, 10, 14, 16	Competitive market, economic institutions, entrepreneurship, economic role of government

Arkansas Grade level Curriculum Standards matched to National Voluntary Standards

Standard	Grade K -4	Grade 5-6
Standard 1 Scarcity , choice, productive resources	4	4
Standard 2 Decision making, marginal analysis	4	4
Standard 3 Economic systems & allocation mechanisms	5	5
Standard 4 Incentives		6
Standard 5 Trade	7	7
Standard 6 Specialization & comparative advantage	7	5,7
Standard 7 Markets & prices	5	
Standard 8 Supply & demand; role of price	5	6
Standard 9 competition and market structure		6
Standard 10 Economic institutions	5, 6	6
Standard 11 Money , money supply, and inflation	6	6
Standard 12 Interest rates		
Standard 13 Incomes and labor market	5	
Standard 14 Entrepreneurship	5	5
Standard 15 Economic growth; physical & human capital	5	5
Standard 16 Economic role of government; market failure	6	6
Standard 17 Government failure		
Standard 18 economic fluctuations, business cycles	6	
Standard 19 Unemployment & inflation	6	6
Standard 20 Fiscal & monetary policy		

Standard	Economics	Civics	Sociology
Standard 1 Scarcity , choice, productive resources	1		
Standard 2 Decision making, marginal analysis	1		
Standard 3 Economic systems & allocation mechanisms	2		
Standard 4 Incentives	8		
Standard 5 Trade	7		
Standard 6 Specialization & comparative advantage	7		
Standard 7 Markets & prices	2		
Standard 8 Supply & demand; role of price	2		7
Standard 9 competition and market structure	4		
Standard 10 Economic institutions	3, 6	2	
Standard 11 Money , money supply, and inflation	6		
Standard 12 Interest rates	6, 9		
Standard 13 Incomes and labor market	7, 8		7
Standard 14 Entrepreneurship	3		
Standard 15 Economic growth; physical & human capital	5		
Standard 16 Economic role of government; market failure	3	2	
Standard 17 Government failure	3, 7	2	
Standard 18 economic fluctuations, business cycles	5		
Standard 19 Unemployment & inflation	5		
Standard 20 Fiscal & monetary policy	6		

Standard	Government	World History
Standard 1 Scarcity , choice, productive resources		1
Standard 2 Decision making, marginal analysis		
Standard 3 Economic systems & allocation mechanisms		1
Standard 4 Incentives		
Standard 5 Trade		1
Standard 6 Specialization & comparative advantage		1
Standard 7 Markets & prices		1
Standard 8 Supply & demand; role of price		1
Standard 9 competition and market structure		
Standard 10 Economic institutions		
Standard 11 Money , money supply, and inflation		
Standard 12 Interest rates		
Standard 13 Incomes and labor market		4
Standard 14 Entrepreneurship		
Standard 15 Economic growth; physical & human capital		
Standard 16 Economic role of government; market failure	6	4
Standard 17 Government failure	6	4
Standard 18 economic fluctuations, business cycles	6	
Standard 19 Unemployment & inflation	6	
Standard 20 Fiscal & monetary policy	6	

Standard	United States History	World Geography	Grade 9-12 Arkansas History
Standard 1 Scarcity , choice, productive resources		6	3
Standard 2 Decision making, marginal analysis			
Standard 3 Economic systems & allocation mechanisms	2		
Standard 4 Incentives			
Standard 5 Trade			
Standard 6 Specialization & comparative advantage	4, 6	4, 6	3, 4, 6
Standard 7 Markets & prices			
Standard 8 Supply & demand; role of price			
Standard 9 competition and market structure			
Standard 10 Economic institutions	1, 3, 7, 8		3
Standard 11 Money , money supply, and inflation			
Standard 12 Interest rates			5
Standard 13 Incomes and labor market			
Standard 14 Entrepreneurship			5, 6
Standard 15 Economic growth; physical & human capital			6
Standard 16 Economic role of government; market failure	3, 7		4
Standard 17 Government failure	3, 7		
Standard 18 economic fluctuations, business cycles	3, 7		
Standard 19 Unemployment & inflation	3, 7		
Standard 20 Fiscal & monetary policy	3, 7		

National Voluntary Economic Standard across grade levels	African American History	Family & Consumer Science
Standard		
Standard 1 Scarcity , choice, productive resources		
Standard 2 Decision making, marginal analysis		
Standard 3 Economic systems & allocation mechanisms		7
Standard 4 Incentives		
Standard 5 Trade		
Standard 6 Specialization & comparative advantage		
Standard 7 Markets & prices		
Standard 8 Supply & demand; role of price		
Standard 9 competition and market structure	2	7
Standard 10 Economic institutions		
Standard 11 Money , money supply, and inflation		7
Standard 12 Interest rates		
Standard 13 Incomes and labor market		
Standard 14 Entrepreneurship		
Standard 15 Economic growth; physical & human capital	2, 5	
Standard 16 Economic role of government; market failure		
Standard 17 Government failure	5	
Standard 18 economic fluctuations, business cycles		
Standard 19 Unemployment & inflation		
Standard 20 Fiscal & monetary policy		

Appendix C

Voluntary National Content Standards in Economics
Grade Level Introduction

Standard	BET K - 6	TEK 7 - 9	TEL 10 -12
Standard 1 Scarcity , choice, productive resources	X	X	X
Standard 2 Decision making, marginal analysis	X	X	X
Standard 3 Economic systems & allocation mechanisms	X	X	X
Standard 4 Economic incentives - price, wages, profits etc.	X	X	X
Standard 5 Voluntary exchange & trade	X	X	X
Standard 6 Specialization & comparative advantage	X	X	X
Standard 7 Markets & prices	X	X	X
Standard 8 Supply & demand (role of prices)	X	X	X
Standard 9 Competition & market structure	X	X	X
Standard 10 Economic institutions	X	X	X
Standard 11 Money, money supply, inflation	X	X	X
Standard 12 Interest rates		X	X
Standard 13 Labor markets & income	X	X	X
Standard 14 Entrepreneurship	X	X	X
Standard 15 Physical & human capital investment (economic growth)	X	X	X
Standard 16 Role of government & market failure	X	X	X
Standard 17 Government failure		X	X
Standard 18 Economic fluctuations (business cycles)		X	X
Standard 19 Unemployment & inflation	X	X	X
Standard 20 Fiscal & monetary policy			X

(Siegried, et al., 2010)

Appendix D

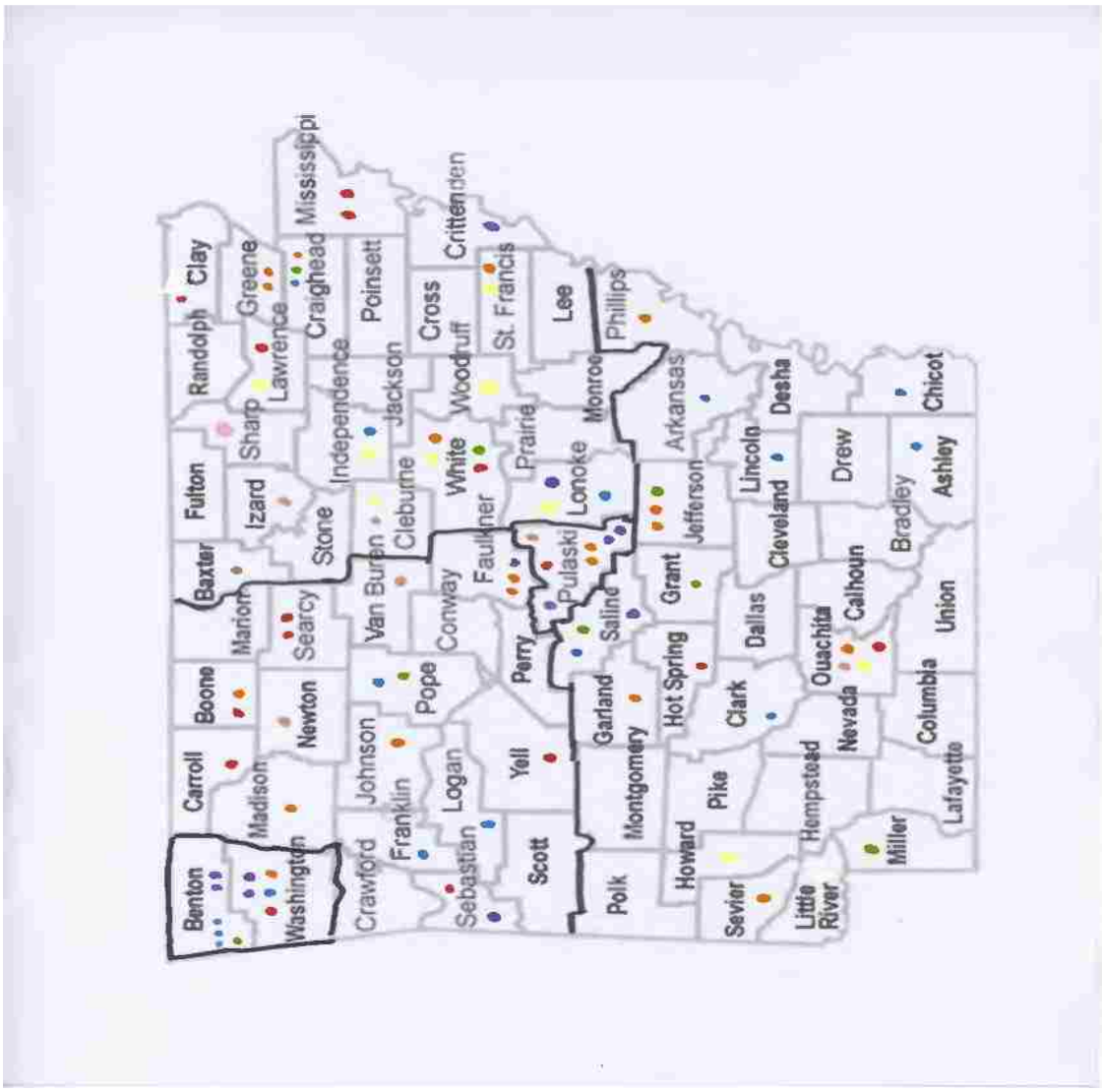
Voluntary National Content Standards in Economics
Grade Level Economic Literacy Test Items

Standard	BET K - 6	TEK 7 - 9	TEL 10 -12
Standard 1 Scarcity , choice, productive resources	X	X	X
Standard 2 Decision making, marginal analysis	X	X	X
Standard 3 Economic systems & allocation mechanisms	X	X	X
Standard 4 Economic incentives - price, wages, profits	X	X	X
Standard 5 Voluntary Exchange & trade	X	X	X
Standard 6 Specialization & comparative advantage	X	X	X
Standard 7 Markets & prices	X	X	X
Standard 8 Supply & demand (role of prices)	X	X	X
Standard 9 competition & market structure	X	X	X
Standard 10 Economic institutions	X	X	X
Standard 11 Money, money supply, inflation	X	X	X
Standard 12 Interest rates			X
Standard 13 Labor markets & income	X	X	X
Standard 14 Entrepreneurship	X	X	X
Standard 15 Physical & human capital investment (economic growth)	X	X	X
Standard 16 Economic role of government & market failure	X	X	X
Standard 17 Government failure			X
Standard 18 Economic Fluctuations		X	X
Standard 19 Unemployment & inflation	X	X	X
Standard 20 Fiscal & monetary policy		X	X

(Walstad, Rebeck, & Butters, Basic economics test, examiners manual, 2010; Walstad & Rebeck, Test of Economic Literacy, Examiner's Manual, 2010)

Appendix E

Map of School District Geographic Location and Schools Size Classification



Classification: one = brown; two = yellow; three = red; four = blue; five = orange; six = green; seven = purple; community college = pink

Source:

https://www.google.com/search?q=maps+of+arkansas+counties&tbm=isch&tbo=u&source=univ&sa=X&ei=7kuUVcTfHcHesAXZuZn4Dw&ved=0CCAQsAQ&biw=1366&bih=631#imgrc=W-MGEksQP1YotM%3A

Appendix F

Survey Instrument

K-12 Teachers economic knowledge survey

Why I am asking you to take the survey

Your name was selected at random so as to provide a cross section of ALL Arkansas teachers, regardless of teaching area. You are being asked to help school districts and professional development organizations determine what type of economic training they could offer teachers.

If you choose to participate your name will be entered into a drawing for one of three $100 dollar gift certificates from Amazon.com.

I am June M Freund, doctoral student in Curriculum and Instruction, at the University of Arkansas. With the inclusion of a course in Economics as an Arkansas high school graduation requirement, my dissertation research is to establish a base line measure of economic knowledge of Arkansas teachers. The results from the research study will suggest continuing education and faculty development opportunities to strength the economic knowledge of Arkansas teachers.

What you are being asked to complete

You are asked to take an economic knowledge test, the same grade level economic test recommended by the Council for Economic Education for your students, and complete a short teacher survey. Your participation is important to assure an accurate picture of the economic human capital of teachers in Arkansas is obtained. All information collected will be confidential and your responses are recorded anonymously; however, if you would like a copy of the results of the study you may send a separate email requesting a copy to junem.freund@gmail.com. Individual responses will not be made available to any source and only aggregate data will be used in the research study.

Teachers Survey

All data collected in the survey and test are completely anonymous and individual responses will not be included in the published dissertation only aggregate data will be used. Completion of the survey will act as informed consent to participate in the research project.

The survey and test take approximately 35 minutes to complete. Thanking you in advance for your time taken to complete the survey and test.

Demographic information

1. Gender:

☐ male

☐ female

Page 1

K-12 Teachers economic knowledge survey

2. Age:

- ◯ 20 - 25
- ◯ 26 - 30
- ◯ 31 - 35
- ◯ 36 - 40
- ◯ 41 - 45
- ◯ 46 - 50
- ◯ 51 - 55
- ◯ 56 - 60
- ◯ over 60

Undergraduate educational information

The information gathered on this page is used for reference only, and provides a picture of the post-secondary preparation of K-12 teachers in Arkansas

3. Undergraduate major (i.e. secondary education - history; chemistry; mathematics; elementary education; early childhood education)

4. undergraduate minor

5. Institution awarding [Q3] undergraduate degree

6. Do you have additional undergraduate degrees ?

- ◯ yes
- ◯ no

undergraduate educational information continued

7. Undergraduate major (i.e. secondary education - history; chemistry; mathematics; elementary education; early childhood education)

8. undergraduate minor

K-12 Teachers economic knowledge survey

9. Institution awarding [Q7] undergraduate degree

10. Do you have additional undergraduate degrees ?

- ◯ yes
- ◯ no

undergraduate educational information continued

11. List any additional undergraduate degrees and the institution where the degree was earned

graduate degree information

The information gathered on this page is used for reference only, and provides a picture of the graduate school preparation of K-12 teachers in Arkansas

12. I have a graduate degree

- ◯ Yes
- ◯ No

graduate degree information

13. Graduate degree

14. Institution awarding [Q13] graduate degree

15. Do you have additional graduate degrees?

- ◯ yes
- ◯ no

graduate degree information continued

16. Graduate degree

K-12 Teachers economic knowledge survey

17. Institution awarding [Q16] graduate degree

18. Do you have additional graduate degrees?

- ◯ yes
- ◯ no

graduate degree information continued

19. List any additional graduate degrees and the institution where the degree was earned

Economic Course Work

The information collected here will help provide a picture of the economic course preparation of K-12 Teachers

20. I took an economics course(s) as an undergraduate

- ◯ Yes
- ◯ No

undergraduate economic course listing

K-12 Teachers economic knowledge survey

21. Undergraduate economic course(s) you have completed, select all that apply

- [ ] survey of economics (basic economics)
- [ ] economics for teachers elementary
- [ ] economics for teachers secondary
- [ ] economic issues
- [ ] principles of microeconomics (introduction to microeconomics)
- [ ] principles of macroeconomics (introduction to macroeconomics)
- [ ] intermediate microeconomics
- [ ] intermediate macroeconomics
- [ ] international economics
- [ ] international trade
- [ ] money and banking
- [ ] business finance
- [ ] economic history
- [ ] environmental economics
- [ ] history of economic thought
- [ ] global issues
- [ ] labor economics
- [ ] public finance

Other (please specify)

Graduate economics course work

22. I completed a graduate economics course(s).

- ◯ Yes
- ◯ No

K-12 Teachers economic knowledge survey

Graduate economics courses

23. Graduate economics course(s) you have completed, select all that apply.

- [ ] econometrics
- [ ] global issues
- [ ] international trade
- [ ] labor economics
- [ ] macroeconomics
- [ ] microeconomics
- [ ] money and banking
- [ ] organizational economics

Other (please specify)

Teacher License(s) and Endorsement(s)

I am interest in the type of license or endorsements held by teachers assigned to teach economic content versus teachers that are not responsible for economic content.

K-12 Teachers economic knowledge survey

24. Select the Teacher License(s) and Endorsement(s) that you hold (select all that apply)

- [ ] Age 3-4 Endorsement (PRE K)
- [ ] Agriculture Science & Technology (7-12)
- [ ] Art (K-12)
- [ ] Art (K-6)
- [ ] Art (7-12)
- [ ] Business Technology (4-12)
- [ ] Career Orientation Endorsement (7-12)
- [ ] Career Orientation Endorsement (4-8)
- [ ] Career Preparation (K-12)
- [ ] Content Specialist Literacy (K-6)
- [ ] Content Specialist Math (K-6)
- [ ] Content Specialist Science (K-6)
- [ ] Curriculum Program Administrator Social Studies (P-12)
- [ ] Drama (7-12)
- [ ] Drama & Speech (7-12)
- [ ] Earth Science (7-12)
- [ ] Elementary (K-6)
- [ ] English Language Arts (7-12)
- [ ] English (7-12)
- [ ] Family & Consumer Science (7-12)
- [ ] Gifted & Talented (K-12)
- [ ] Grade 5-6 Endorsement Social Studies (5-6)
- [ ] Industrial Technology (7-12)
- [ ] Journalism (7-12)
- [ ] Library Media Specialist (K-12)
- [ ] Life Science (7-12)
- [ ] Marketing (7-12)
- [ ] Mathematics (7-12)
- [ ] MCH Social Studies (4-8)
- [ ] Middle Childhood (4 -8)
- [ ] Physical Education & Health (K-12)

K-12 Teachers economic knowledge survey

- [ ] Physical Education & Health (K-6)
- [ ] Physical Education & Health (7-12)
- [ ] Physical Science (7-12)
- [ ] Physics/Mathematics (7-12)
- [ ] Social Studies (7-12)
- [ ] Special education (K-12)
- [ ] Speech (7-12)

Other (please specify, subject and license or endorsement)

Prasix II

25. Have you taken a Social Studies or Economic Praxis II exam

- ◯ Yes
- ◯ No

Praxis II Exams

26. Please indicate the Praxis II taken (select all that apply)

- [ ] Praxis II Social Studies: Content and interpretation test (0086 or 5086)
- [ ] Praxis II Social Studies: Social Studies Middle School Multiple Subjects 0144 or 5144 (5141)
- [ ] Praxis II Economics (0911)
- [ ] Other

Other (please specify the other social studies Praxis II taken)

Economic Organization memberships

27. Are you a member of an economic teachers organization?

- ◯ Yes
- ◯ No

Economic Organization memberships

K-12 Teachers economic knowledge survey

28. Please indicate if you are a member of:

◯ GATE (Global Association of Teachers of Economics)

OTHER (If you are a member of another economic organization please specify which economic organizations that your are a member)

Teaching Experience

This section will ask questions about your previous and current teaching experience

29. Grade Level(s) currently teaching (select all that apply)

- ☐ pre K
- ☐ K
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10
- ☐ 11
- ☐ 12

Teaching Experience continued

30. Teaching Load and longevity

	normal number of classes taught per academic year	average class size	number of years you have taught (include current year)
teaching experience			

31. Current School District (information will be used to group data into district classifications)

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K-12 Teachers economic knowledge survey

Teaching Experience with economic content

32. Are you currently or have you previously taught an economics class?

- ◯ Yes
- ◯ No

Teaching Experience with economic content

33. Indicate the number of years you have taught an economics class(s), including this year

- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ 6
- ◯ 7
- ◯ 8
- ◯ 9
- ◯ 10
- ◯ 11 - 15
- ◯ 16 - 20
- ◯ 21 - 25
- ◯ more than 25

Teaching Experience with economic content

K-12 Teachers economic knowledge survey

34. Select the class(s) name, and indicate if the class is being taught currently or previously, is an AP or Honors class, and the grade level of the class (select all that apply)

	teaching	type of class	grade level
economics			
economic issues			
global or international			
investments			
microeconomics			
macroeconomics			

Other (please specify class name, teaching, type of class, and grade level as above))

Infusion of economic content into the curriculum of the class(s) you teach

To determine how economic content is infused into the curriculum

35. When teaching other subjects I infuse economic content into the curriculum

- ◯ Yes
- ◯ No

List of class(s) economic content is infused

K-12 Teachers economic knowledge survey

36. Please indicate the class(s) in which you infuse economic content and the percentage of class time spent on economic content (select all that apply)

	less than 12.5%	12.5% to 25%	26% to 33%	34% to 50%	51% to 66.7%	67% to 75%	greater than 75%
civics	◯	◯	◯	◯	◯	◯	◯
current events	◯	◯	◯	◯	◯	◯	◯
general business	◯	◯	◯	◯	◯	◯	◯
geography	◯	◯	◯	◯	◯	◯	◯
government	◯	◯	◯	◯	◯	◯	◯
language arts	◯	◯	◯	◯	◯	◯	◯
mathematics	◯	◯	◯	◯	◯	◯	◯
psychology	◯	◯	◯	◯	◯	◯	◯
reading	◯	◯	◯	◯	◯	◯	◯
sociology	◯	◯	◯	◯	◯	◯	◯
social studies	◯	◯	◯	◯	◯	◯	◯
U. S. History	◯	◯	◯	◯	◯	◯	◯
World history	◯	◯	◯	◯	◯	◯	◯

Other (please specify name of class and percentage of time spent on economic content

Economic Human Capital (knowledge and skills) Development

Information regarding academic credit and non-credit professional development experiences.

37. I have you attended an Economic Professional Development workshops or seminars.

◯ Yes

◯ No

Economics workshops/seminars attended

K-12 Teachers economic knowledge survey

38. For each organization indicate If you have participated in workshop(s) or seminar(s) sponsored by the organization; If yes indicate the number of workshops/seminars participated in, if you earned continuing education credit for the workshops/seminar, the average length of workshop/seminar in days, and the last year attended

	Attended	number attended	Continuing Educattion credit	average length in days	Year last attended a workshop
Economics Arkansas					
Economic Education Center					
Federal Reserve Bank					
Foundation for Economic Education (FEE)					
School District In-Service Faculty Development					
Educational Cooperative					
Jump$tart Coalition					
Junior Achievement					
University or College					
Junior Achievement					
Other 1 (list sponsoring organization in comment section)					
other 2 (list sponsoring organization in comment section)					
other 3 (list sponsoring organization in comment section)					

List sponsoring organization for Other 1, Other 2, and Other 3 above

Use of economic education curriculum materials

39. Many organizations and institutions provide economic education curriculum materials, have you used such materials in any of your class(s)?

◯ Yes

◯ No

Use of economic education curriculum materials

40. Indicate if you have used curriculum materials provided by each organization

- [ ] Economics Arkansas
- [ ] Economic Education Center
- [ ] Federal Reserve Bank
- [ ] Foundation for Economic Education (FEE)
- [ ] School District In-Service Faculty Development
- [ ] Educational Cooperative
- [ ] Jump$tart Coalition
- [ ] Junior Achievement
- [ ] University or College
- [ ] Junior Achievement
- [ ] Other 1 (list sponsoring organization in comment section)
- [ ] other 2 (list sponsoring organization in comment section)
- [ ] other 3 (list sponsoring organization in comment section)

List sponsoring organization for Other 1, Other 2, and Other 3 above

Importance of Economic Education

Rate how important, if any, is Economic Education in the curriculum and its value for students

41. Rate the importance of economic content as part of the curriculum

	Important	Somewhat important	Unimportant
Students should have instruction in economic content	○	○	○
My school district places importance on economic content as part of the curriculum	○	○	○

Other (please specify)

K-12 Teachers economic knowledge survey

Rate your economic skill level

You now have the opportunity to rate you economic knowledge

42. Use the scale below to rate you economic skill level

	Very good	Good	Fair	Poor	Very poor
Self evaluate your economic content knowledge	◯	◯	◯	◯	◯
Self evaluate your economic teaching skills	◯	◯	◯	◯	◯

additional comments

Your comments

This is your chance to tell us what type of programs you would like to see implemented to help prepare teachers to infuse economic content into other subjects or teach a stand alone economics course

43. Would you like to make a comment on possible training opportunities?

◯ Yes

◯ No

Suggestions for possible economic content workshops, in-service faculty de...

44. Please enter comments in the box below:

Direct to grade appropriate economic knowledge test

Thank you for completing the teacher survey, you will now be directed to the appropriate grade level Economic Knowledge Test. At the completion of the test you will be given the opportunity to enter a drawing for a $100 Amazon gift card. One gift card will be given for each grade level test.

K-12 Teachers economic knowledge survey

Direct to grade appropriate economic knowledge test

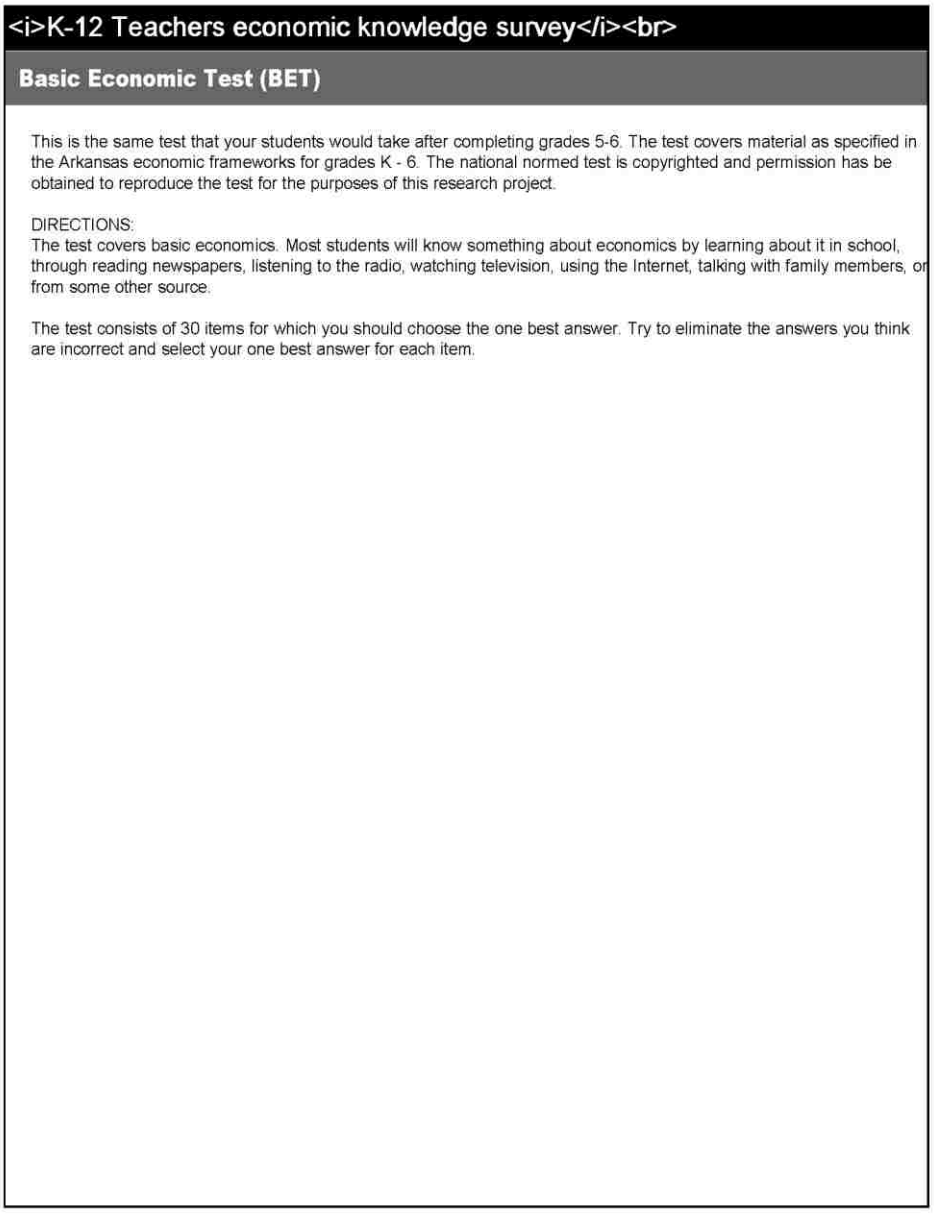
Thank you for completing the teacher survey, you will now be directed to the appropriate grade level Economic Knowledge Test. At the completion of the test you will be given the opportunity to enter a drawing for a $100 Amazon gift card. One gift card will be given for each grade level test.

45. Enter the grade level you primarily teach

- ◯ pre K thru 6 grade
- ◯ 7 - 9 grades
- ◯ 10 - 12 grades

Appendix G

Basic Economics Test (BET) Form A



K-12 Teachers economic knowledge survey

Basic Economic Test (BET)

This is the same test that your students would take after completing grades 5-6. The test covers material as specified in the Arkansas economic frameworks for grades K - 6. The national normed test is copyrighted and permission has be obtained to reproduce the test for the purposes of this research project.

DIRECTIONS:
The test covers basic economics. Most students will know something about economics by learning about it in school, through reading newspapers, listening to the radio, watching television, using the Internet, talking with family members, or from some other source.

The test consists of 30 items for which you should choose the one best answer. Try to eliminate the answers you think are incorrect and select your one best answer for each item.

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K-12 Teachers economic knowledge survey

Basic Economic Test (BET)

46. Marti paid to get her hair cut. At the hair salon, she also bought some shampoo. Which is true about her purchases?

- ◯ The haircut and the shampoo are both goods.
- ◯ The haircut and the shampoo are both services.
- ◯ The haircut is a good, and the shampoo is a service.
- ◯ The haircut is a service, and the shampoo is a good.

47. Why do people make economic choices?

- ◯ Their wants are greater than their resources.
- ◯ Their resources are greater than their wants.
- ◯ Government makes them choose.
- ◯ Businesses make them choose.

48. What is opportunity cost?

- ◯ The time you spend deciding what to buy.
- ◯ The amount of money you pay for something.
- ◯ The money you have left after you buy something.
- ◯ The best thing you give up in order to get something else.

49. Which of the following would be the best example of a capital good?

- ◯ sand
- ◯ water
- ◯ truck driver
- ◯ cement truck

50. Erin wanted to buy five pairs of jeans, but decides to buy only two pairs so she can save more money to buy a computer. Erin's decision is an example of

- ◯ paying interest.
- ◯ borrowing money.
- ◯ making a tradeoff.
- ◯ choosing a service.

BET continued

51. In a market economy, which group has the most influence on what is produced?

- ◯ Unions.
- ◯ Banks.
- ◯ Consumers.
- ◯ Government.

52. A reward or penalty for how people behave is

- ◯ a trade off
- ◯ an incentive
- ◯ an economic want
- ◯ a voluntary exchange

53. Human capital consists of

- ◯ stocks and bonds
- ◯ plant and equipment
- ◯ knowledge and skills
- ◯ savings and investment

54. Alex trades his ice hockey stick for Sam's soccer ball. What is this exchange called?

- ◯ Barter.
- ◯ Export.
- ◯ Borrowing
- ◯ Allocations.

55. Kevin offers to trade two of his books for one of Julie's games. Julie accepts Kevin's offer. After this trade is made, which is most likely true?

- ◯ Julie is better off but Kevin is worse off.
- ◯ Kevin is better off but Julie is worse off.
- ◯ Both of them are better off.
- ◯ Both of them are worse off.

BET continued

56. The United States sells soybeans to Japan. Soybeans are

- ◯ exported goods.
- ◯ durable goods.
- ◯ capital goods.
- ◯ public goods.

57. Specialization allows people to produce more goods and services because it results in

- ◯ less trade.
- ◯ more jobs.
- ◯ lower wages.
- ◯ higher productivity.

58. What can be a problem with specializing to produce bookmarks in a class project?

- ◯ One of the students could get behind and slow down production.
- ◯ Students will take more time to make the bookmarks.
- ◯ It helps students develop special skills.
- ◯ Students will make more bookmarks.

59. In a competitive market for bananas, what will most likely change to cause the amount of sellers produce to equal the amount buyers want to buy?

- ◯ The price of bananas.
- ◯ The quality of bananas.
- ◯ The taxes paid on bananas.
- ◯ The profit from selling bananas.

K-12 Teachers economic knowledge survey

BET continued

60. An increase in the price of a good or service usually leads to

- ◯ no change in the amount people will buy.
- ◯ a decrease in the amount people will buy.
- ◯ an increase in the amount people will buy.
- ◯ either an increase or a decrease in the amount people will buy.

61. A market with only one seller of a good or service is called.

- ◯ demand.
- ◯ competition.
- ◯ a monopoly,
- ◯ an economy.

62. At a beach popular with local students, which situation would probably lead to the lowest price for hotdogs?

- ◯ Having many hotdog sellers.
- ◯ Having only one hotdog seller.
- ◯ Having more students who like hotdogs.
- ◯ Having fewer students who like hamburgers.

63. A bank pays you for saving your money. What is this payment called?

- ◯ Loan.
- ◯ Profit.
- ◯ Credit.
- ◯ Interest.

64. Juan has a weekly income of $600. He spends $200 a week to pay rent for his apartment and spends $300 for all other goods and services. How much does Juan save each week?

- ◯ $100.
- ◯ $200.
- ◯ $300.
- ◯ $400.

BET continued

65. Why do most people use money to buy things instead of bartering to get them?

- ◯ People like to spend their money.
- ◯ Money is a productive resource.
- ◯ Banks give people money.
- ◯ Money is easier to use.

66. The value of a dollar depends on how much

- ◯ you spend.
- ◯ you can buy with it.
- ◯ gold the government owns.
- ◯ price changes on the stock market.

67. Most people earn their income by exchanging their human resources for

- ◯ rent.
- ◯ interest.
- ◯ profits and losses.
- ◯ wages or salaries.

68. Jobs usually pay a higher salary when

- ◯ they have a job title.
- ◯ more education is required.
- ◯ people must be interviewed.
- ◯ an ad has to be placed in a newspaper.

69. An entrepreneur is someone who

- ◯ manages a bank.
- ◯ starts a new business.
- ◯ works for the government.
- ◯ trades goods with foreign countries.

K-12 Teachers economic knowledge survey

BET continued

70. Chris started a summer business selling tomatoes. He sold tomatoes for $300 and his business costs were $250. The $50 that was left over was his

- ◯ price.
- ◯ costs.
- ◯ profit.
- ◯ revenue.

71. One way to improve human capital is to

- ◯ buy stocks.
- ◯ gain job experience.
- ◯ sell new equipment.
- ◯ increase worker wages.

72. Which of the following is most likely to improve the productivity of workers at a factory?

- ◯ Increasing the taxes on their income.
- ◯ Adding rules that increase work time.
- ◯ Giving them more capital goods to use.
- ◯ Hiring more workers for the same job.

73. Most of the money used to pay for police departments comes form

- ◯ prices paid for police services.
- ◯ taxes paid to the government.
- ◯ insurance paid for police services.
- ◯ donations given to police departments.

74. What does inflation mean?

- ◯ Fewer people have jobs.
- ◯ More people have jobs.
- ◯ A fall in most prices.
- ◯ A rise in most prices.

75. To be counted as unemployed, a person does not have a job and

- ◯ receives money from government.
- ◯ is looking for work.
- ◯ has few job skills.
- ◯ is poor.

K-12 Teachers economic knowledge survey

BET continued

You have completed the BET test, just a few more questions.

76. Have you previously taken the Basic Economics Test (BET) ?

- ◯ Yes
- ◯ No

77. Have you ever administered the Basic Economic Test (BET)?

- ◯ Yes
- ◯ No

Appendix H

Test of Economic Knowledge (TEK) Form A

K-12 Teachers economic knowledge survey

This is the same test that your students would take after completing grades 7 - 9. The test covers material as specified in the Arkansas economic frameworks for grades 7 - 9. The national normed test is copyrighted and permission has be obtained to reproduce the test for the purposes of this research project.

DIRECTIONS:
The test covers basic economics. Most students will know something about economics by learning about it in school, through reading newspapers, listening to the radio, watching television, using the Internet, talking with family members, or from some other source.

The test consist of 40 items for which you should choose the one best answer. Try to eliminate the answers you think are incorrect and select your one best answer for each item.

Test of Economic Knowledge (TEK)

78. The economic problem of scarcity means that for individuals, governments, and societies the

- ◯ supply of goods and services is greater than the demand for them.
- ◯ prices of goods and services are greater than the value of consuming them.
- ◯ cost of producing goods and services are greater than the benefits of having them.
- ◯ wants for goods and services are greater than the available resources to meet them.

79. One consequence of scarcity is that

- ◯ there is full employment of resources.
- ◯ the production of goods and services is constant.
- ◯ people have to make choices among alternatives.
- ◯ products which are plentiful have relatively high prices.

80. The opportunity cost of a decision is the

- ◯ money spent making a choice.
- ◯ worst choice that could have been made.
- ◯ value of the next best alternative not chosen.
- ◯ total benefit expected from all forgone opportunities.

81. Which of the following is typically true?

- ◯ Correct choices have no costs.
- ◯ People do not respond to incentives.
- ◯ Voluntary trade causes winners and losers.
- ◯ People's choices have consequences for the future.

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82. It will cost Amanda an extra $30 to purchase a warranty for a $400 new camera that she is buying. If Amanda decides to buy the warranty she has concluded that the

- ◯ cost of the warranty is greater than its benefit.
- ◯ benefit of the warranty is greater than its cost.
- ◯ cost of the camera is greater than the cost of the warranty.
- ◯ benefit of the camera is greater than the benefit of the warranty.

TEK continued

83. There is little government ownership of farms and businesses in the country of Mala. People may change jobs and start new businesses. The government does not control prices and wages. What type of economy is Mala?

- ◯ Market economy.
- ◯ Political economy.
- ◯ Command economy.
- ◯ Traditional economy.

84. Which is true about who gets the goods and services that are produced?

- ◯ Most societies have an equal distribution of goods and services.
- ◯ No method of distributing goods and services will satisfy everyone.
- ◯ All methods of distributing goods and services will satisfy everyone.
- ◯ All societies use the same method for distributing goods and services.

85. What is the most likely reason why a business would cut the price of a product it sells?

- ◯ To reduce the economic profit.
- ◯ To decrease the number of workers.
- ◯ To encourage more people to purchase the product.
- ◯ To increase the investment in other business operations.

86. Expansion of international trade usually

- ◯ increases worldwide production.
- ◯ increases worldwide unemployment.
- ◯ decreases worldwide interdependence.
- ◯ decreases worldwide living standards.

K-12 Teachers economic knowledge survey

87. If a high tariff was placed on steel shipped into the U.S.,

- ◯ the price of steel would go down.
- ◯ U.S. consumers would pay more for steel.
- ◯ foreigners would buy more goods from the U.S.
- ◯ U.S. reserves of iron ore would last a longer time.

TEK continued

88. Specialization and trade lead to

- ◯ less economic interdependence.
- ◯ lower costs of goods and services.
- ◯ fewer choices of goods and services.
- ◯ fewer exchanges of goods and services.

89. In the United States, prices for most goods and services are determined by the actions of

- ◯ workers and labor unions.
- ◯ businesses and consumers.
- ◯ consumers and the government.
- ◯ businesses and the government.

90. Why are diamonds more expensive than water even though water is necessary for life and diamonds are not?

- ◯ Diamonds are more scarce than water.
- ◯ Water is more scarce than diamonds.
- ◯ The demand for water is decreasing.
- ◯ The supply of diamonds is increasing.

91. At the end of winter, retail clothing stores still have many winter coats for sale. The retail store owner can eliminate the

- ◯ surplus by raising the price.
- ◯ surplus by lowering the price.
- ◯ shortage by raising the price.
- ◯ shortage by lowering the price.

K-12 Teachers economic knowledge survey

92. A market-clearing price occurs when

- ◯ deficits equal surpluses.
- ◯ shortages equal surpluses.
- ◯ total assets equal total liabilities.
- ◯ quantity demanded equals quantity supplied.

TEK continued

93. Chicken and fish are substitutes for each other. If the cost of raising chickens increases, then the price of chickens will

- ◯ decrease and people will buy less fish.
- ◯ increase and people will buy less fish.
- ◯ decrease and people will buy more fish.
- ◯ increase and people will buy more fish.

94. If there is a large decrease in demand for corn and no change in supply

- ◯ consumers will pay a lower price for corn.
- ◯ consumers will pay a higher price for corn.
- ◯ there will be no change in the price of corn.
- ◯ there will be no change in the amount of corn sold.

95. The price of DVDs will decrease if the

- ◯ supply of DVDs increases.
- ◯ supply of DVDs decreases.
- ◯ demand for DVDs increases.
- ◯ demand for DVDs increases and the supply decreases.

96. There used to be one producer of a good in a market and now there are many competing producer. What is most likely to be the result?

- ◯ Less service.
- ◯ Lower product price.
- ◯ Lower product quality.
- ◯ Less output produced in the market.

TEK continued

97. Which is most likely to influence the level of competition in markets?

- ◯ The number of buyers and sellers.
- ◯ The size of the government budget.
- ◯ The amount of wages and salaries.
- ◯ The market-clearing price of a product.

98. Banks make most of their profits by charging

- ◯ fees for advice on investments in stocks.
- ◯ fees for using automatic teller machines (ATMs).
- ◯ lower rates of interest to borrowers than they pay depositors.
- ◯ higher rates of interest to borrowers than they pay depositors.

99. Jody bought shares of stock in a company. She and the other stockholders voted to elect its board of directors. The company is a

- ◯ collective.
- ◯ partnership.
- ◯ corporation.
- ◯ proprietorship.

100. Amy is saving ten percent of her income a month. The money she saved is primarily functioning as a

- ◯ store of value.
- ◯ terms of trade.
- ◯ unit of account.
- ◯ medium of exchange.

101. Which one of the following is correct?

- ◯ Money is useful for saving, but not investing.
- ◯ It just takes money to produce goods and services.
- ◯ Trade is more difficult with money compared with barter.
- ◯ Most nations create their own currency for use as money.

TEK continued

K-12 Teachers economic knowledge survey

102. Most wages and salaries in the United States are determined by

- ◯ imports and exports.
- ◯ savers and investors.
- ◯ lawyers and bankers.
- ◯ supply and demand.

103. Which will result from an increase in the demand for construction workers?

- ◯ A decrease in the price of housing.
- ◯ A decrease in the supply of housing.
- ◯ An increase in the wage of construction workers.
- ◯ An increase in unemployed construction workers.

104. Workers' wages usually increase when

- ◯ the unemployment rate increases.
- ◯ the supply of workers increases.
- ◯ demand for the products they produce increases.
- ◯ businesses face more competition in selling their product.

105. Most entrepreneurs start a new business because they expert to

- ◯ avoid risk.
- ◯ earn a profit.
- ◯ decrease work hours.
- ◯ increase their human capital.

106. Advances in technology result in

- ◯ a decrease in output.
- ◯ an increase in prices.
- ◯ a decrease in wages.
- ◯ an increase in productivity.

TEK continued

K-12 Teachers economic knowledge survey

107. What usually causes the standard of living in a country to increase over time?

- ◯ High taxes.
- ◯ High tariffs.
- ◯ Increased output per worker.
- ◯ Conservation of natural resources.

108. In what way is a fireworks display a public good?

- ◯ It causes pollution and noise.
- ◯ It can be provided by several businesses.
- ◯ It requires expenditures for public safety.
- ◯ It can be seen by those who do not pay for it.

109. A major economic role that government is supposed to perform in a market economy is to

- ◯ guarantee profits.
- ◯ maintain competition.
- ◯ set wages and salaries.
- ◯ establish production targets.

110. A sales tax is a tax on

- ◯ income.
- ◯ property.
- ◯ investment.
- ◯ consumption.

111. What does the gross domestic product (GDP) measure?

- ◯ The total assets and liabilities of a nation.
- ◯ The market value of products government buys each year.
- ◯ The market value of final goods and services produced in a year.
- ◯ The wages and salaries paid for productive work done during a year.

TEK continued

K-12 Teachers economic knowledge survey

112. When comparing the standard of living in one nation's economy to another nation's economy, GDP is typically adjusted in each nation by dividing GDP by a nation's

- ◯ population.
- ◯ inflation rate.
- ◯ square miles.
- ◯ unemployment rate.

113. Inflation is the term used to describe

- ◯ a decrease in interest rates.
- ◯ an increase in interest rates.
- ◯ a general increase in prices.
- ◯ a general decrease in prices.

114. Which of the following people would the U.S. government count as unemployed?

- ◯ A part-time cashier who is unhappy with her wage and looking for a full-time position.
- ◯ A high school graduate who has not yet found a job but continues looking.
- ◯ A college student who decides not to work during the school year.
- ◯ A retired scientist who is living on her pension.

115. To know if an increase in wages over a period of time has led to an increase in the standard of living, we must also look at changes in

- ◯ interest rates.
- ◯ prices on the stock market.
- ◯ price of goods and services.
- ◯ government spending and taxes.

116. Government spending less than taxes collected during a year is called

- ◯ a budget surplus.
- ◯ a budget deficit.
- ◯ the national debt.
- ◯ the balanced budget.

K-12 Teachers economic knowledge survey

117. The control of the money supply is the main responsibility of the

- ◯ Federal Reserve System.
- ◯ Internal Revenue Service.
- ◯ Department of Commerce.
- ◯ Federal Trade Commission.

K-12 Teachers economic knowledge survey

TEK continued

You have completed the grade level economic knowledge test, just a couple more questions and you will be finished.

118. Have you previously taken the Test of Economic Knowledge (TEK)?

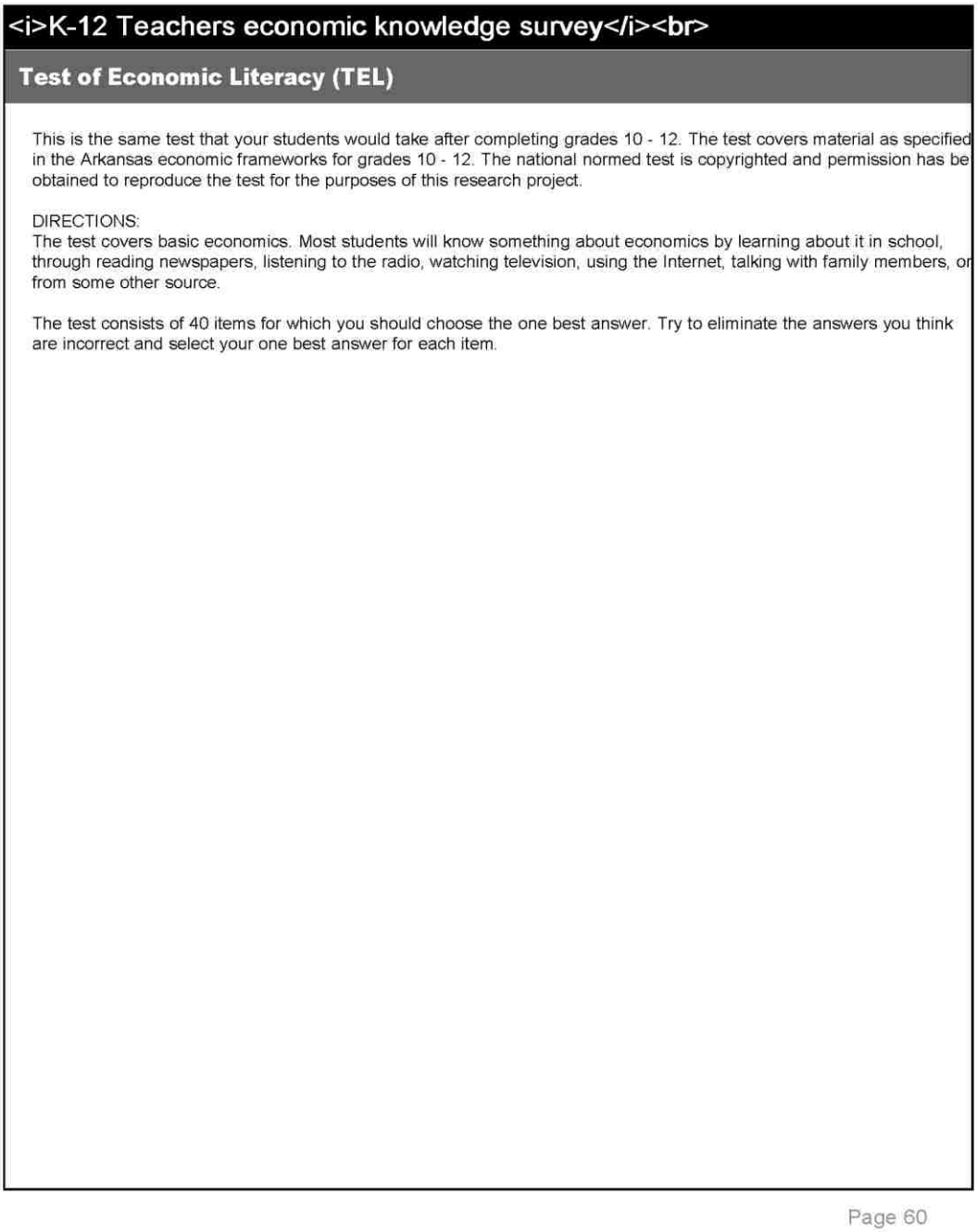
- ◯ Yes
- ◯ No

119. Have you ever administered the Test of Economic Knowledge (TEK).

- ◯ Yes
- ◯ No

Appendix I

Test of Economic Literacy (TEL) Form A



K-12 Teachers economic knowledge survey

Test of Economic Literacy (TEL)

This is the same test that your students would take after completing grades 10 - 12. The test covers material as specified in the Arkansas economic frameworks for grades 10 - 12. The national normed test is copyrighted and permission has be obtained to reproduce the test for the purposes of this research project.

DIRECTIONS:
The test covers basic economics. Most students will know something about economics by learning about it in school, through reading newspapers, listening to the radio, watching television, using the Internet, talking with family members, or from some other source.

The test consists of 40 items for which you should choose the one best answer. Try to eliminate the answers you think are incorrect and select your one best answer for each item.

Page 60

K-12 Teachers economic knowledge survey

Test of Economic Literacy (TEL)

120. In every economic system, people must choose how to

- ◯ satisfy all of the wants of society.
- ◯ make the best use of scarce resources.
- ◯ create an equal distribution of income.
- ◯ save money to reduce the national debt.

121. Which do economists consider to be a productive resources (factor of production)?

- ◯ Common stock in a computer business.
- ◯ Corporate bonds of an oil company.
- ◯ Machines in an auto plant.
- ◯ Money in a bank.

122. A basic role of entrepreneurs in the economy is to

- ◯ tell government what new products to produce and sell.
- ◯ take the risks associated with starting new businesses.
- ◯ buy and sell the common stocks of corporations.
- ◯ limit the liability of investors in new businesses.

123. The opportunity cost of a new public high school is the

- ◯ money cost of hiring teachers for the new school.
- ◯ cost of constructing the new school at a later date.
- ◯ change in the annual tax rate to pay for the new school.
- ◯ other goods and services that must be given up for the new school.

124. When a nation's human and material resources are fully employed, more of any one product

- ◯ can be produced only if private enterprise does so rather than the government.
- ◯ can be produced only if there is less production of other products.
- ◯ can be produced only if there is a general decrease in prices.
- ◯ cannot be produced.

K-12 Teachers economic knowledge survey

125. The specialization of labor usually results in

- an increase in inflation.
- a more equal distribution of income.
- an increase in output per hour worked.
- a decrease in economic interdependence.

126. Which would most likely increase the productivity of labor?

- A decrease in the use of labor-saving technology.
- a decrease in the pay of corporate executives.
- an increase in pollution control requirements.
- an increase in capital investment.

127. Which question must be answered by people of all economic systems?

- What will be the share of profits distributed to stockholders?
- What will be the amount of the minimum wage for workers?
- How will goods and services be produced?
- How will stock markets be regulated?

128. In a market economy, the public interest is likely to be served even when individuals pursue their personal economic goals because of

- the operations of competitive markets.
- the social responsibility of business leaders.
- central planning and coordination of market activity.
- individuals' understanding of what is in the public interest.

129. Profits are equal to total

- revenue minus total cost.
- assets minus total liabilities.
- sales minus wages and salaries.
- sales minus taxes and depreciation.

TEL continued

130. Common stocks, limited liability, and unlimited life are basic characteristics of

- ◯ cartels.
- ◯ partnerships.
- ◯ corporations.
- ◯ proprietorships.

131. A decrease in real interest rates provides an incentive for people to save

- ◯ more and borrow more.
- ◯ less and borrow less.
- ◯ more and borrow less.
- ◯ less and borrow more.

132. A high school student buys a sweatshirt from a store. The sweatshirt is on sale at a 20 percent discount off the regular price. In this exchange,

- ◯ the student and the store benefit.
- ◯ the student benefits, but the store does not.
- ◯ the store benefits, but the student does not.
- ◯ neither the student nor the store benefits.

133. What primary function is money serving when it is used to buy a ticket to a movie?

- ◯ Store of value
- ◯ Flow of funds.
- ◯ Unit of account.
- ◯ Medium of exchange.

TEL continued

134. Business firms wish to sell their products at high prices. Households wish to buy products at low prices. In a market economy this conflict of interest is resolved by

- ◯ lawsuits.
- ◯ government.
- ◯ competition.
- ◯ collective bargaining.

K-12 Teachers economic knowledge survey

135. Which would most likely increase the quantity of gasoline sold in a competitive market?

- An increase in the price of crude oil.
- A decrease in the price of automobiles.
- A decrease in the income of consumers.
- An increase in taxes on gasoline products.

136. In a competitive market, the price of shoes is likely to be increased by

- a decrease in the supply of shoes.
- a decrease in the demand for shoes.
- more capital investment in shoe factories.
- new machines reducing the cost of shoe production.

137. Why do medical doctors generally earn more than farmers?

- Medical doctors are more efficient than farmers.
- Medical doctors provide a service rather than make a product.
- There are fewer medical doctors than farmers in our economy.
- Medical doctors are more scarce, given the demand for their services.

138. If the government charges a new tax of one dollar on every pair of pants sold, which would most likely result?

- Consumers would pay a higher price and buy fewer pairs of pants.
- Consumers would pay a higher price and suppliers would make larger profits.
- Consumers would pay a higher price and producers would sell more pairs of pants.
- Suppliers would increase the quantity sold in order to make up for the taxes paid to the government.

TEL continued

139. A newspaper reports, "COFFEE GROWERS' MONOPOLY BROKEN INTO SEVERAL COMPETING FIRMS." If this is true, we would expect the coffee-growing industry to

- decrease output and decrease prices.
- increase output and increase prices.
- decrease output and increase prices.
- increase output and decrease prices.

K-12 Teachers economic knowledge survey

140. In a market economy, high wages depend mostly on

- ◯ responsible business leaders.
- ◯ high output per worker.
- ◯ actions of government.
- ◯ minimum wage laws.

141. From an economic point of view, which approach to controlling pollution is most efficient?

- ◯ Abolish the use of toxic chemicals.
- ◯ Use economic resources to eliminate all pollution.
- ◯ Reduce pollution as long as the additional benefits are greater than the additional costs.
- ◯ Adopt laws and regulations that prohibit economic activities that cause pollution problems.

142. Government rather than private business provides national defense because

- ◯ it is a benefit and not a cost.
- ◯ it is a cost and not a benefit.
- ◯ not all who benefit from it would pay for it.
- ◯ is some benefit from it, less is available for others.

143. State Tax Table
Income Percentage Tax Rate
$0 - $10,000 0
$10,001 - $30,000 10
$30,001 - $60,000 20
$60,001 and above 30

The tax described in the table above is a

- ◯ flat tax on income.
- ◯ progressive income tax.
- ◯ proportional income tax.
- ◯ value added tax on income.

TEL continued

K-12 Teachers economic knowledge survey

144. Gross domestic product (GDP) is a measure of

- ◯ the price level of goods and services sold.
- ◯ total spending by federal, state, and local governments.
- ◯ the quantity of goods and services produced by private businesses.
- ◯ the market value of the nation's output of final goods and services.

145. An economy's potential output at any time is limited by

- ◯ the quantity and quality of labor, capital, and natural resources.
- ◯ business demand for final goods and services.
- ◯ government regulations and spending.
- ◯ the amount of money in circulation.

146. Which would usually reduce total spending in the economy?

- ◯ A decline in consumer incomes.
- ◯ A reduction in personal income tax rates.
- ◯ An expectation that prices will soon rise.
- ◯ An increase in investment in new plants and equipment.

147. An economy will typically experience a decline in its unemployment rate when there is

- ◯ an increase in population.
- ◯ an increase in economic growth.
- ◯ a decrease in consumer incomes.
- ◯ a decrease in business investment.

148. An economy will typically experience a decline in its unemployment rate when there is

- ◯ an increase in population.
- ◯ an increase in economic growth.
- ◯ a decrease in consumer incomes.
- ◯ a decrease in business investment.

K-12 Teachers economic knowledge survey

149. Inflation is an increase in

- ◯ interest rates over time.
- ◯ the standard of living over time.
- ◯ the general level of prices over time.
- ◯ real gross domestic product over time.

TEL continued

150. If your annual money income rises by 50% while prices of the things you buy rise by 100%, then your

- ◯ real income has risen.
- ◯ real income has fallen.
- ◯ money income has fallen.
- ◯ real income is not affected.

151. When commercial banks increase their loans to businesses and consumers, this usually results in

- ◯ a decrease in the spending power of consumers and businesses.
- ◯ an increase in government control over the economy.
- ◯ an increase in the banks' excess reserves.
- ◯ an increase in the nation's money supply.

152. Which monetary policy by the Federal Reserve would most likely increase aggregate demand?

- ◯ Raising income tax rates.
- ◯ Raising the discount rate.
- ◯ Buying government bonds on the open market.
- ◯ Raising reserve requirements at commercial banks.

153. A government budget deficit exists when

- ◯ government spending is greater than tax revenues.
- ◯ government spending is increased.
- ◯ the national debt is decreasing.
- ◯ taxes are reduced.

154. One reason the federal government might reduce taxes is to

- slow down the rate of inflation.
- slow down a rapid rise in interest rates.
- decrease business spending on plant and equipment.
- increase consumer spending and stimulate the economy.

TEL continued

155. Specialization and division of labor by nations followed by increasing international trade probably would

- increase the level of worldwide unemployment.
- increase total world production of goods and services.
- lower living standards in the poor nations of the world.
- eliminate differences in standards of living among nations.

156. If Britain has a comparative advantage over France in the production of cars, then

- the opportunity cost of producing cars in Britain is lower than in France.
- the opportunity cost of producing cars in Britain is higher than in France.
- there are no gains from specialization and trade in cars between Britain and France.
- only Britain will gain from specialization and trade in cars between Britain and France.

157. Which statement about tariffs in true?

- Tariffs increase the market for exports.
- Tariffs decrease employment in protected industries.
- Tariffs benefit some groups at the expense of others.
- Tariffs encourage the growth of a nation's most efficient industries.

158. A nation has a deficit in its international balance of trade when the value of its

- gold reserves is less than the value of the gold reserves of its trading partners.
- imports of goods is greater than the value of its exports.
- exports of goods is greater than the value of its imports.
- government expenditures is less than the value of its tax revenue.

K-12 Teachers economic knowledge survey

159. The exchange rate between the U.S. dollar and the German mark changes from $1=1.8 marks to $1=1.6 marks. This change means that

- ◯ U.S. goods will be more expensive for Germans.
- ◯ German goods will be more expensive for Americans.
- ◯ there will be an increase in U.S. imports from Germany.
- ◯ there will be a decrease in German imports from the U.S.

160. Which best measures a nation's standard of living over time?

- ◯ Rate of Inflation.
- ◯ Rate of unemployment.
- ◯ Real income per capita.
- ◯ Money incomer per capita.

TEL continued

You have now completed the TEL, just a couple of more questions.

161. Have you previously taken the Test of Economic Literacy (TEL)?

- ◯ Yes
- ◯ No

162. Have you ever administered the Test of Economic Literacy?

- ◯ Yes
- ◯ No

Thank You

163. Thank you for taking time out of your busy schedule to complete the teacher survey and economic knowledge test. I appreciate your contribution to the success of the research project.

If you would like to be entered in a drawing for a $100 Amazon Gift Card for [Q44] enter you email in the box below.

Appendix J

Coding Scheme for Sub-categories of Economic Content by Grade Level

Grade level	Content standards	Questions included in category
K -6	Economic Fundamentals	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 18, 19, 24, 25, 26, 27
	Microeconomics	15, 16, 17, 22, 23, 28, 14
	Macroeconomics	20, 21, 29, 30
	International Economics	11, 12, 13
K 7 – 9	Economic Fundamentals	1, 2, 3, 4, 5, 6, 7, 8, 21, 22, 28, 29
	Microeconomics	12, 13, 14, 15, 16, 17, 18, 19, 20, 25, 26, 27, 30, 31, 32, 33
	Macroeconomics	23, 24, 34, 35, 36, 37, 38, 39, 40
	International Economics	9, 10, 11
K10 – 12	Economic Fundamentals	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
	Microeconomics	15, 16, 17, 18, 19,20, 21, 22, 23, 24
	Macroeconomics	25, 26, 27, 28, 28, 30, 31, 32, 33, 34
	International Economics	35, 36, 37, 38, 39, 40

Appendix K

Coding Scheme of Test Questions to Voluntary National Content Standards in Economics by Grade level

Basic Economics Test (BET)

Standard	Description	Question number
One	Scarcity, choice, opportunity cost, resources	1, 2, 3, 4, 8
Two	Decision making, marginal analysis	5
Three	Economic system, allocation mechanisms	6
Four	Incentives	7
Five	Trade	9, 10, 11
Six	Specialization and comparative advantage	12, 13
Seven	Markets and prices	14
Eight	Supply and demand; role of prices	5
Nine	Competition and market structure	16, 17
Ten	Economic institutions	18, 19
Eleven	Money, money supply, inflation	20, 21, 29
Twelve	Interest rates	NA
Thirteen	Income; labor markets	22, 23
Fourteen	Entrepreneurship	24, 25
Fifteen	Economic Growth; physical and human capital	26, 27
Sixteen	Role of government and market failure	28
Seventeen	Government failure	NA
Eighteen	Economic Fluctuations	NA
Nineteen	Unemployment and inflation; business cycle	30
Twenty	Fiscal and monetary policy	NA

Appendix K, continued

Coding Scheme of Test Questions to Voluntary National Content Standards in Economics by Grade level

Test of Economic Knowledge (TEK)

Standard	Description	Question number
One	Scarcity, choice, opportunity cost, resources	1, 2, 3, 4
Two	Decision making, marginal analysis	5
Three	Economic system, allocation mechanisms	6, 7
Four	Incentives	8
Five	Trade	9, 10
Six	Specialization and comparative advantage	11
Seven	Markets and prices	12, 13, 14, 15
Eight	Supply and demand; role of prices	16, 17, 18
Nine	Competition and market structure	19, 20
Ten	Economic institutions	21, 22
Eleven	Money, money supply, inflation	23, 24, 36
Twelve	Interest rates	NA
Thirteen	Income; labor markets	25, 26, 27
Fourteen	Entrepreneurship	28
Fifteen	Economic Growth; physical and human capital	29, 30
Sixteen	Role of government and market failure	31, 32, 33
Seventeen	Government failure	NA
Eighteen	Economic Fluctuations	34, 35
Nineteen	Unemployment and inflation; business cycle	37, 38
Twenty	Fiscal and monetary policy	39, 40

Appendix K, continued
Coding Scheme of Test Questions to Voluntary National Content Standards in Economics by Grade level

Test of Economic Literacy (TEL)

Standard	Description	Question number
One	Scarcity, choice, opportunity cost, resources	1, 2, 4
Two	Decision making, marginal analysis	5, 22
Three	Economic system, allocation mechanisms	8
Four	Incentives	10
Five	Trade	13, 38
Six	Specialization and comparative advantage	6, 35, 36
Seven	Markets and prices	39
Eight	Supply and demand; role of prices	16, 17, 19
Nine	Competition and market structure	9, 15, 20
Ten	Economic institutions	11
Eleven	Money, money supply, inflation	14, 31,
Twelve	Interest rates	12
Thirteen	Income; labor markets	18, 21
Fourteen	Entrepreneurship	3
Fifteen	Economic Growth; physical and human capital	7
Sixteen	Role of government and market failure	23, 24
Seventeen	Government failure	37
Eighteen	Economic Fluctuations	25, 26, 27, 40
Nineteen	Unemployment and inflation; business cycle	28, 29, 30
Twenty	Fiscal and monetary policy	32, 33, 34

Appendix L

Item Analysis of Basic Economic Test (BET)

Questions Number	Percentage answered Correct	Voluntary Standard	Arkansas Standard Grade K-4	Arkansas Standard Grade 5 -6
1	97.1	1	4	4
2	88.2	1	4	4
3	86.8	1	4	4
4	79.4	1	4	4
5	100	2	4	4
6	97.1	3	5	5
7	89.7	4	5	6
8	91.2	1	4	4
9	95.6	5	7	7
10	91.2	5	7	7
11	94.1	5	7	7
12	91.2	6	7	5, 7
13	82.4	6	7	5, 7
14	66.2	7	5	7
15	89.7	8	5	6
16	94.1	9		6
17	97.1	9		6
18	94.1	10	5, 6	6
19	94.1	10	5, 6	6
20	79.4	11	6	6
21	58.8	11	6	6
22	95.6	13	5	
23	95.6	13	5	
24	92.6	14	5	5
25	94.1	14	5	5
26	77.9	15	5	5
27	61.8	15	5	5
28	94.1	16	6	6
29	95.6	11	6	6
30	76.5	19	6	6

		Percentage of Correct Responses BET				Normed sample	
Item	National Standards	With economics (n = 38)	without economics (n = 30)	With professional development (n = 61)	Without professional development (n = 7)	with economics (n = 821)	without economics (n = 831)
1	1	94.7	100.0	96.7	100.0	73.3	64.4
2	1	89.5	86.7	88.5	85.7	44.6	33.3
3	1	89.5	83.3	88.5	71.4	48.2	27.0
4	1	76.3	83.3	80.3	71.4	33.1	21.7
5	2	100.0	100.0	100.0	100.0	49.1	37.9
6	3	100.0	93.3	96.7	100.0	48.7	40.0
7	4	86.8	93.3	90.2	85.7	38.3	33.7
8	1	89.5	93.3	93.4	71.4	41.4	36.5
9	5	92.1	100.0	96.7	85.7	61.6	53.7
10	5	97.4	83.3	93.4	71.4	46.5	42.7
11	5	94.7	93.3	95.1	85.7	73.6	70.0
12	6	89.5	93.3	91.8	85.7	51.2	41.5
13	6	86.8	76.7	85.2	57.1	44.2	33.6
14	7	63.2	70.0	65.6	71.4	49.1	37.9
15	5	89.5	90.0	90.2	85.7	59.1	48.7
16	9	92.1	96.7	93.4	100.0	40.8	33.1
17	9	97.4	96.7	96.7	100.0	50.6	44.2
18	10	94.7	93.3	93.4	100.0	46.4	44.2
19	10	94.7	93.3	93.4	100.0	85.8	76.8
20	11	73.7	86.7	80.3	71.4	52.4	40.7
21	11	65.8	50.0	60.7	42.9	55.5	50.1
22	13	94.7	96.7	95.1	100.0	50.2	44.2
23	13	94.7	96.7	95.1	100.0	69.1	65.1
24	14	94.7	90.0	93.4	85.7	58.2	45.9
25	14	92.1	96.7	93.4	100.0	80.5	71.2
26	15	73.7	83.3	80.3	57.1	32.3	28.0
27	15	60.5	63.3	65.6	28.6	34.0	31.7
28	16	92.1	96.7	93.4	100.0	77.3	67.5
29	11	94.7	96.7	95.1	100.0	41.1	37.6
30	19	78.9	73.3	73.7	100.0	46.7	40.0

Appendix M

Item Analysis of Test of Economic Knowledge (TEK)

Questions Number	Percentage answered Correct	Voluntary Standard	Arkansas Standard Grade 7 Geography	Arkansas Standard Grade 7-8 Arkansas History	Arkansas Standard Grade 8 U.S. History
1	91.5	1	7	3	
2	95.7	1	7	3	
3	70.2	1	7	3	
4	97.9	1	7	3	
5	97.9	2			
6	83.0	3			
7	89.4	3			
8	97.9	4			
9	91.5	5			1
10	95.7	5			1
11	61.7	6	7	4	1, 2
12	78.7	7			
13	95.7	7			
14	95.7	7			
15	70.2	7			
16	91.5	8			
17	74.5	8			
18	78.7	8			
19	89.4	9			
20	93.6	9			
21	83.0	10		3, 4	
22	87.2	10		3, 4	
23	76.6	11			
24	85.1	11			
25	89.4	13			
26	61.7	13			
27	89.4	13			
28	87.2	14		3, 4	
29	93.6	15	7		
30	80.9	15	7		
31	78.7	16		3	
32	89.4	16		3	3
33	87.2	16		3	3

34	70.2	18	3
35	63.8	18	3
36	93.6	11	
37	74.5	19	3
38	89.4	19	3
39	74.5	20	
40	87.2	20	

Appendix M, continued

Item Analysis of TEK Question Comparison of Sample to Normed Group

		Percentage of Correct Responses TEK				Percent Correct Normed Sample	
Item	national standard	with economics course (n = 37)	without economics course (n = 10)	With professional development (n = 35)	Without professional development (n = 12)	with economics course (n = 513)	without economics course (n = 1,408)
1	1	91.9	90	97.1	75	59.5	39.2
2	1	97.3	90	94.3	100	59.3	43.4
3	1	73	60	82.9	33.3	52.4	26.7
4	1	97.3	100	97.1	100	72.1	65.1
5	2	97.3	100	97.1	100	63.6	51.6
6	3	86.5	70	82.9	83.3	49.7	45.1
7	3	91.9	80	88.6	91.7	51.3	40.5
8	4	97.3	100	97.1	100	81.3	73.2
9	5	94.6	80	91.4	91.7	67.1	62.4
10	5	94.6	100	97.1	91.7	67.1	59.5
11	6	62.2	60	65.7	50	45.4	39.1
12	7	75.7	90	77.1	83.3	53.8	43.7
13	7	97.3	90	94.3	100	81.9	75.4
14	7	97.3	90	94.3	100	78.0	71.0
15	7	70.3	90	74.3	58.3	34.9	31.8
16	8	94.6	80	88.6	100	62.0	57.1
17	8	78.3	60	71.4	83.3	50.5	47.9
18	8	83.8	60	74.3	91.7	57.1	53.1
19	9	94.6	70	88.6	91.7	68.0	54.1
20	9	97.3	80	94.3	91.7	68.8	58.4
21	10	86.5	70	85.7	75	61.2	46.4
22	10	94.6	60	85.7	91.7	51.7	46.6
23	11	83.8	50	71.4	91.7	49.9	0.0
24	11	89.2	70	85.7	83.3	64.1	55.2
25	13	94.6	70	88.6	91.7	71.0	58.8

Appendix M, continued
Item Analysis of TEK Question Comparison to Normed Group

		Percentage of Correct Responses TEK				Percent Correct Normed Sample	
Item	national standard	with economics course (n = 37)	without economics course (n = 10)	With professional development (n = 35)	Without professional development (n = 12)	with economics course (n = 513)	without economics course (n = 1,408)
26	13	56.8	80	60	66.7	48.7	49.9
27	13	89.2	90	88.6	91.7	61.8	53.0
28	14	89.2	80	85.7	91.7	86.4	79.6
29	15	94.6	90	91.4	100	61.6	51.6
30	15	81.1	80	80	83.3	37.0	24.2
31	15	81.1	70	80	75	65.9	57.5
32	15	89.2	90	85.7	100	38.4	21.2
33	15	89.2	80	82.9	100	55.4	42.3
34	18	70.3	70	68.6	75	53.8	36.8
35	18	67.6	50	71.4	41.7	52.6	48.3
36	11	94.6	90	91.4	100	62.6	45.1
37	19	78.3	60	71.4	83.3	58.1	54.7
38	19	91.9	80	88.6	91.7	49.7	41.1
39	20	75.7	70	74.3	75	47.4	39.6
40	20	91.9	70	88.6	83.3	57.9	30.7

Appendix N

Item Analysis of Test of Economic Literacy TEL Question

Test of Economic Knowledge Tel

Questions Number	Percentage answered Correct	Voluntary Standard	Arkansas Standard
1	85.1	1	1
2	85.1	1	1
3	89.6	14	3
4	67.2	1	1
5	59.7	2	1
6	73.1	6	7
7	74.6	15	5
8	92.5	3	2
9	74.6	9	4
10	82.1	4	8
11	85.1	10	3, 6
12	76.1	12	6, 9
13	79.1	5	7
14	79.1	11	6
15	82.1	9	4
16	82.1	8	2
17	80.6	8	2
18	64.2	13	7, 8
19	83.6	8	2
20	76.1	9	4
21	68.7	13	7, 8
22	52.2	2	1
23	65.7	16	3
24	82.1	16	3
25	73.1	18	5
26	73.1	18	5
27	79.1	18	5
28	74.6	19	5
29	64.2	19	5
30	74.6	19	5

Test of Economic Knowledge Tel

Questions Number	Percentage answered Correct	Voluntary Standard	Arkansas Standard
31	59.7	11	6
32	37.3	20	6
33	79.1	20	6
34	71.6	20	6
35	61.2	6	7
36	56.7	6	7
37	61.2	17	3, 7
38	61.2	5	7
39	38.8	7	2
40	65.7	18	5

Note: Arkansas standard is for high school economics curriculum guidelines.

Appendix N, continued

Item Analysis of TEL Question Comparison of Sample to Normed Group

		Percentage of Correct responses				Normed Sample	
question number	national standard	with economics course (n = 59)	without economics course (n = 8)	with professional development (n =53)	without professional development (n = 14)	with economics course (n = 2,619)	without economics course (n = 669)
1	1	84.7	87.5	86.8	78.6	63.5	36.8
2	1	88.1	62.5	92.5	57.1	62.2	31.4
3	14	88.1	100.0	94.3	71.4	82.5	66.2
4	1	71.2	37.5	75.5	35.7	64.9	28.7
5	2	62.7	37.5	64.2	42.9	47.5	38.7
6	6	72.9	75.0	83.0	35.7	62.7	44.3
7	15	74.6	75.0	79.2	57.1	61.4	51.6
8	3	91.5	100.0	94.3	85.7	85.2	60.4
9	9	76.3	62.5	81.1	50.0	53.8	40.1
10	4	83.1	75.0	84.9	71.4	68.0	47.8
11	10	86.5	75.0	84.9	85.7	68.9	53.2
12	12	78.0	62.5	75.5	78.6	57.8	38.7
13	5	78.0	87.5	83.0	64.3	67.8	53.5
14	11	79.7	75.0	84.9	57.1	79.5	57.1
15	9	81.4	8.5	88.7	57.1	68.7	58.2
16	8	86.4	50.0	83.0	78.6	66.4	51.3
17	8	81.4	75.0	84.9	64.3	73.2	61.7
18	13	66.1	50.0	71.7	35.7	62.6	40.1
19	8	84.7	75.0	84.9	78.6	75.1	62.8
20	9	78.0	62.5	83.0	50.0	69.1	58.0
21	13	72.9	37.5	71.1	57.1	63.4	51.6
22	2	52.5	50.0	62.3	14.3	53.8	46.8
23	16	66.1	62.5	69.8	50.0	46.9	37.8
24	16	84.7	62.5	84.9	71.4	60.6	43.1
25	18	78.0	37.5	77.4	57.1	56.5	42.9
26	18	78.0	37.5	77.4	57.1	61.2	44.5

Appendix N, continued
Item Analysis of TEL Question Comparison of Sample to Normed Group

		Percentage of Correct responses				Normed Sample	
question number	national standard	with economics course (n = 59)	without economics course (n = 8)	with professional development (n =53)	without professional development (n = 14)	with economics course (n = 2,619)	without economics course (n = 669)
27	18	81.4	62.5	84.9	57.1	72.9	59.3
28	19	78.0	50.0	81.1	50.0	66.1	53.7
29	19	66.1	50.0	71.7	35.7	65.1	52.8
30	19	76.3	62.5	79.2	57.1	65.5	54.1
31	11	64.4	25.0	73.6	7.1	44.9	28.0
32	20	40.7	12.5	39.6	28.6	37.2	25.7
33	20	81.4	62.5	83.0	64.3	67.8	53.7
34	20	72.9	62.5	75.5	57.1	66.8	52.9
35	6	66.1	25.0	64.2	50.0	70.9	53.1
36	6	59.3	37.5	62.3	35.7	56.2	44.0
37	17	67.8	12.5	66.0	42.9	59.2	50.2
38	5	62.7	50.0	67.9	35.7	56.7	52.5
39	7	39.0	37.5	37.7	42.9	41.6	36.6
40	18	71.2	25.0	69.8	50.0	53.1	41.7

Appendix O

Permission to digitalize BET, TEK, and TEL

COUNCIL FOR
Economic
Education
Teaching Opportunity

April 12, 2013

Ms. June M. Freund, MBA, EdS
Pittsburg State University
Kelce College of Business
171 South Broadway
Pittsburg, KS 66762-7523

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Appendix P

IRB Committee Approval

UNIVERSITY OF ARKANSAS

Office of Research Compliance
Institutional Review Board

December 19, 2012

MEMORANDUM

TO:	June Freund Mounir Farah
FROM:	Ro Windwalker IRB Coordinator
RE:	New Protocol Approval
IRB Protocol #:	12-12-334
Protocol Title:	*Economic Literacy: Measuring the Economic Human Capital of Arkansas K-12 Teachers*
Review Type:	☒ EXEMPT ☐ EXPEDITED ☐ FULL IRB
Approved Project Period:	Start Date: 12/19/2012 Expiration Date: 12/18/2013

Your protocol has been approved by the IRB. Protocols are approved for a maximum period of one year. If you wish to continue the project past the approved project period (see above), you must submit a request, using the form *Continuing Review for IRB Approved Projects*, prior to the expiration date. This form is available from the IRB Coordinator or on the Research Compliance website (http://vpred.uark.edu/210.php). As a courtesy, you will be sent a reminder two months in advance of that date. However, failure to receive a reminder does not negate your obligation to make the request in sufficient time for review and approval. Federal regulations prohibit retroactive approval of continuation. Failure to receive approval to continue the project prior to the expiration date will result in Termination of the protocol approval. The IRB Coordinator can give you guidance on submission times.

This protocol has been approved for 500 participants. If you wish to make *any* modifications in the approved protocol, including enrolling more than this number, you must seek approval *prior to* implementing those changes. All modifications should be requested in writing (email is acceptable) and must provide sufficient detail to assess the impact of the change.

If you have questions or need any assistance from the IRB, please contact me at 210 Administration Building, 5-2208, or irb@uark.edu.

210 Administration Building • 1 University of Arkansas • Fayetteville, AR 72701
Voice (479) 575-2208 • Fax (479) 575-3846 • Email irb@uark.edu