FINANCIAL MATHEMATICAL TASKS
IN A MIDDLE SCHOOL MATHEMATICS TEXTBOOK SERIES:
A CONTENT ANALYSIS

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FINANCIAL MATHEMATICAL TASKS
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Dissertation

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This content analysis examined the distribution of financial mathematical tasks (FMTs), mathematical tasks that contain financial terminology and require financially related solutions, across the National Standards in K-12 Personal Finance Education categories (JumpStart Coalition, 2007), the thinking skills as identified by A Taxonomy for Learning, Teaching, and Assessing (Anderson et al., 2001), and the National Council of Teachers of Mathematics Standards (NCTM, 2000). Two hundred seventy-eight FMTs, recording units for this study, were taken from a selected portion in each lesson within the three grade level textbooks of the middle school mathematics textbook series, Math Connects Concepts, Skills, and Problem Solving Course 1, 2, and 3 (Glencoe McGraw-Hill, 2009).

Three research questions, with corresponding coding forms, were developed for this study. After the coding forms were evaluated, the researcher trained coders, held trial codings, and conducted a pilot test to determine reliability, address validity concerns, and determine her credentials as the sole coder. As a result of the evaluations, trial codings, and pilot test, the coding forms were refined. The data analysis yielded frequency counts and percentages. None of the FMTs focused on planning a budget. The FMTs poorly addressed Create, the highest order thinking skill. The FMTs did not support the NCTM standard Representation adequately.
The findings indicate that the FMTs did not uniformly address the personal finance categories, the selected thinking skills, and the selected NCTM standards investigated in this research study. The potential is limited for middle school students to experience FMTs that contain: a balanced array of personal finance concepts and skills, challenging higher order thinking requirements, and an equal balance of the NCTM standards investigated in this research study. Among the recommendations advocated are: stabilizing the alignment of the FMTs to the personal finance categories, thinking skills, and NCTM standards, directing future research to continue investigating FMTs, focusing on worthwhile financial mathematical tasks, and investigating the potential for mathematics textbooks to be a vehicle for financial literacy education.
DEDICATION

To my mentor: Dr. Katharine Owens
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I would like to express my heartfelt gratitude and appreciation to those who have given me the help, encouragement, prayers, and love to complete this dissertation.

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CHAPTER I
INTRODUCTION

In Babbage’s (2007) preface, he proposes that the people of the United States are their own worst enemies. Babbage warns that our political adversaries will not have to be concerned about destroying us, for we are defeating ourselves by burying ourselves in debt. He goes on to suggest that this debt may well be owned by our adversaries through their financing of our debt and purchasing our land, our labor, and our capital. He asserts that we have turned our founding spirit into financial failure and folly and no enemy attack is needed to annihilate our American way of living. Our financial irresponsibility may well destroy our nation’s honor, our influence, and our future. I believe that we did not heed Babbage’s forewarning then, but we must address it now.

According to the Commission on Thrift (Institute for American Values, 2008) America has a growing population of “debtors and bettors” (p. 8). A large coalition of American leaders and institutions, under the joint initiative called Project Thrift, are calling for societal changes to address today’s debt crisis and promote financial health, saving, and wealth building. Knowledge of financial matters has become a critical issue in American daily life. How does the American educational system currently address financial literacy education?

Financial literacy at all age levels has been a long-standing concern. *Hamilton’s Essentials of Arithmetic Second Book* (1919) devoted over three-fourths of its contents to
financial concepts and skills. Horace Moses, cofounder of Junior Achievement in 1920, stated, “Habits are formed in youth … what we need in this country now … is to teach the growing generations to realize that thrift and economy, coupled with industry, are necessary now as they were in past generations” (http://www.ja.org/about/about_who.shtml, p. 1, Horace Moses).Founded in 1949, the National Council on Economics Education (NCEE) continues to provide teachers with economic and personal finance materials and resources. The Consumer Federation of America, created in 1968, carries on its mission to furnish information on consumer issues, one of which is personal finance.

Within the past several years, some governmental agencies have increased their attention to financial literacy education. In May of 2002, the Department of Treasury established the Office of Financial Education to promote financial literacy education for all age levels and to coordinate the efforts of the Financial Literacy and Education Commission. At the Office of Financial Education’s (2002) panel discussion on integrating financial education into core curricula, Secretary of Education, Rod Paige, asserted that financial literacy is just as important as reading and comprehension. He added that the wellbeing of our nation depends on every American’s financial knowledge and skills. The Financial Literacy and Education Commission (2006) published Taking Ownership of the Future: The National Strategy for Financial Literacy. The Federal Reserve Bank of Chicago co-sponsored the Financial Literacy & Education Summit 2007 to discuss promoting financial education on a national level and best practices in current financial programs (see http://practicalmoneyskills.com/summit2007).
Other groups, such as JumpStart Coalition, an alliance of over 150 business institutions, governmental agencies, and educational associations, promote financial literacy education. JumpStart Coalition serves as a clearinghouse of financial materials for grades K-12. JumpStart Coalition also provides speakers for financial literacy education, standards for personal finance education, best practices for financial literacy educational materials, information on financial literacy programs, and a publication for quarterly news.

Throughout the literature many individuals and organizations have offered definitions of financial literacy. The most comprehensive definition is provided by Vitt, Anderson, Kent, Lyter, Siegenthaler, and Ward (2000). They described personal financial literacy as a cycle of financial actions: reading, analyzing, managing, deciding, communicating, and planning. They emphasize that one must repeatedly take these measures, despite anxiety or uneasiness, to respond effectively to the events of life that affect one’s daily financial choices.

Former Federal Reserve Board Chairman Alan Greenspan (2003) stated that the American financial system is becoming more complex with new products and services continually expanding and changing the options available to consumers. Greenspan called for improving elementary and secondary basic financial education as well as fundamental mathematical and problem solving skills to cultivate well-informed consumers who are able to take advantage of the complex financial services offered in a continuously changing marketplace. A continually shifting marketplace forces the public citizenry to use problem solving skills to continually analyze and evaluate their financial options to determine the best course of action for their current monetary needs.
Problem solving skills are not only a key factor in financial literacy but also in mathematical literacy as well. Responsible financial decision making involves choosing the best course of action and the best solution to resolve, maintain, or enhance one’s current financial state of affairs. Mathematical problem solving also involves choosing the best course of action or strategy to obtain a solution for a problem, assignment, or task. Therefore, investigating mathematical problems and problem solving may be the key to exploring the current incorporation of financial literacy education within the curriculum.

Mathematical Problems and Problem Solving

Today as in the past, many scholars are concerned with mathematical problems and problem solving (Halmos, 1980; Lesh & Zawojewski, 2007; Schoenfeld, 1992). According to Schoenfeld, the literature defined mathematical problem solving from working repetitive exercises to executing mathematical operations as a professional mathematician would do. The National Council of Teachers of Mathematics (2000) defines mathematical problem solving as attempting to find a resolution for a task for which the solution technique is not known ahead of time. According to Lesh and Zawojewski (2007), mathematical problem solving is a cyclic process of expressing, testing and revising a mathematical interpretation of a task.

Stanic and Kilpatrick (1989) stated that problems have been a principal inclusion in school mathematics since ancient Egyptian, Greek, and Chinese curricula. In its traditional sense, the term problem can be defined as a rote exercise developed to offer practice on a particular mathematical procedure (Schoenfeld, 1992). Or at the other end
of the continuum, problems are the core of mathematics and of life (Halmos, 1980). Since a large portion of life and living is solving problems, Halmos maintained that it is every educator’s responsibility to present many more problems than facts to their students. Lesh and Zawojewski (2007) described tasks or goal-directed activities as problems when these activities become problematic for the problem solver. At this point the problem solver needs to generate a more productive strategy to satisfy the situation.

Three NCTM documents have established the importance of problems and problem solving. First, An Agenda for Action (NCTM, 1980) recommended that during the following decade school mathematics concentrate on problem solving. Second, the Professional Standards for Teaching Mathematics (NCTM, 1991, 2007) advocates that mathematics educators should develop, revise, or select worthwhile mathematical tasks. Third, within Principles and Standards for School Mathematics (NCTM, 2000) NCTM not only makes problem solving a standard, but also proposes that problem solving be utilized throughout the mathematics curriculum to provide opportunities to learn and apply mathematical concepts.

Educational Tasks

Problems can be identified by other terms such as difficulties, obstructions, puzzles, or tasks. According to Schoen and Charles (2003) problems are rich, challenging tasks in which the mathematics to be learned is entrenched. NCTM (1991, 2007) identifies tasks as projects, problems, and exercises. Worthwhile mathematical tasks are likely to support a student’s development of mathematical understandings of concepts and procedures, a student’s ability to solve problems, and a student’s capability
to reason and communicate mathematically (NCTM, 1991, 2007). Worthwhile mathematical tasks are quality undertakings that engage students’ curiosity, encourage speculation and the pursuit of hunches, and may have more than one sound solution.

Standard 1. Worthwhile Mathematical Tasks (NCTM, 1991, 2007) describes three criteria for quality tasks: (a) mathematical content, (b) the students, and (c) the ways in which students learn mathematics (see Appendix A).

To address the quality of financial literacy materials and resources JumpStart Coalition (2003) had also issued on its website the National Best Practices Guidelines for Personal Finance Education Materials. These guidelines provide criteria for the development, adaptation, and selection of meaningful financial literacy materials such as financial programs, financial booklets, and financial tasks. JumpStart Coalition’s guidelines promote objectivity, alignment to state or national standards, appropriate design, accuracy, and timeliness of financial materials (see Appendix B).

Higher Order Thinking

Problem solving tasks involve higher order thinking (Lesh & Zawojewski, 2007). Lewis & Smith (1993) suggested that higher order thinking occurs when one brings together new information and previously learned information to discover possible solutions to perplexing problems. Solving problems entails not only the thinking skill of recalling mathematical concepts and procedures, but also interpreting, comparing, executing, analyzing, evaluating, and creating to solve worthwhile mathematical tasks (Goldenberg & Walter, 2003). Mathematics educators have continued to be concerned about students’ experiencing worthwhile mathematical tasks using higher order thinking.
skills (Giannetto & Vincent, 2002; Moreau & Coquin-Viennot, 2003; Morrison, Cowan, McBride, & McBride, 1999).

Numerous academics (Anderson et al., 2001; Bloom et al., 1956; Hauenstein, 1998; Marzano, 2001) have developed classification systems for thinking skills. Bloom, Englehart, Furst, Hill, and Krathwohl (1956) were the first to attempt classifying thinking skills in their Taxonomy of Educational Objectives. The thinking skills in Bloom’s taxonomy are: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation. Anderson et al. (2001) updated Bloom’s Taxonomy of Educational Objectives. The revised taxonomy contains the cognitive processes: Remember, Understand, Apply, Analyze, Evaluate, and Create, all thinking skills encouraged by educators to solve mathematical tasks (see Appendix C).

Many educators develop, modify, and select mathematical tasks for their alignment to standards as well as the level of complex thinking required. Often educators select and modify tasks from textbooks.

Textbooks and Standards

Mathematics textbooks have long been a major influence on what is taught and learned, and all who are involved in the curriculum and instructional concerns of mathematics need to know what opportunities textbook tasks offer for students in such areas as higher order thinking skills (Nicely, 1991) and standards alignment. In the recent past, streaming (ability grouping) policies and tracking (teaching non-academic students different types of mathematics with different methods) policies led to students being placed in mathematics classes that needed academic or non-academic mathematics
textbooks. One such non-academic track was Consumer Mathematics (Mason & McFeetors, 2004). The textbooks used for this track contained mathematical tasks and financial mathematical tasks that students would find in their future personal lives and work lives. However, with the reform movement of “Algebra for All” (Edwards, 1990) consumer mathematics and its inclusion of personal finance tasks declined in prominence.

Today, textbooks continue to remain an important resource in classrooms (Oakes & Saunders, 2004; Tarr, Chavez, Reys, & Reys, 2006). Textbook authors often include financial mathematical tasks within mathematics textbooks not only to comply with the NCTM (2000) Problem Solving standard, but also to implement the Connections standard which states that students should be able to identify and utilize mathematics in areas outside of mathematics (see Appendix D).

Four prominent standards documents that should guide the vision for mathematics and financial literacy teaching and learning are the Principles and Standards for School Mathematics (NCTM, 2000), the Professional Standards for Teaching Mathematics (NCTM, 1991, 2007), the National Standards in K-12 Personal Finance Education (JumpStart Coalition [JSC], 2007), and the National Best Practice Guidelines for Personal Finance Education Materials (JumpStart Coalition, 2003, 2008).

In response to the national concern for an increase in school-based financial literacy education, JumpStart Coalition published Personal Finance Guidelines and Benchmarks (JumpStart Coalition, 1998). JumpStart Coalition revised the standards in 2002 and again in 2007 (JumpStart Coalition, 2007). The National Standards in K-12 Personal Finance Education (JumpStart Coalition, 2007) is found in Appendix E. The
National Standards in K-12 Personal Finance Education (JumpStart Coalition, 2007) offers three important tools for educators. First, the standards present a means to integrate basic financial concepts and skills into core curricula. Second, the standards promote higher order thinking skills and problem solving necessary to make appropriate personal finance decisions. Third, the standards offer a set of criteria to evaluate the integration of financial concepts and skills within core curricula, textbooks, and financial literacy programs and materials.

The National Standards in K-12 Personal Finance Education (JumpStart Coalition, 2007) contains 29 standards banded for grades, K-4, 5-8, and 9-12. The standards are divided into six personal finance categories: Financial Responsibility and Decision Making, Income and Careers, Planning and Money Management, Credit and Debt, Risk Management and Insurance, and Saving and Investing. Each grade band has expectations at the 4th, 8th, and 12th grade levels. The National Standards in K-12 Personal Finance Education (JumpStart Coalition, 2007) does not contain a specifically stated problem solving standard as does the NCTM document. However, JumpStart Coalition developed cognitive behavioral standards encouraging problem solving experiences in which students make decisions, develop plans, prioritize goals, and analyze and evaluate claims (JumpStart Coalition, 2007).

JumpStart Coalition (2003, 2008) published National Best Practice Guidelines for Personal Finance Education Materials. These guidelines make recommendations for developing and selecting personal finance educational materials and resources. The guidelines suggest educators utilize resources that are objective, aligned to standards, target the needs of students, and be up-to-date and accessible.
Statement of the Problem

Today financial literacy education at all age levels is a prominent concern. Financial literacy education is the process of teaching students how to make every day financial decisions with one’s best interests in mind. Dara Duguay, in the foreword of *Money Math: Lessons for Life* (Suiter & McCorkle, 2001), stated that instruction in financial concepts and skills at the middle school level is important because these students need to learn how to manage their money in a responsible manner. Otherwise they may learn in a trial-and-error manner which may have detrimental consequences. Duguay (Suiter & McCorkle, 2001) indicated that financial literacy education can no longer be relegated to the electives of Economics, Family and Consumer Sciences, and Business courses in high school. Financial literacy education needs to be permeated throughout all grade levels and all classes, especially mathematics.

Even though there is a plethora of financial literacy materials that can be employed within the classroom, there is a paucity of financial literacy scholarly research evaluating these materials (Financial Literacy & Education Commission, 2006). *Taking Ownership of the Future: the National Strategy for Financial Literacy*, (Financial Literacy and Education Commission, 2006) and the Financial Literacy & Education Summit 2007 ([http://practicalmoneyskills.com/summit2007](http://practicalmoneyskills.com/summit2007)) call for increasing academic research investigating financial literacy education. At present, researchers have not developed a systematic process to evaluate the integration of financial literacy education within school curricula, to evaluate the financial materials used in an educational setting, and to evaluate the financial mathematical tasks found within mathematics textbooks.
Since the National Council of Teachers of Mathematics recommends worthwhile mathematical tasks and JumpStart Coalition promotes worthwhile financial mathematical tasks, the focus of this study will be to determine the distribution of financial mathematical tasks, found in a middle school mathematics textbook series, across the categories of the National Standards in K-12 Personal Finance Education (JumpStart Coalition, 2007), and selected recommendations of the Professional Standards for Teaching Mathematics (NCTM, 1991, 2007) and the National Best Practices Guidelines for Personal Finance Education Materials (JumpStart Coalition, 2003, 2008).

Purpose of the Study and Research Questions

The purpose of this study is to conduct a content analysis of a middle school mathematics textbook series to ascertain the extent to which the financial mathematical tasks found within the textbook series support the recommendations of the National Standards in K-12 Personal Finance Education (JumpStart Coalition, 2007), the Professional Standards for Teaching Mathematics (NCTM, 1991, 2007), and the National Best Practices Guidelines for Personal Finance Education Materials (JumpStart Coalition, 2003, 2008). In particular, the content analysis will focus on the extent to which the financial mathematical tasks: (a) are distributed across the categories of the National Standards in K-12 Personal Finance Education (JumpStart Coalition, 2007), (b) support higher order thinking skills as identified by A Taxonomy for Learning, Teaching, and Assessing (Anderson et al., 2001), and (c) meet the recommendations of the National Council of Teachers of Mathematics’ Standards (NCTM, 2000).
investigation will examine the potential for financial literacy education to take place in the middle school mathematics classroom through the use of middle school mathematics textbooks.

Middle school is the focal point of this study for the following reasons. First, middle school students will soon be entering the existing complex financial services marketplace (Greenspan, 2003). As Americans today continuously need to be actively and effectively involved in the management of their finances (Braunstein & Welch, 2002), so too, do middle level learners need to be actively and effectively involved in their financial management decisions. For example, middle school learners should explore the difference between needs and wants, opportunity costs, credit card risks, and the value of sustained saving initiated during the teenage years. Middle school students could benefit from the use of financial mathematical tasks taught in mathematics (Greenspan, 2003). Second, the financial marketplace is continuously becoming more complex (Greenspan, 2003). The higher order thinking skills needed to address this increasing complexity develop at 12-15 years of age (Piaget, 1972).

Furthermore, I am interested in evaluating a textbook series rather than three or four textbooks on the same grade level from different publishers for this reason. Because the Principles and Standards for School Mathematics (National Council of Teachers of Mathematics, 2000) and the National Standards in K-12 Personal Finance Education (JumpStart Coalition, 2007) are written for banded grades, the content analysis sample should encompass a sequence of grades. Because of standard banding, publishers are able to choose to meet standard requirements in any one or all of the textbooks within a textbook series. Therefore, it would be prudent to study all of the
textbooks within a series to determine the level of support of the financial mathematical
tasks that a publisher has included to meet the standards for the banded grades.

This study will focus on three research questions.

1. What is the distribution of the financial mathematical tasks in a middle
school mathematics textbook series across the six categories of the National Standards in
K-12 Personal Finance Education (JumpStart Coalition, 2007)?

2. What is the distribution of the financial mathematical tasks in a middle
school mathematics textbook series across the thinking skills as identified by A
Taxonomy for Learning, Teaching, and Assessing (Anderson et al., 2001)?

3. What is the distribution of the financial mathematical tasks in a middle
school mathematics textbook series across the recommendations of the National Council
of Teachers of Mathematics’ Standards (NCTM, 2000)?

Significance of the Study

The results of this study will document: (a) the distribution of the financial
mathematical tasks found in a middle school mathematics textbook series across the
personal finance categories of the National Standards in K-12 Personal Finance
Education (JumpStart Coalition, 2007), (b) the distribution of the financial mathematical
tasks found in a middle school mathematics textbook series across the thinking skills as
identified by the A Taxonomy for Teaching, Learning, and Assessing (Anderson et al.,
2001), and (c) the distribution of the financial mathematical tasks found in a middle
school mathematics textbook series across the recommendations of the National Council
of Teachers of Mathematics’ Standards (NCTM, 2000). With the current attention being
given to school-based financial literacy education and the recent publication of the National Standards in K-12 Personal Finance Education (JumpStart Coalition, 2007), financial literacy education advocates may be interested in the findings of this investigation to determine the extent to which textbooks, particularly middle school mathematics textbooks, presently support the acquisition of financial literacy. The research findings may indicate that a mathematics textbook is a promising venue for the incorporation of financial literacy. The results of this study may provide an impetus for further financial literacy integration studies with other school curricula and will add to the literature on financial literacy education and worthwhile mathematical tasks. Knowledge of the research findings could guide publishers and authors of textbooks in the future development or revisions of their mathematical textbook series.

Limitations

There are two limitations to this study. First, this research will be limited to one middle school mathematics textbook series. Second, this research will be limited to the actual content within the textbook and not the content taught in the classroom. The researcher will not examine, for example, how a teacher implements the financial mathematical tasks within the lessons, how the tasks could be modified, or how students experienced the tasks. This researcher will only investigate the distribution of the financial mathematical tasks across: (a) the six categories of the National Standards in K-12 Personal Finance Education (JumpStart Coalition, 2007), (b) the thinking skills as identified by the *A Taxonomy for Teaching, Learning, and Assessing* (Anderson et al.,
2001), and (c) the recommendations of the National Council of Teachers of Mathematics (NCTM, 2000) standards.

Definition of Terms

The following terms are directly related to the research questions of this study.

_Banded grades_. In general, grades that are grouped together. For example, K-2, 3-5, 6-8, and 9-12. For this study, the grouping of grades 6-8.

_Content analysis._ A versatile research technique developed to make objective and systematic decisions by applying unambiguously defined coding procedures on communications and documents to describe their contents (Holsti, 1969; Krippendorf, 1980; Weber, 1985).

_Eighth grade mathematics textbook._ A mathematics textbook published for the use of students operating at the eighth grade level.

_Financial literacy._ The knowledge and application of monetary concepts and skills that underlie daily financial decision-making.

_Financial literacy education._ Financial knowledge and skills acquired through formal classroom instruction and life experiences.

_Financial mathematical task._ A financial mathematical task (FMT) is a mathematical task that has the following characteristics: (a) contains financial words, monetary words, and monetary symbols, (b) requires a financially related solution, and (c) assumes the problem solver has an understanding of financial or monetary concepts.
**Mathematical task.** A textbook mathematical task (MT) requires the use of mathematical concepts and skills for its solution and has the following characteristics: (a) physical delineations and (b) written communications.

**Middle school.** A division in education comprising grades 6, 7, and 8.

**Personal finance.** Monetary knowledge and skills applied to an individual’s own financial state of affairs.

**Problem.** A mathematical pursuit as defined by the National Council of Teachers of Mathematics (1991, 2007) in the *Professional Standards for Teaching Mathematics.*

**Problem solving.** The use of higher order cognitive processes to select a solution technique to reach a result for a non-routine task (NCTM, 2000; Schoenfeld, 1992).

**Seventh grade mathematics textbook.** A mathematics textbook published for the use of students operating at the seventh grade level.

**Sixth grade mathematics textbook.** A mathematics textbook published for the use of students operating at the sixth grade level.

**Task.** An exercise, project, problem, application, creation, application, or any other activity in a textbook given to students to facilitate and promote learning.

**Textbook.** A published mathematics hardback for student use containing concepts, skills, problems, end of chapter and unit tests, and any other ancillary material individual publishers include.

**Textbook series.** In general, published textbooks that are grouped together. For example, K-2, 3-5, 6-8, and 9-12. For this study, the grouping of published textbooks for Grades 6-8.
Thinking skills. A group of cognitive processes classified from simple thought processes to more complex thought processes.
CHAPTER II
REVIEW OF LITERATURE

The research topics of interest for this study of financial mathematical tasks are: financial literacy, financial literacy education, financial literacy education in schools, educational standards, educational tasks, mathematical problems, mathematical problem solving, higher order thinking, educational textbooks, and content analysis. The literature relating to each topic is discussed as it pertains to the purpose of the study.

Financial Literacy

A review of the literature revealed many definitions of financial literacy. Vitt, Anderson, Kent, Lyter, Siegenthaler, and Ward (2000) provided the most comprehensive definition. They described personal financial literacy as a cycle of financial actions that one must repeatedly use to respond effectively to the events of life that affect one’s daily financial choices. The National Association of State Boards of Education (NASBE, 2006) utilized this definition in their report presenting the commission’s assessment of the current state of financial and investor education in public schools and recommendations to improve students’ financial literacy.

In their survey, Godsted and McCormick (2007) employed this definition: “Financial Literacy is the ability to make informed judgments and effective decisions regarding the use and management of money” (p. 12). Fox, Bartholomae, and Jinkook
(2005) stated that financial literacy implies understanding and knowledge of financial concepts. They also asserted that financial literacy is vital to financial decision making. Financial literacy, Jacob, Hudson, and Bush (2000) suggested, not only entails understanding financial terms and concepts, but also transforming that knowledge into effective financial behavior. Financial literacy is the set of tools that will characterize how daily financial choices are made.

Governmental agencies dealing with economic issues have established their own definitions of financial literacy. The United States Financial Literacy and Education Commission regarded financial literacy as the ability to make knowledgeable financial decisions and to take effective actions in the management of money for current and future use (as cited in Basu, 2005). The website subcommittee of the Financial Literacy and Education Commission described financial literacy as possessing sufficient knowledge to make wise decisions and avoid fraud when managing one’s finances (Brown-Hruska, 2004). The United States Government Accountability Office (2006) recommended that the Financial Literacy and Education Commission include in its national strategy a clear and precise definition of financial literacy and education.

JumpStart Coalition (2007), an association that promotes financial literacy education, used a synthesis of several sources as a basis for their definition of financial literacy. JumpStart Coalition (JSC) suggested that financial literacy is a capability to utilize monetary knowledge and skills to handle one’s finances effectively throughout one’s lifetime. JSC described financial literacy as a fluctuating state of abilities based upon various factors such as age and culture. For JSC competency in financial literacy is constantly evolving, allowing individuals to respond to their ever-changing personal and
financial state of affairs. This study defines financial literacy as the knowledge and application of monetary concepts and skills that underlie daily financial decision-making.

Financial Literacy Education

The acquisition of financial concepts and skills can be obtained through everyday life and classroom experiences. These experiences collectively are called financial literacy education, a topic that is currently gaining prominence and with historical roots stemming from the early 20th century.

Definitions of Financial Literacy Education

A review of the literature found several definitions of financial literacy education. Arnone (1999) considered financial education an aid to developing skills to make informed choices and to taking action to improve one’s financial welfare. Vitt et al. (2000) stated that one’s education determines his or her occupation and earnings. One’s financial literacy education continuously augments an individual’s life journey by enhancing one’s ability to access, accumulate, and protect assets. Fox, Bartholomae, and Jinkook (2005) maintained that financial education incorporates any program that focuses on an individual’s knowledge, attitudes, and/or behavior regarding financial literacy. Jeanne Hogarth, Federal Reserve Board (2006), indicated that there are three themes flowing through the many definitions of financial education: knowing financial information, understanding assets and money management, and using that knowledge and understanding to plan, execute, and evaluate financial decisions.
Historical Perspective

Concern for financial literacy education is not a recent issue. In the past, middle school mathematics textbooks heavily included financial literacy concepts and skills. Hamilton’s Essentials of Arithmetic Second Book (1919) devoted five of its six chapters’ contents to financial concepts and skills. Marsh and Van Sickle’s (1924) The Pilot Arithmetics Book Three allocated 6 of their 14 chapters to financial literacy topics and processes. In Stone’s (1925) The Stone Arithmetic Eighth Year, the first semester’s work covered mathematical concepts and skills. The second semester’s work only involved financial literacy education. Essentials of Junior High School Mathematics Book Two by Hamilton, Bliss, and Kupfer (1927) allotted 7 of its 17 chapters to such topics as taxes, banks, investing, commission, and “problems of the home” (p. vii). Clark, Ottis, and Hatton’s (1930) Modern-School Arithmetic Book Three contained four chapters committed to financial literacy concepts and skills. This textbook used the label, business practice, for some of its chapters that presented such concepts as discounts, receipts, installment purchases, checking accounts, family budgets, and inventory.

Within the recent past, high school curriculum policies have supported placing ninth-grade students into general math, consumer mathematics, pre-algebra, algebra, and geometry classes (Gamoran & Hannigan, 2000; Mason & McFeetors, 2004). Consumer mathematics courses allow students to solve financial mathematical tasks and mathematical tasks that they will experience in their future personal lives and their working lives (Mason & McFeetors, 2004). However, many within the field of education believed that tracking students led to learning inequalities. These proponents asserted that all students needed to experience algebra fundamentals to develop within
themselves the necessary systematic approaches to analyzing data and solving problems that studying algebra could afford them (Edwards, 1990). At the 1988 NCTM Annual Meeting in Chicago, a group was asked to discuss the topic of providing equal access to algebra for all students and to suggest the means by which this proposal could be attained. This meeting was the beginning of the “Algebra for Everyone” movement (Edwards, 1990). Even with this concern for the addition of algebraic fundamentals for all students at all levels, Consumer Math has not disappeared. It has become more of an elective option rather than as a substitute for Algebra.

Within the last two decades several business corporations and other groups have created organizations to address diverse financial literacy education issues. For example, established in 1992, the National Endowment for Financial Education (NEFE) ([http://www.nefe.org](http://www.nefe.org)), a nonprofit foundation, provides all Americans information and skills to help manage their own personal finances. JumpStart Coalition, founded in 1995 and sustained by over 150 business corporations, educational organizations, and government agencies, concentrates on its mission to enhance the financial skills of young adults by promoting financial literacy education in Grades K-12 (JumpStart Coalition, 2002b). In 1998, JumpStart Coalition (2002b) issued its first publication, *Personal Finance Guidelines and Benchmarks*. These guidelines were developed by 20 education, government, and business professionals. In 2001, JumpStart (2002b) established a task force to revise and update the guidelines and benchmarks. A committee examined the revision and proposed additional improvements to the guidelines. In 2002, Jumpstart published the second edition of standards, the *National Standards in Personal Finance* (Jumpstart Coalition, 2002b).
*K-12 Personal Finance Education* (JumpStart Coalition, 2007) is the third edition of the financial standards. JumpStart Coalition considers the standards an active document that is amended and adapted to meet the changing needs of personal finance educators and students.

In January of 2002, Congress passed the No Child Left Behind Act of 2001. In Title 5, Subpart 3, Section 5131, Category 11, the act states that monies can be used for activities to promote personal finance education. The Treasury Department established the Office of Financial Education in May of 2002. In October of 2002, National Endowment for Financial Education (NEFE) held the symposium, *The State of Financial Literacy in America – Evolutions and Revolutions* (NEFE, 2002). Within the full white paper of those proceedings, *Financial Literacy in America: Individual Choices, National Consequences*, NEFE reported that it brought together a diverse group of individuals, representing institutions, organizations, media, financial services firms, foundations, government agencies, research groups, consultants, advocacy groups, and the United States military, who were interested in Americans’ financial literacy. After 3 days of discussions, the symposium was able to lay the foundation for the establishment of a financial literacy movement. The symposium established the national goal of creating a common vision of financial literacy for all segments of the American public.

Given this directive to develop a national financial literacy strategy, the Financial Literacy and Education Commission issued the *Taking Ownership of the Future, The National Strategy for Financial Literacy* (Financial Literacy and Education Commission, 2006). This document is a comprehensive policy outlining the Financial Literacy and Education Commission’s plan to improve the financial literacy of all Americans. The
Federal Reserve Bank of Chicago’s Financial Literacy & Education Summit 2007
brought together leading proponents of financial literacy policy and practice to present
their vision of the future of personal financial education. Financial literacy advocates
also examined what responsibilities the government should assume in promoting
financial literacy and financial literacy education. On January 22, 2008, President G. W.
Bush signed an executive order establishing the President’s Advisory Council on
Financial Literacy. The advisory council’s mission is to formulate recommendations for
enhancing the financial literacy education of peoples from all walks of life (http://www.whitehouse.gov/news/releases/2008/01/20080122-7.html).

Economists have also promoted the linking of economics and financial literacy.
During the National Summit on Economic and Financial Literacy, several speakers
promoted economic and personal finance education (Federal Reserve Bank of
Minneapolis, 2002). Roger Ferguson, Federal Reserve Board Vice Chairman, stated that
understanding economics and finance is essential for individuals in a market economy.
Bonnie Meszaros, Associate Director for the Center for Economics and Entrepreneurship
at the University of Delaware, offered that new materials need to be developed to
integrate economics and personal finance into reading, mathematics, and other content
areas. William Walstad, Director of the National Center for Research in Economic
Education, called for a series of courses containing personal finance, business, career
education, public policy and basic economics.

Meyers (2004) emphasized that educating our youth in economics and personal
finance is essential. He explained that the study of economics investigates decision-
making, the choices that societies and individuals make when using limited resources to
meet people’s unlimited wants. Meyers (2004) posited that economics is not concerned about money. Economics is concerned about the choices associated with the use of money. Meyers also believed that integrating economic and personal finance lessons into core curricula is the key to helping students learn how to think, choose, and function in a changing and challenging world. For Meyers, an economically literate population is one that has responsible citizens, productive workers, knowledgeable consumers, prudent savers and investors, effective participants in the global economy, and lifelong decision makers. Since learning about economic and financial matters takes place both at home and in schools, the next section reviews financial literacy education within the schools.

Financial Literacy Education in Schools

In *Money Math: Lessons for Life* (Suiter & McCorkle, 2001), Dara Duguay stated that personal finance has progressed into a complex life skill that cannot be relegated any longer to course electives such as Family and Consumer Sciences or Business classes. Financial literacy education needs to be incorporated into other disciplines. The Office of Financial Education (2002) supported this belief by stating that the school is an ideal venue to provide financial literacy education to our youth. In the United States, financial literacy education and financial resource materials target numerous grade levels. Some of the ways in which financial literacy education is included within the classroom are: (a) personal finance courses, (b) financial literacy programs, and (c) personal finance lessons.
Personal Finance Courses

Only seven states continue to mandate that a personal finance course be required for high school graduation (National Council on Economic Education [NCEE], 2007). Even though 40 states contain personal finance in their educational standards, only 28 states require that these standards be implemented (NCEE, 2007). Schools considering initiating personal finance courses face obstacles. With daily class schedules already filled to capacity, schools find it difficult to include a personal finance course. Administrators, limited by budgetary constraints, also find it difficult to pay for the additional teaching personnel and materials. To mandate a personal finance course may require that another elective course be deleted, the school day extended, or a modification of graduation requirements be made (Braunstein & Welch, 2002).

Textbook publishers offer personal finance textbooks for high school students. For example, in Practical Mathematics for Consumers (Globe Fearon, 2004), the publishers present many familiar financial literacy topics such as expenses, budgets, salary, banking, saving, checking accounts, credit cards, loans, and interest. The fourth edition of Personal Finance: Turning Money into Wealth (Keown, 2007) includes discussions on inheritances and budget constraints in times of family crises like death and divorce.

Personal Finance Programs

Financial literacy programs are another source of financial literacy education employed within schools. Money Savvy Generation (http://www.msgem.com) is an organization that develops financial literacy materials for parents, educators, and other
groups interested in promoting financial literacy. The company has four programs. Money Savvy Kids Basic Personal Finance Curriculum is designed for grades K-5 and is aligned with mathematics and social studies state standards. To help parents, Money Savvy Kids @Home is the interactive home version of Money Savvy Kids. Money Farm Activity Book and DVD Series, for 6- to 10-year-olds, is based on Money Savvy Kids Basic Personal Finance Curriculum. On the DVD segments children talk to children about financial concepts. Money Savvy U Intermediate Personal Finance Curriculum, for Grades 6-10, can be used as a supplement in an economics, consumer education, personal finance, or business class (http://www.msgen.com/assembled/products_services.html).


The National Endowment for Financial Education (2001) published the NEFE High School Financial Planning Program. The course was up-dated in 2006 and launched in 2007. The most recent version has seven units covering financial planning, budgeting, investing, debt, saving, insurance, and careers.

Junior Achievement (JA), a 501(c)3 not-for-profit worldwide organization, is committed to improving the life of all youth through educational programs in business, economics, entrepreneurship, and personal finance. JA provides both in-school and after-school programs for Grades K-12 using a network of volunteers.
Junior Achievement has middle school personal finance programs: JA Economics for Success, Biz Kid$, and JA Finance Park. JA Economics for Success includes activities concentrating on self knowledge, decision-making, career choices, budgeting, credit, and risk. Biz Kid$ is a multi-media, multifaceted program. It includes a weekly 30-minute TV show, classroom activities, Website, and eNewsletter. JA Finance Park is a real-life simulation involving both in-classroom instruction and an out-of-classroom experience at the JA Finance Park site. Initial lessons within the classroom investigate such topics as financial institutions, taxes, budgeting, and career and lifestyle goals to prepare the students for their visit to JA Finance Park. JA Finance Park is an off-school site that simulates a small city. Once at JA Finance Park, each student participant makes financial decisions based on the life situation and salary given to him or her in the previous lesson. Each student then makes the every-day financial decisions such as banking, transportation, food, entertainment, healthcare, housing, and investing that an adult in that situation would have to do. The follow-up classroom lesson allows the students to reflect on the success or failure of their experiences at JA Finance Park.

3M, a global technology company, conducted a study for JA (2005) correlating Ohio’s content standards for social studies, language arts, and mathematics to all the elementary school, middle grades, and high school Junior Achievement Programs. I reviewed the correlation table for JA Go Figure! Exploring Math in Business, a middle school program containing some personal finance topics. The correlation table revealed that within the eight units of the middle school program, all five mathematics content
standards were met in varying degrees. For example, all of the eight units of the JA Go Figure! program aligned to standard one’s indicator of using simple integer expressions to represent and solve problems, and only one unit aligned to standard four’s indicator of evaluating simple expressions and using formulas to solve problems. No other information was given on this website other than the alignment table.

**Personal Finance Lessons**

Within the past few years, educators have found a number of financial literacy resource materials at the middle school level. Golomb (1996) developed *Economics and You*, an activity book that contains information and activities on credit cards, taxes, and money. Biedenweg (1999) wrote *Personal Finance*, an activity book for Grades 5-8+ that includes such topics as savings accounts, bonds, and stocks. *Money Management Word*, published by Remedia Publications (2000), is a high interest activity book with a 4th - 5th readability level for Grades 7-12 containing vocabulary pertinent to the JumpStart Coalitions’ standards in four of the six categories. Only vocabulary aligning to income, careers, and insurance are not present.

More recent publications include: *Financial Math: Book One* (Steck-Vaughn, 2008), *Financial Math: Book Two* (Steck-Vaughn, 2008), and *Jumpstarters for Math Word Problems* (Steele, 2007). Steck-Vaughn states that the series aids in the application of traditional math class knowledge and skills to everyday financial endeavors. The first two chapters of book one review basic mathematics. The next two chapters provide students with a sense of money and how it is acquired. The following two chapters examine everyday monetary activities such as comparison shopping and
sales discounts. The last chapter concentrates on understanding insurance. Book two addresses more challenging financial topics such as bank accounts, borrowing money, buying or renting a home, investing, taxes, purchasing and maintaining a car, and personal finance.

*Jumpstarters for Math Word Problems* (Steele, 2007) is a resource that provides short daily warm-ups for the classroom. Each page is a week’s worth of short problem solving tasks. Seven of the 39 pages contain financial mathematical word problems. The financial word problems include: unit pricing, discounts, sale price, sales tax, simple interest, and profit.

Financial Literacy Education Research

This researcher reviewed the academic literature to determine to what extent scholars have researched student financial literacy and financial literacy education. After examining the existing studies, the researcher found that scholarly research on Grades K-12 financial literacy topics was limited. Exhaustive searches were undertaken in Academic Search Premier, Business Source Complete, Business Source Premier, ProQuest Digital Dissertations, Education Abstracts, Educational Resources Information Center (ERIC), Kraus Curriculum Development Library, Mastery FILE Premier, Middle Search Plus, Professional Development Collection, Psychology and Behavioral Sciences Collection, Soc INDEX, Soc INDEX with full Text, Sociological Collection, and TOPIC Search to locate financial literacy education studies. Even though scholarly research on financial literacy and financial literacy education is limited, a few published results of studies at all age levels exist.
At the preschool level, in an experimental study Macklin (1996) investigated students learning brand names from visual cues. The first experiment, a $5 \times 2$ experimental design had 100 preschoolers at two nursery schools randomly assigned to five experimental groups to determine if visual cues helped the children learn brand names. The first experiment also included an equal number of school-age children. The researchers in this study wished to compare the results of the preschool students with the older students. The results indicated that both groups of children, preschool and school-age, learned the brand name easily with the use of a visual cue. The second experiment, a one-way experimental design, used five levels of cues: associated pictures, associated colors, unassociated pictures, unassociated colors, and a no cues control to determine if two cues are more helpful in learning brand names. The data determined that two cues were more helpful than one. The third experiment examined whether more extensive displays of visual cues would further improve the learning of brand names. A one-way design confirmed Macklin’s hypothesis that too many visual cues did not enhance the preschoolers’ ability to learn brand names. Macklin provided sufficient evidence to ensure reliability and validity of the data for each experimental design.

At the elementary level, Lucey (2002) developed the 4th Grade Financial Literacy and Personal Information Survey to measure the personal financial literacy levels of 4th grade students and to explore how gender, race, self-esteem, income level, method of learning, and outside of school activities relate to the fourth grade students’ personal financial literacy. Using JumpStart Coalition’s 1998 initial guidelines and benchmarks, Lucey measured the students’ basic knowledge of pricing, banking, budgeting, and mathematics skills. The overall financial literacy mean was 44.84% with
a SD = 10.19. The results also indicated that the race, income, and self-esteem were directly related to the students’ financial literacy. Lucey addressed validity and reliability issues of his survey adequately and stated that because of the non-randomized convenience sampling, any causality was nullified. However, out of a sample of 318 students from nine public schools in a large metropolitan area, Lucey received only 172 completed surveys. With a response rate of 49%, bias may have occurred (Heberlein & Baumgartner, 1978; Newman & McNeil, 1998).

Klemme (2002) developed an instrument to determine the amount of time devoted to financial education instruction in middle and high school family and consumer sciences classrooms. The survey, using the guidelines of JumpStart Coalition’s (1998) benchmarks, contained questions on consumer education and financial management topics. The survey also contained items and questions related to other family and consumer science concerns. The researcher of this study also did a pilot study requesting nine family and consumer sciences teachers to review the survey. For the study, Klemme mailed every third label generated from the list of 880 family and consumer sciences high school and middle school teachers for a purposive sample. Out of a possible 4 being “a good deal,” 3 being “some,” 2 being “slightly,” and 1 being “not at all,” the mean score for the high school surveys was 2.8 and the mean score for the middle school surveys was 2.3. Ninety-nine surveys were returned, a response rate of 33%. With a return rate of 33%, bias cannot be disregarded with such a low rate of return (Heberlein & Baumgartner, 1978; Newman & McNeil, 1998).

Studying the effectiveness of an interdisciplinary approach in a middle school mathematics class, Suiter (2007) paired the mathematics instruction with economics
instruction in four suburban middle schools within the same district. Data included pretests, posttests, teacher education and experience, and student attitudes towards mathematics. Suiter had a control group receiving a traditional mathematics instructional approach. The experimental group encountered a set of lessons that had mathematics and economics taught simultaneously. The results suggested that learning mathematics helped the experimental group of students score higher on the economic tests than the control group of students. The results of the mathematics testing revealed that studying economics did not impair the learning of mathematics. Suiter stated that economic instruction complemented the mathematics instruction.

Varcoe, Peterson, Garret, Martin, Rene, and Costello (2001) surveyed 323 teens to determine what financial information they wanted to learn and how they wished to learn this financial information. Within four southern California counties, the convenience sample consisted of five teen groups: (a) teens on probation or in juvenile hall, (b) teens participating in migrant education programs, (c) teens participating in an expectant parenting program, (d) teens in public high school classes, and (e) teens participating in youth groups. The researchers of this study found that high school students’ interests in financial information depended upon their goals. For example, migrant teenagers were interested in saving for college while expectant parenting program teens wanted to learn how to save money for a home.

The most publicized senior high school studies are the JumpStart Coalition’s biennial financial literacy surveys. Mandell (2001) has conducted each study since the initial investigation in 1997. The sampling techniques used for the first two studies were
identical. Mandell had a stratified sample consisting of 150 public high schools throughout the United States.

Because an adequate amount of methodological information of the JumpStart Coalition’s biennial surveys has not been made easily available to researchers, Lucey (2005) investigated the reliability and validity of the JumpStart Coalition surveys. Only able to obtain the datasets from the 1997 and 2000 surveys, Lucey utilized the Kuder-Richardson 20 formula (Richardson & Kuder, 1939), a statistical analysis, to assess internal consistency. The results demonstrated that there was an overall high internal consistency and some measure of face and content validity. Evidence for construct, congruent, and predictive validity was limited. A statistical analysis also revealed a presence of bias.

Nevertheless, in the 1997 JumpStart Coalition survey, the students answered on the average 57.3% of the questions correctly. In 2000, students answered on the average 51.9% correctly. In 2002, the researchers gave the third biennial survey to 4,024 students who answered on the average 50.2% of the questions correctly (JumpStart Coalition, 2002a). In 2004, over 4,000 high school students in 215 high schools found in 33 states reversed the declining scores trend with an average correct response rate of 52.3% (JumpStart Coalition, 2004). The 2006 survey involved 5775 high school students from 37 states. The average correct score was 52.4%. In JumpStart’s press release of April 5, 2006, Mandell stated that this score suggested that even though attention to the lack financial literacy in the high school student population has increased, the problem will not be resolved quickly (http://www.jumpstart.org/fileuptemp/2006GeneralReleaseFinal%202.doc). In its April 9, 2008, news release,
JumpStart Coalition stated that the biennial survey results of 2008 declined to a response rate of 48.3% correctly answered questions (http://www.jumpstart.org/upload/2008%20JumpStart%20Release%20Final.doc).

Evaluating mandated personal finance education, Peng (2008) investigated the relationship between the different types of mandates for personal finance education and high school senior scores on JumpStart Coalition’s biennial survey. Even though critics of the survey were concerned with the survey’s validity and content questions, Peng stated that JumpStart Coalition’s survey is the only comprehensive and nationally representative survey to examine the financial literacy of American high schoolers. The results showed that each type of mandate had a different impact on the survey scores. Standard mandates that provide guidelines for financial literacy education had little impact on the scores. Course mandates that require students to take a class in personal finance had a positive relationship with the survey scores. Test mandates that have students taking a required financial literacy test before they graduate had a negative relationship with the high schoolers scores. This study reported that adequate methodological measures were taken.

This researcher found most financial literacy education studies at the college level. Roberts and Jones (2001) investigated the relationship between college students’ attitudes toward money, credit cards use, and compulsive buying. Roberts and Jones administered the Money Attitude Scale (Yamauchi & Templar, 1982) and Faber and O’Guinn’s Compulsive Buying Scale (Faber & O’Guinn, 1992) to a convenience sample of 406 college students. Using a causal modeling approach, the authors found that power and prestige, distrust, and anxiety are closely related to compulsive spending and
that credit card use facilitates these relationships. A more recent study by Norvilitis, Merwin, Osberg, Roehling, Young, and Kamas (2006) investigated personality factors, money attitudes, financial knowledge and credit card debt among 448 college students on five college campuses. Critical factors related to debt are lack of financial knowledge, age, number of credit cards, delay of gratification, and attitudes towards credit card use. Students with greater debt reported more stress and decreased sense of well being. Failure to report the response rate by the researchers raises the question of bias, despite the reporting of the methodological measures that were taken.

**Educational Standards**

Other than the widely recognized JumpStart Coalition’s biennial surveys of high school students’ knowledge of financial matters, few research investigations have studied the effect of standards in financial literacy education. Since standards influence much of what is taught in the classroom, educational standards is the topic of this section.

*Importance of Standards*

Educators and researchers hold a variety of views on standards. Ravitch (1995) stated, “A standard is both a goal (what should be done) and a measure of progress toward that goal (how well it was done)” (p. 7, italics in original). Eisner (1995) suggested that for educators, state and local governing bodies, and the public, standards provide not only the destination, but the direction as well. Hiebert (1999) asserted that standards reveal the priorities and goals of educational disciplines. Consequently,
standards are value judgments selected through a complex process, indicating what students should know and be able to do.

Standards are valuable tools employed in education. Participating in the Office of Financial Education’s (2002) panel on the integration of financial education into school curricula, Pam Mathews, Associate Executive Director for National Council of Teachers of Mathematics, stated that standards plainly define what quality is for this century. Ravitch (1995) emphasized that standards are able to improve student success by defining what is to be taught and what type of performance is expected. Mid-Continent Research for Education and Learning, McREL, stressed that standards furnish a common set of expectations (McREL, 2004). For all the aforementioned reasons, Cross (1998) asserted that subject matter standards need to be clear, focused, measurable, rigorous, appropriately challenging, subject to continuous evaluation and improvement, and sanction the best practice teaching methods.

Standards’ authoritative role in guiding today’s educational reform has come about relatively recently. A brief historical examination of the evolution of standards, especially the content standards containing personal finance, follows.

**Historical Perspective**

Contemporary educational reform efforts began after Sputnik became the first man-made vehicle to enter space in 1957 (Eisner, 1995). With the American belief in our space leadership shattered, the United States educational system embarked on a journey of continuous reform movements leading to the development of standards-based education. Many educators have considered the report, *A Nation at Risk* (National
Commission on Excellence in Education, 1983), the impetus for the current standards movement (McREL, 2004). *Content Knowledge – 4th Edition* (2004) is McREL’s published results of its continuing efforts to address major issues of content standards, to provide a model for their identification, and to apply the model to identify the standards and benchmarks within the subject areas in a common language throughout the standards.

Within *Content Knowledge-4th Edition*, McREL (2004) provided an in-depth history of the standards movement. However, only a small number of the standards movement’s landmark events are offered here. The first organization to begin developing standards was the National Council of Teachers of Mathematics (NCTM). In 1987, NCTM began its work on curriculum and evaluation standards. In 1989, NCTM published its first set of guidelines *Curriculum and Evaluation Standards for School Mathematics* (NCTM, 1989).

Standards Containing Personal Finance Content

In many disciplines such as business education, family and consumer sciences, and economics, financial literacy topics and skills are included within classroom instruction through the recommendations of these disciplines’ standards (National Business Education Association, 2001; National Association of State Administrators Family and Consumers Sciences, 1998; National Council on Economic Education, National Association of Economic Educators, & Foundation for Teaching Economics, 1997). Also JumpStart Coalition, an organization committed to financial literacy education, has published financial standards and guidelines.

JumpStart Coalition’s Personal Finance Standards


The National Standards in K-12 Personal Finance Education (JumpStart Coalition, 2007) contains 26 standards found within six categories: Financial Responsibility and Decision Making, Income and Careers, Planning and Money Management, Credit and Debt, Risk Management and Insurance, and Saving and Investing. Each category has a different number of standards contained within it. For example, Financial Responsibility and Decision Making has six standards, while Income
and Careers has three. Benchmarks are provided at the 4th, 8th, and 12th grade level. This progression allows students to advance from simple to more complex financial literacy concepts and skills.

National Best Practices Guidelines for Personal Finance Education Materials

JumpStart Coalition (2003, 2008) also published the National Best Practices Guidelines for Personal Finance Education Materials on its website (http://www.jumpstart.org/bp.cfm). The guidelines are recommendations for selecting, evaluating, or developing personal finance educational materials. The guidelines are grouped into six categories: Objectivity, Aligned to Standards, Design, Accurate and Up-to-Date, Available and Accessible, and Assessment. The Objectivity guidelines ensure that the financial materials do not promote specific brands, offer different viewpoints, and provide information on the development and funding of the materials. The Aligned to Standards guidelines recommend that the financial materials not only correlate to the most current financial standards, but also to state or national standards issued for several disciplines such as mathematics. The Design guidelines encourage the use of plain-language, clearly defined technical terms, contemporary topics of interest, appropriate reading levels, culturally sensitive text, and socio-economically diverse subject matter. The Accurate and Up-to-Date guidelines stress regularly revising financial materials and clearly document the revisions. The Available and Accessible guidelines promote not only that all resources are to be easily accessible, but also available in other special needs formats such as Braille and other languages. The
Assessment guidelines emphasize that the materials are tested before publication, includes assessment tools, and measure both knowledge and behavior.

JumpStart Coalition is not the only organization that is concerned about financial topics and skills. Several other educational organizations’ standards contain financial literacy concepts and skills within their recommendations.

*National Standards for Business Education*

The National Business Education Association (2001) created the *National Standards for Business Education* in response to the need for all students and adults to receive equal access to understanding business concepts and skills. The standards are banded into four levels: K-6, 6-9, 9-12, and two-year postsecondary/community college or technical college. The *National Standards for Business Education* (National Business Education Association [NBEA], 2001) contain eleven content areas: accounting, business law, career development, communication, computation, economics and personal finance, entrepreneurship, information technology, international business, management, and marketing. The personal finance achievement sub-standards consist of personal decision making, earning a living, budgeting and managing finances, saving and investing, buying goods and services, banking, credit, and risk (NBEA, 2001). NBEA recommended that middle school learners understand concepts and skills such as these: wants and needs, opportunity costs, job and entrepreneurial opportunities, income, expenses, saving, investing, rights and responsibilities of consumers, banking, credit, and insurance.
Gayton (2005) cross-referenced the *National Standards in Personal Finance for Business Education* (NBEA, 2001) with the *National Standards in Personal Finance* (Jumpstart Coalition, 2002b) and determined the extent to which both sets of standards were correlated. The content analysis revealed that standards in the money management category of the *National Standards in Personal Finance* [NSPF] (JumpStart Coalition, 2002b) correlated with seven of the eight NBEA Personal Finance standards. Standards in the category of saving and investing in the NSPF (JumpStart Coalition, 2002b) correlated with four of the eight NBEA Personal Finance standards. Standards in the spending and credit category in the NSPF (JumpStart Coalition, 2002b) correlated with two of the eight standards in the NBEA Personal Finance standards. Finally, in the income category of the NSPF (JumpStart Coalition, 2002b) only one standard correlated with standard two in the NBEA Personal Finance standards.

*National Standards for Family and Consumer Sciences*

The *National Standards for Family and Consumer Sciences* (National Association of State Administrators for Family and Consumer Sciences, 1998) consists of 16 areas of study for middle and high school students. Personal finance topics can be found within comprehensive standard two, consumer and family resources, and comprehensive standard three, consumer services. Only four content standards are pertinent to this study. Content standard 2.1 requires students to demonstrate the management of individual and family resources. Content standard 2.5 expects students to analyze interrelationships between the economic system and consumer actions. Content standard 2.6 requires students to demonstrate the management of financial
resources. Finally, content standard 3.3 recommends that students analyze factors in
developing a long-term financial management plan.

_Expectations of Excellence, Curriculum Standards for Social Studies_

The National Council for the Social Studies (1994) developed the _Expectations of Excellence, Curriculum Standards for Social Studies_ and addressed the overall integration of the social sciences and humanities to support knowledge of and participation in civic affairs by cultivating the ability to make informed decisions (National Council for the Social Studies, 1994). Ten themes form the framework of the standards: (a) culture; (b) time, continuity, and change; (c) people, places, and environment; (d) individual development and identity; (e) individuals, groups, and institutions; (f) power, authority, and governance; (g) production, distribution, and consumption; (h) science, technology, and society; (i) global connections; and (j) civic ideals and practices. The National Council for the Social Studies banded the standards into early grades, middle grades, and high school without any grade level reference. Each theme has standards at each banded level. Within theme seven, production, distribution, and consumption, performance expectation “j” requires the students to apply economic reasoning to various issues, one of which is unemployment.

Unemployment is related to the category, income and careers, found in the _National Standards in K-12 Personal Finance Education_ (JumpStart Coalition, 2007). The social studies standards refer to no other specific personal finance topics or skills.
The National Council on Economic Education, the National Association of Economic Educators, and the Foundation for Teaching Economics (1997) developed the *Voluntary National Content Standards in Economics*. The principles of economics found within the standards focus on the everyday business transactions and how these transactions affect individuals as consumers, producers, and citizens. Economic reasoning is an important skill promoted by the economic standards. The National Council on Economic Education recognizes the ability to identify economic issues, analyze economic situations, examine consequences of public policies, collect and organize evidence, and compare costs and benefits as key skills for the development of economic reasoning.

The 20 content standards found within the *Voluntary National Content Standards in Economics* (1997) are banded at the 4th, 8th, and 12th grade levels. The standard content principles are: scarcity, marginal cost/benefit, allocation of goods and services, role of incentives, gain from trade, specialization and trade, markets – price and quantity determination, role of price in market system, role of competition, role of economic institutions, role of money, role of interest rates, role of resources in determining income, profit and the entrepreneur, growth, role of government, using cost/benefit analysis to evaluate government programs, macroeconomy-income/employment, prices, unemployment and inflation, and monetary and fiscal policy.

The *Voluntary National Content Standards in Economics* (1997) do not directly address personal finance. However, several personal finance concepts and skills do align to several of the content standards. For example, content standard one, scarcity,
addresses wants and opportunity costs that are directly related to the personal finance topics of spending and credit. Standard 10, role of economic institutions, deals with such topics as banking and interest that are related to saving and investing. Standard 11, role of money, is correlated to money management. Standard 16, role of government, is linked to income, taxes, and bonds. Standard 19, unemployment and inflation, is associated with income and spending.

Mathematics Standards

Even though the mathematics standards do not explicitly contain financial literacy terminology within the standards’ statements, Principles and Standards for School Mathematics (NCTM, 2000) does support financial literacy concepts and skills by promoting the use of real world experiences such as in financial problem solving tasks to aid the students in applying mathematical concepts and skills outside of mathematics.

Principles and Standards for School Mathematics

School Mathematics (NCTM, 2000). The document contains ten standards: (a) Numbers and Operations, (b) Algebra, (c) Geometry, (d) Measurement, (e) Data Analysis and Probability, (f) Problem Solving, (g) Reasoning and Proof, (h) Communication, (i) Connections, and (j) Representation. The standards are banded into four levels: PreK-2, 3-5, 6-8, and 9-12. Each of these bands addresses each standard with objectives and expectations. Elaborations of each objective and examples are provided for the educator in the discussions of each standard. Principles and Standards for School Mathematics (NCTM, 2000) often uses financial problem solving tasks to illustrate a standard’s objective in these discussions. For example, within the numbers and operations’ discussion “Which is the better buy—12 tickets for $15.00 or 20 tickets for $23.00?” (p. 221) is found.

Professional Standards for Teaching Mathematics

Concerned not only about what students are learning, but also how educators are responding to these standards through their instructional practices, NCTM (1991, 2007) published the Professional Standards for Teaching Mathematics to promote its vision of mathematics teaching, of evaluating mathematics teaching, of professional development of teachers of mathematics, and of providing support and professional development of mathematics teachers and teaching. The document presents what educators need to know to teach mathematics according to the recommendations of the NCTM standards, how that teaching should be evaluated, what professional development for educators entails, and what needs to be done to support the professional development. The professional standards are divided into Standards for Teaching Mathematics, Standards

Meeting standards’ recommendations is accomplished by curriculum and instruction. A recent document, *Curriculum Focal Points for Prekindergarten through Grade 8 Mathematics: A Quest for Coherence* (NCTM, 2006), is the next developmental step in NCTM’s continuous goal to improve mathematical teaching and learning. This document assists in the organizing, prioritizing, and focusing of the concepts and skills found in the NCTM standards for each grade level into one suggested curricular approach. NCTM (2006) definitively states that *Principles and Standards for School Mathematics* (2000) remains the authoritative reference for developing mathematical knowledge. However, many educators are in need of assistance in developing a focused and coherent curriculum. The focal points for each grade level are NCTM’s response to organizing the standards into a focused and coherent curriculum. NCTM believes that this document may lead to the development of new materials that can assist students in learning mathematical concepts and skills recommended by the NCTM standards. The use of educational tasks is one means that allows educators to adhere to the recommendations of standards.

**Educational Tasks**

This section contains six topics: definitions of tasks, classifications of tasks, components of tasks, importance of tasks, mathematical tasks, and research on mathematical tasks.
Task Definitions

In order to select, modify, or develop worthwhile mathematical tasks, educators need to fully appreciate and understand the construct of tasks. Researchers and professional organizations discussed academic tasks (Doyle, 1983, 1988), authentic tasks (Kramarski, Mevarech, & Arami, 2002), mathematical tasks (Henningsen & Stein, 1997; Stein, Grover, & Henningsen, 1996), worthwhile mathematical tasks (Alper & Fendel, 1995; Anderson, 1994; Caulfield, Harkness, & Riley, 2003; Chamberlin & Zawojewski, 2006; Krebs, 2005; NCTM, 1991, 2007), and mathematical problem tasks (English, 1998). All appeared to be discussing the same construct, tasks, from different perspectives and utilizing different descriptors.

Early literature on tasks discussed the general concept of academic tasks. Doyle (1983) stated “Academic tasks … are defined by the answers students are required to produce and the routes that can be used to obtain these answers” (p. 161). Later, Doyle (1988) defined an academic task in terms of four general components. They are (1) the end product or solution, (2) the procedures used to produce the product, (3) the resources used to attain the product, and (4) the importance of the task to the students in the class. Hiebert et al. (1997) asserted that a classroom task is the key facilitator for all teaching and learning.

Alper and Fendel (1995) identified worthwhile mathematical tasks as those that address NCTM’s (1991, 2007) goal of helping students develop mathematical power. Alper and Fendel stated that worthwhile mathematical tasks must not only advance mathematical goals, but also involve students’ minds, engage students imagination, cause students’ to believe in the value of the tasks, be relevant and relate to real-life
contexts, and captivate the curiosity of the students. Alper and Fendel asserted that in word problems, thinking lies in the examination of an unfamiliar situation and discovering the underlying mathematical concepts.

Stein and Smith (1998) stated that a task is a portion of a classroom activity that is dedicated to the development of a specific mathematical idea. Stein, Grover, and Henningsen (1996) maintained that their definition though similar to Doyle’s (1988), differs in task duration. For these researchers, a mathematical task is an activity which focuses students’ attention on a specific mathematical idea. Thus, another activity would not be considered a new activity unless the new activity was focused on a different mathematical idea.

NCTM (1991, 2007) states that mathematics tasks, along with the materials which they use, structure and focus students’ mathematics learning opportunities in school. Kramarski, Mevarech, and Arami (2002) maintained that mathematically authentic tasks use realistic data, supply rich contextual information, allow multiple solution strategies, build on wide array of mathematical knowledge and skills, and require students to use different representations in their solutions.

**Task Classifications**

Along with defining tasks, researchers classify tasks in many ways. Doyle (1985) suggested two categories: familiar and novel. Familiar tasks are routine exercises that call upon memorized algorithms to obtain a solution. Novel tasks require students to make decisions on what solution to generate and how to generate it. Smith and Stein (1998) categorized tasks by the cognitive processing level that the tasks demand, such as
memorization, procedures without connections to concepts or meaning, procedures with connections to concepts and meaning, and doing mathematics.

Smith and Stein (1998) presented a Task-Analysis Guide (TAG) for educators to employ as they reflect on and select the mathematical tasks they will use in class. The guide classifies mathematical tasks into four categories: Memorization, Procedures without connections to concepts or meaning, Procedures with connections to concepts and meaning, and Doing mathematics. According to the authors, educators using the (TAG) will be able to determine the kind of thinking the task requires from the students.

For their mathematical task coding instrument Heid, Blume, Hollebrands, and Piez (2002) defined three task categories (concept, product, and reasoning) according to their goal. Concept tasks require the characterization of a concept. Product tasks require the creation of a mathematical object. Reasoning tasks require a justification for a conclusion.

Kramarski, Mevarech, and Arami (2002) differentiated tasks into two groups: authentic and standard. Authentic tasks have no ready algorithms to accommodate a solution. Standard tasks describe simple situations, give some numerical information, and have ready-made algorithms that students can apply to obtain a solution. Kramarski et al. (2002) considered word problems found in mathematics textbooks as examples of standard tasks.

*Task Components*

Doyle (1988) stated that the components of a task are the product (solution), the operations to produce the product, the resources (notes, textbook information,
conversations, models of solutions), and the importance of the task in the accountability system (daily grade or test grade). Stein, Grover, and Henningsen (1996) suggested that teacher initiated classroom mathematical tasks have two components: features and cognitive demands. Task features are those aspects which mathematics teachers identify as vital concerns for engaging student thinking, reasoning, and sense-making. These features are: multiple strategies, multiple representations, required explanations and justifications. Cognitive demands are the processes that the students actually employ as they perform the task. They include memorization, complex thinking, and reasoning strategies.

To help student teachers develop tasks for classroom use, Prestage and Perks (2007) designed a tool for adapting and extending a task by changing, altering, or removing its components. To adapt or extend a task, this tool suggests four actions: (a) Notice the givens in the task and in the resources, (b) Change, add, or remove a given, (c) Analyse (sic) the resulting mathematics and choices for pupils and teachers, and (d) Choose an appropriate task for the classroom. This tool is not only useful for student teachers, but practicing educators as well.

Task Importance

Tasks are essential for several reasons. Doyle and Carter (1984) stated that academic tasks provide a principal classroom structure that channels student information processing. Later, Doyle (1988) indicated that tasks serve as a framework for students’ thinking during and after instruction. NCTM (1991, 2007) maintained that tasks provide impressions about what mathematics is and what is involved in doing mathematics.
Building on Doyle’s work, Stein et al. (1996) stated that tasks determine what mathematics students learn, what students think about mathematics, and how students make sense of mathematics. There are tasks that engage students superficially and there are tasks that require students to construct meaning.

Stein and Smith (1998) asserted that the daily combined effect of classroom tasks leads to the development of students’ beliefs about mathematics, about their ability to make sense of mathematics, and about how long and how hard they have to put forth the effort to do so. Even at the kindergarten level, educators (Dacey & Eston, 1999-2000, Fall/Winter) voice their concern about the developing beliefs of their students based upon the types of mathematical tasks the students are given.

Mathematical Tasks

The Standards for Teaching Mathematics, incorporated within *Professional Standards for Teaching Mathematics* (NCTM, 1991, 2007), contains an overview, introduction, assumptions, and the standards themselves. The first standard, worthwhile mathematical tasks, is of interest to this study. The standard for worthwhile mathematical tasks suggests that mathematics teachers pose tasks that fulfill requirements such as: engage student interest, develop knowledge and skills, stimulate students to construct frameworks, involve problem solving, promote communication, and encourage favorable dispositions toward mathematics. Such tasks adhering to these characteristics build mathematical power.

To reach NCTM’s central goal of developing mathematical power within all students, the first duty of mathematics teachers is to select, modify, or develop
meaningful mathematical tasks. NCTM (1991, 2007) maintained that in selecting, modifying, or developing mathematical tasks, teachers focus their decisions on three areas of concern: the mathematical content, the students, and the ways in which students learn mathematics. When considering the mathematical content of a task, NCTM (1991, 2007) states that teachers need to bear in mind three considerations: (a) how appropriately the task exemplifies the concepts and procedures entailed, (b) what the task reveals about what is involved in doing mathematics, and (c) where within the task is the development of appropriate skill and automaticity.

When considering students, teachers should bear in mind the knowledge of their individual students as well as the cultural, sociological, psychological, and political perspectives of students at the age level in general. For example, worthwhile tasks are mindful of gender issues and the age appropriate interests of students.

When considering the manner in which students learn mathematics, teachers need to determine the ways in which the task requires students to learn and demonstrate their understanding. For example, does the task require the students to make a representation, a model, or a written explanation? If so, each of these products requires a different manner of thinking and learning.

To solidify the reader’s understanding of worthwhile mathematical tasks, NCTM presents three task vignettes to illustrate three teachers’ conscious efforts to take into account the three areas of concern when selecting mathematical tasks. For example, in the first vignette, the teacher examined two mathematical tasks dealing with area and perimeter. The first mathematical task stated to find the area and perimeter of the pictured rectangles. This task does little to stimulate the intellect of the students through
reasoning and problem solving. The second mathematical task posed a real-world task of determining various dimensions for a dog pen. Given 64 meters of fencing, the task required the student to give the pen dimensions for: (a) least play space available, (b) best play space available, and (c) best space available for running. This task challenged the students to (a) consider various approaches to reach the needed solutions, (b) determine which solutions are the required solutions, and (c) justify their answers. Also, the second task encouraged students to make graphical representations of the various solutions to each question asked. The graphical representations then allowed the students to explore the patterns that emerge. Thus, the second mathematical task was worthwhile for it encouraged students to exercise the concepts and skills promoted by all the NCTM standards: Numbers and Operations, Algebra, Geometry, Measurement, Data Analysis and Probability, Problem Solving, Reasoning and Proof, Communications, Connections, and Representations.

Mathematical Task Research

This researcher found that studies investigating mathematical tasks offered a range of interests. Stein et al. (1996), believing that mathematical tasks are important vehicles in developing mathematical thinking and reasoning, analyzed and described mathematical tasks used in reform-oriented classrooms. Reform-oriented classrooms are those that not only emphasize students’ ability to understand mathematics but also their ability to do mathematics.

Stein et al. (1996) gathered data from written narrative summaries of field notes, videotaped lessons, and artifacts obtained from classroom observations. From four sites
participating in the project for three full years, the investigators obtained 620 tasks in 310 observations. This study’s researchers used a stratified random sampling procedure. The coders reviewed 144 tasks using a coding system initially based on a review of the literature on academic tasks. The average intercoder reliability was 79%. The researchers found that 51% of the task topics were reform-inspired (emphasizing deeper mathematical understanding and multiple mathematical performance), 63% of the tasks had no real-life contexts and were situated in the abstract world, 66% of the tasks could be solved by using multiple strategies, 66% of the tasks were set up to include the use of multiple representations (numerals, mathematical symbols, mathematical notations, diagrams, or pictures), and 61% required students to produce mathematical explanations or justifications. However, Stein et al. (1996) discovered that the higher the cognitive demands that a task placed on students at the task-set up stage, the less likely the cognitive demands would continue at that high level during the implementation phase. The reform-oriented tasks, though essential in building mathematical thinking and reasoning, were the most difficult to consistently carry out.

Heid, Blume, Hollebrands, and Piez (2002) developed a coding instrument (MaTCI) for mathematical tasks involving computer technology. The researchers in this study stated that they grounded the development of the categories and codes in transcript data. They piloted and revised their categories, definitions, and codes many times. From their work, these researchers were able to generate three categories: concept tasks, product tasks, and reasoning tasks with subcategories and coding information for each. The researchers failed to include within their paper other pertinent information such as sampling and other methodological procedures.
Caulfield, Harkness, and Riley (2003) shared their experience of changing routine problems into worthwhile mathematical tasks. The investigators for this study stated that textbook tasks are often monotonous, boring, and permit very little mathematical thinking or dialogue. In their work the authors modified a typical eighth-grade probability textbook problem that generally has one right answer, into a problem that fostered students’ thinking, mathematical understanding, and discourse. The textbook problem required the students to determine the probabilities of the spinner landing on a winning section or losing section of a circle. The authors chose to change the surface background under the spinner not only to make the answer less obvious to the students, but also to make the students think about the arcs of the circle as the spinner rotated. Students worked in pairs or individually. The authors observed the students’ measurement efforts, mathematical language, and recording of their strategies to solve the task. The authors were surprised at the number of different strategies that the students used. The authors learned much about the students’ understanding as they recorded the students’ whole class discussions, listened to their conversations while working on the task, and analyzed their writing about the task. The authors believed that the task choice is the key which gives students power over their own mathematical thinking and discussions.

Krebs (2005) reported on a professional development activity that had teachers analyzing a task involving dominoes to determine if it was a worthwhile task. Initially, the teachers considered the dominoes task to be worthwhile because it required the students to collect data and find a pattern. Collecting data is an expectation of fifth NCTM (2000) standard, Data Analysis and Probability. “Represent, analyze, and
generalize a variety of patterns” (NCTM, 2000, p. 222) is also an expectation of the second standard, Algebra. The teachers, upon further examination and discussion of the task, determined that the mathematics contained within the task also included reasoning and interpretation of variables. The teachers concluded that the dominoes task assessed what they wanted their students to know and be able to do. The teachers predicted that writing the generalization for the pattern could be challenging for numerous students.

Mathematical Problems

Many authors use the terms “task” and “problem” interchangeably. Other authors prefer to employ one term over the other. NCTM (1991, 2007) defines projects, problems, constructions, applications, exercises, and such as tasks. Moreover, Schoenfield (1992) reported that mathematicians and mathematics educators still did not agree on any single definition of a problem. The words, task and problem, elicit different emotions, impressions, frames of mind, dispositions, opinions, and attitudes. Even for this researcher, each word has its own connotations, nuances, and associations. Therefore, even though the literature appears to use the terms interchangeably, this researcher chooses to present the literature on problems independently from the literature on tasks so that the reader is able to obtain the full essence of each term as discussed by each scholar.

Definitions of Mathematics Problems

Halmos (1980) stated that it is the duty of teachers to expose students to problems, the core of mathematics. Anderson et al. (2001) stated that a problem is a task that at first a student does not know how to solve. The student must then determine a
course of action to solve the problem. Duncker (1945) stated a problem exists when a problem solver has an objective but does not know how this objective is to be achieved.

Types of Mathematical Problems

One way to classify problems is to categorize them as routine and non-routine (Mayer & Hegarty, 1996, Polya, 1962). A routine problem is one that the problem solver already knows how to perform the appropriate solution procedure and understands that the solution procedure is correct for that problem. A non-routine problem is one that the problem solver does not immediately understand how to solve (Mayer & Hegarty, 1996). Zeitz (2007) differentiated between problems and exercises. For Zeitz, an exercise is a question that one knows how to answer immediately. A problem is a challenge that “demands much thought and resourcefulness before the right approach is found” (p. 1). He classified problems into three problem families: recreational, contest, and open-ended problems. Within each family he further subdivided each into “to find” problems and “to prove” problems. Problems that are classified as “to find” are those that require a specific piece of information or answer; and problems classified as “to prove” are those that need a more general argument or line of reasoning. Educators concerned with mathematical problems are also concerned with mathematical problem solving.

Mathematical Problem Solving

This section focuses on four topics: types of problem solving, the importance of problem solving, the history of problem solving, and problem solving research.
Types of Problem Solving

Mayer and Hegarty (1996) considered mathematical problem solving a process of determining how to solve a mathematics problem that one does not immediately know how to work out. They recognized two types of problem solving processes: representation and solution. These authors stated that representation occurs when a student tries to understand the problem, and solution occurs when a student actually carries out actions that are needed to resolve the problem. Mayer (1985, 1992, 1994) categorized the mathematical problem solving process into translating, integrating, planning, and executing. Translating entails constructing a mental representation of each component of the problem. Integrating necessitates constructing a mental representation of the entire set of circumstances found within the problem. Planning involves developing a plan to solve the problem. Executing entails carrying out the plan.

Importance of Problem Solving

Problem solving is important for several reasons. Hiebert and Wearne (2003) stated that engaging in problem solving can lead students to a greater understanding of classroom mathematics. For these authors, when a concept is understood, everything one knows about the concept will be useful, will be remembered, and will be used flexibly in new situations. Using knowledge in a flexible manner allows one to be successful as a citizen and as a professional. Using problem solving as the vehicle to teach mathematics develops young mathematicians as well as deepens their mathematical understanding and cultivates sense-making processes (Kahan & Wyberg, 2003).
Many educators believe that teaching mathematics through problem solving is valuable (Grouws, 2003; Zbiek, 2003). For example, Levasseur and Cuoco (2003) considered habits of the mind a by-product of learning mathematics through problem solving. These habits are guessing, challenging solutions, looking for patterns, conserving memory, specializing, using alternative representations, classifying carefully, and thinking algebraically. Mathematicians conserve memory by trying to memorize as little as possible, specialize by analyzing a special case of the problem, and classify the outcomes of a problem carefully if many outcomes are required.

**Historical Perspective**

Stanic and Kilpatrick (1989) stated that even though since ancient times problems have occupied a prominent place in a mathematics curriculum, problem solving has not. In the past problem solving meant presenting problems and including an example of a solution strategy. Then in 1980, NCTM published *An Agenda for Action*. This document recommended that problem solving be the focus of school mathematics in the 1980s and curricula should be organized around problem solving. With the publication of *Curriculum and Evaluation Standards for School Mathematics* (NCTM, 1989) and *Principles and Standards for School Mathematics* (NCTM, 2000) problem solving has come into prominence both as a mathematical end as a standard and a mathematical means to aid in the learning of other mathematical knowledge and skills.

Within school mathematics curricula, three themes have emerged as to the role of problem solving (Stanic & Kilpatrick, 1989). These themes are problem solving as context, as skill, and as art. There are five sub-themes of problem solving as context.
These sub-themes are problem solving as justification, as motivation, as recreation, as vehicle, and as practice. Problem solving as skill refers to problem solving being seen as an ability to be taught in mathematics. Problem solving as art refers to viewing problem solving as a heuristic of discovery. Stanic and Kilpatrick stated that Polya’s work influenced the perception of problem solving as art. Polya believed that mathematics consists of information and know-how. To know mathematics was to be able to do mathematics. Polya (1962) asked, “What is know-how in mathematics? The ability to solve problems—not merely routine problems but problems requiring some degree of independence, judgment, originality, creativity” (p. viii).

Problem Solving Studies

Moreau and Coquin-Viennot (2003) studied fifth-graders’ abilities to discriminate between indispensable representation elements in a problem (problem model, PM) and agents, actions, and events in everyday representation elements in a problem (situation model, SM). These investigators sampled 91 fifth-grade students between ten and eleven years old (mean age was ten years and nine months). Fifty-six students had a higher mathematics ability level than the other 35 students. The ability levels were based on teachers’ assessments. These researchers assigned the students randomly to one of two booklets containing either word problems numbered one and four or two and three. The students were given two tasks for each problem. To detect the students’ ability to develop a problem representation, the first task asked the students to select the information found within the word problem to make the word problem as short as possible and still be understandable and solvable. To detect the students’ ability
to develop situational representation, the second task asked the students to select the information found in the word problem to make the word problem easier to understand. By studying how the information was selected, these investigators were able to detect if understanding a problem lead the students to construct both models, or one model. The results of the study significantly demonstrated ($F_{1,89} = 21.34, p < .001$) that the participants, no matter what ability level, selected more solving information than situational information. The results also indicated that students were able to discriminate between the elements necessary for solving a problem and the elements to make the problem easier to understand.

Wood and Sellers (1996) studied the effect of students experiencing problem-centered mathematical instruction for two years. The instruction reflected socio-constructivist theory and was aligned to NCTM’s (1989, 1991) curriculum, evaluation, and professional teaching standards. The experimental work occurred in third grade classrooms. These researchers provided detailed descriptions of the method and procedures sections. Wood and Sellers compared students in problem-centered (project-study) classes for two years, students in textbook-based (textbook-study) classes for two years, and students in problem-centered (nonproject-nonstudy) classes for one year. These researchers compared the results of 19 third-grade classes, 417 sample students from five schools, on the computation and concepts and applications subtest portions of the Indiana Sequential Test of Educational Progress (ISTEP), a state-wide, norm-referenced, standardized test, an Arithmetic Test developed by the project staff, and a Personal Goals and Beliefs Questionnaire (Nicholls, Cobb, Wood, Yackel, & Patashnick, 1990). Using a Scheffe test, Wood and Sellers performed a three-way comparison on
the mathematics portions of the ISTEP. Students in the problem-centered classes achieved significantly higher ($F = 5.67, p < .05$) than the students in the nonproject classes. As for the Arithmetic Test developed by the project personnel, the results demonstrated that the project classes scored significantly higher than the nonproject classes on seven of the nine subscales of the relational portion of the test ($t = 8.86, p < .001$). On the beliefs scale of the Personal Goals and Beliefs Questionnaire, the students in the project classes scored higher than the non-project classes in their belief that success in mathematics is related to developing their own way or using other ways to solve problems rather than being consistent with the method shown by the teacher ($t = 8.20, p < .0001$). Woods and Sellers stated that the results from the analyses indicated that the students in the project classes understand arithmetic concepts better than those in textbook-instructed classes.

Throughout the problem and problem solving literature, many authors (Hiebert & Wearne, 2003; Kahan & Wyberg, 2003; Levasseur & Cuoco, 2003) mentioned the importance of thinking, reasoning, and sense-making.

Higher Order Thinking

Researchers have proposed well over 40 major thinking frameworks (Mosely et al., 2005). The most widely known thinking framework is the Taxonomy of Educational Objectives (Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956). Bloom’s Taxonomy of Educational Objectives (1956) was a response to the need to develop a theoretical framework to facilitate communications among those who constructed assessments by classifying the goals of the educational system. The taxonomy aided not only in
clarifying educators’, administrators’, professional specialists’, and researchers’
discussions, but also in substantiating the accuracy of their communications. For
example, the taxonomy assisted teachers in the development of learning outcomes and
assessments of students’ thinking. The hierarchy gave a precise definition to the types of
thinking and problem solving required of the students by an instructional experience.
The taxonomy classified the students’ intended behavior, the ways in which they are to
think, act, and feel, as a result of participating in an instructional unit. Bloom (1956)
stated that the taxonomy was developed to classify student behaviors, the intended
outcomes of educational experiences. The taxonomy presumed that the same kinds of
behavior would be perceived within all classroom disciplines, at all levels of education,
and in all schools. Therefore, one set of categories would apply for all levels, classes,
and schools.

The Taxonomy of Educational Objectives, The Classification of Educational
Goal, Handbook 1: Cognitive Domain (Bloom, Engelhart, Furst, Hill, & Krathwohl,
1956) has impacted both national and international education (Anderson et al., 2001).
Translated into more than 20 languages (Krathwohl, 1994), the original text is one of the
most significant writings to influence curriculum (Shane, 1981). Moseley et al. (2005)
stated that Bloom’s taxonomy has proven itself to be meaningful and useful to educators
and educational professionals.

Even though Bloom’s Taxonomy of Educational Objectives has been of major
importance for over 50 years, Anderson et al. (2001) revised the original taxonomy for
two reasons. First, there was a need to refocus educators’ awareness of value of the
original text. The authors maintained that the original taxonomy is just as beneficial to
educators today as teachers contend with issues concerning development and implementation of curricula and assessments. Second, there was a need to include new learning and understanding into the objectives’ framework. New developmental and learning knowledge as well as societal changes since the publication reinforced the need for modification.

*A Taxonomy for Learning, Teaching, and Assessing* (Anderson et al., 2001) advocates using a taxonomy table consisting of two dimensions, knowledge and cognitive process. The Taxonomy Table allows the educator, researcher, administrator, and educational specialist to classify educational objectives both by the cognitive process and knowledge level they require (Anderson et al., 2001). After taking into account the developments in cognitive psychology since the establishment of the original taxonomy, Anderson and the others agreed on four types of knowledge: factual, conceptual, procedural, and metacognitive. Factual knowledge is knowledge of distinct pieces of information such as terminology, details, and parts. Conceptual knowledge is more intricate knowledge such as knowledge of classifications, categories, principles, models, and structures. Procedural knowledge is knowledge of how to get something done. It is the knowledge of skills and techniques as well as the justification for the order of each step within the process or method. Metacognitive knowledge is knowledge of thinking in general as well as one’s own thinking.

The cognitive process or horizontal dimension of the Taxonomy Table contains six categories: Remember, Understand, Apply, Analyze, Evaluate, and Create. The cognitive processes’ organization offers a comprehensive set of categories for the student behaviors found in educational objectives. The authors placed the categories
from lower order thinking at the top to higher order thinking skills at the bottom within the Taxonomy Table. The first category is Remember. This category includes the behaviors of recognizing and recalling knowledge from long-term memory. Understand is the second category. Within this category interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining objectives are classed. The third cognitive process category is Apply. Executing and implementing are application behaviors. Analyze is the fourth cognitive process. Objectives that require the student to differentiate, organize, and attribute belong in this division. The fifth category is Evaluate. Checking and critiquing determine evaluating behaviors. Create is the final category. Generating, planning, and producing behaviors place objectives in this classification.

Categorizing educational objectives through the use of the Taxonomy Table allows educators to first determine if the given objective, the planned activities implementing that objective, and the assessment of that objective are consistent. For example, if a given objective requires students to execute a procedure, the learning activities for the objective and the assessment of that objective should also fall into the cognitive process column of Apply. Use of the taxonomy table assures educators that their instructional and assessment selections are aligned with the given educational objective. Second, when utilizing the taxonomy table educators can ascertain if the given objectives require higher order thinking skills. Finally, educators are able to clarify the knowledge level called for as well when using the taxonomy table.

Educators need to be aware of the higher order thinking opportunities that mathematics textbooks afford students (Nicely, 1991). Over three decades in several
studies Nicely examined mathematics textbooks to determine the thinking skills that
students needed to solve the mathematical tasks found in specific chapters in the
textbooks sampled. For these investigations he developed his own classification system
for determining the cognitive activity level required for tasks found within the complex
numbers, decimals, and exponential and logarithmic functions chapters, as well as all the
related review tasks thereafter in each textbook.

The taxonomy Nicely (1970) created contained nine leveled categories with an
additional no task category. They are:

0 No Task; Observe; Read

1 Recall; Recognize; Repeat; Copy

2 Iterate

3 Compare; Substitute

4 Categorize; Illustrate

5 Apply; Relate; Convert; Symbolize; Summarize; Describe

6 Justify; Explain; Analyze

7 Hypothesize; Synthesize; Generalize; Deduce

8 Prove; Test; Design; Solve

9 Evaluate

Using this tool he investigated the selected content from elementary and secondary
school mathematics textbooks from the 60s, 70s, 80s, and 90s.

Analyzing the data for complex numbers in secondary textbooks he observed
(Nicely, 1970, 1981) that the 60s textbooks’ tasks (62%) focused on the lower order
Iterative thinking level. In the 70s textbooks, Nicely (1985) observed that tasks (66%)

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aligned to the lower level cognitive process, Iterative. In the 80s textbooks, he (Nicely, Bobango, & Fiber, 1984) reported that at least 77% of the tasks were Iterative. No textbooks in the 60s, 70s, or 80s contained tasks that required students to think at the ninth level, Evaluate.

For his analysis of decimals Nicely (Nicely, Fiber, & Bobango, 1986) chose to investigate four mid-elementary school mathematics series. The data suggested that 72% -100% of the tasks were Iterative. In another study Nicely (Colon & Nicely, 1988) studied multiplication and division decimal tasks in five major fifth grade textbooks. He noted that when they combined the data for the top four levels of his taxonomy (higher order thinking skills) these were the results: Book A (1.6%), Book B (2%), Book C (1.8%), Book D (2.7%), and Book E (5%). The analysis of exponential and logarithmic functions Nicely (Engelder & Nicely, 1990) found that in five Algebra II with Trigonometry textbooks, at least 80% of the tasks supported the lower levels of cognitive processing. Other tasks (14%) addressed higher level thinking.

Nicely (1991) stated that mathematics textbooks have a major influence on what is taught and learned, and that all who are involved in the curriculum and instructional concerns of mathematics need to know what opportunities textbooks offer for students in the acquisition of higher order thinking skills. Some mathematics textbook publishers (Glencoe McGraw-Hill, 2009) have included higher order thinking tasks in their textbooks. Textbooks, the topic of the next section, not only continue to remain an important resource in the classroom for mathematics (Tarr, Chavez, Reys, & Reys, 2006; Oakes & Saunders, 2004), but also can be a resource for financial literacy education as well.
Educational Textbooks

Mathematics textbooks continue to be a driving force in the classroom. Robitaille and Travers’ (1992) were convinced that teachers in all countries greatly rely on textbooks for their daily lesson planning. Some mathematics teachers base many of their decisions on what to teach, how to teach it, and what exercises to assign on the content of the state, district, or building approved textbook for their course.

Textbooks also continue to be a major influence on the curriculum. This influence is due to many factors. First, textbooks have a direct impact on what is taught and what is learned (Issitt, 2004; Reys, Reys, & Chavez, 2004; Tarr, Chavez, Reys, & Reys, 2006). Textbooks not only suggest what knowledge and skills to teach but also the sequence in which to present them. Second, textbooks affect teachers’ curriculum decision-making. For teachers, textbooks often are the primary reference for lesson plans and mathematics instruction (Reys et al., 2004; Weiss, Banilower, McMahon, & Smith, 2001). Because of the limited number of mathematics courses taken in college by most elementary teachers and the shortage of certified mathematics teachers at the secondary level, the mathematics textbook becomes the mathematics curriculum for a large portion of teaching personnel (Reys et al., 2004). Third, textbooks are essential in providing students access to knowledge, supporting their achievement, and meeting a specific state’s content standards. For students, not having access to textbooks, an essential tool within the classroom, may have critical consequences in a standards-based educational system (Oakes & Saunders, 2004).
Historical Perspective

Textbooks have long been in existence to meet educational needs. A notable mathematics textbook during the colonial period was Greenwood’s *Arithmetick, Vulgar and Decimal* (1729). However, according to Thompson (1951), few textbooks were available during the colonial period. Through the late 18th century and early 19th century, textbooks functioned to make children literate using grammar rules and the question and answer approach (Wakefield, 1998). *An Introduction to Ray’s Eclectic Arithmetic* (1834) was the foundation for Ray’s series of popular and widely used arithmetic and algebra textbooks. In the mid-19th century textbooks continued to change as educational goals changed. The goal of understanding replaced the earlier goal of memorization. At the end of the 19th century with an increasing number of schools, publishers decided to standardize content, include regional issues, and avoid controversy to increase sales (Wakefield, 1998). An important mathematics textbook from the early period of this century was *Hamilton’s Essentials of Arithmetic Second Book* (1919).

Because of society’s rapid advancement from the agricultural to the industrial to the technological age during the 20th century, students needed to increasingly manage and process information. Textbooks adjusted by placing strategic questioning exercises throughout the chapters (Wakefield, 1998). The focal points of the curriculum development process changed as well as societal needs changed (Marsh & Willis, 1995; Tanner & Tanner, 1980).

Two major influences affected mathematics textbooks during the period 1966 to 1996 (Fischer, 1997). The first influence was the changes in national educational goals
that were often impacted by international occurrences. One example is the publication of *A Nation at Risk: The Imperative for Educational Reform* (National Commission on Excellence in Education, 1983), a 1960s post-Sputnik reaction. The second influence was the changes in philosophy within the professional mathematics community such as shifting from modern math (set theory), to back-to-basics, to standards (Fischer, 1997). The publication of *Curriculum and Evaluation Standards for School Mathematics* (NCTM, 1989) is an example of the standards-based educational influence.

**Mathematics Textbook Research**

With an abundant number of mathematics textbook series on the market, whether in hardcover, CD-ROM, or on-line form, publishers and research studies provide a considerable amount of information for school districts to aid in the appraisal and selection of mathematics texts. Many publishers place the textbook’s alignment to the NCTM standards and the state’s standards at the beginning of each teacher’s textbook edition. Educators are able to review these alignments to determine to what extent a textbook series is addressing the specific set of standards in question.

Research studies on mathematics textbooks are varied and abundant. McNeil et al. (2006) investigated how four middle school textbook series, two skills-based (emphasis on computation) and two standards-based (emphasis on conceptual understanding) present equal signs. First, these researchers did a content analysis on four middle school mathematics textbooks series (Grades 6 to 8) by examining every occurrence of the equal sign on a randomly selected sample (50%) of the pages in each book. Through the use of a second coder McNeill et al. (2006) established reliabilities
of 96%, 99%, and 96% on their three categories of equal sign problems. These researchers then performed two experiments. The first randomly assigned 322 sixth, seventh and eighth grade students to view one of the three categories of equal sign problems, \(4+2 = 6\), \(7 = 4+3\), or \(8 = 8\). The results demonstrated that middle school students continued to interpret the equal sign as an operational symbol, rather than a relational symbol even though the students were developmentally ready to understand the equal sign as a relational symbol. For example, students interpreted the equal sign in this type of equation, \(2 + 3 = 5\), to be an operational symbol; a symbol meaning “find the total.” In the second experiment students were better able to interpret the equal sign as a relational symbol, or “the two quantities are the same,” when given equations such as this, \(4 + 4 = 10 – 2\) and this, \(5 = 3 + 2\). These researchers gave adequate evidence of statistical analysis throughout their presentation of the methodology. The findings emphasized that students’ understandings are highly linked to context. These researchers also stated that these textbooks series rarely presented the equal sign as a relational symbol.

Martin, Hunt, Lannin, Leonard, Marshall, and Wares (2001) studied to what extent secondary mathematics textbooks aligned to the National Council of Teachers of Mathematics’ standards. The authors chose to investigate five textbooks whose development was funded by the National Science Foundation (NSF). The textbooks were the Interactive Mathematics Program (IMP), Contemporary Mathematics in Context (Core-Plus), Math Connections: A Secondary Mathematics Core Curriculum, SIMMS Integrated Mathematics: A Modeling Approach Using Technology, and Mathematics: Modeling Our World (ARISE). These researchers compared the funded
materials to traditional materials. A standards-based mathematics curriculum gives emphasis to the development of conceptual understanding and reasoning, whereas traditional mathematics education concentrates on memorization and rote learning (Goldsmith & Mark, 1999). When utilizing a standards-based curriculum, students actively engage in the mathematical processes of problem solving, representation, connections, communication, and reasoning and proof. The authors discovered that the organization of contents and implied pedagogy were different in both types of textbooks. For instance, in traditional texts “teach by telling” is implied. In NSF funded texts, student problem solving is the emphasis rather than the teacher facilitating the students’ progress to reach a solution. The results of this study indicated that the analyzed textbooks satisfactorily addressed the NCTM standards.

Jitendra et al. (2005) investigated the extent to which textbook authors’ instructional method recommendations found in third-grade mathematics textbooks adhered to NCTM’s standards and instructional design recommendations for problem solving. These researchers evaluated five third-grade textbooks that were chosen based upon the textbooks’ representativeness of mathematics textbooks widely adopted by United States school districts. The investigators chose to analyze lessons involving addition and subtraction of whole numbers. The data source consisted of 141 lessons on addition and subtraction found within the five textbooks. The authors focused on word problems within these lessons. These researchers adequately adhered to content analysis’ coding and data analysis procedures. Jitendra et al. (2005) calculated the proportion of word problems in each lesson that met the problem solving standard criteria based on the total number of counted lessons. These investigators calculated the
mean number of problem solving strategies across the textbooks as 11.4 with a range of 4 to 16. However, the mean percentage of lessons that applied strategies to solve world problems was 50.8%. As for meeting the eight instructional design criteria, only two textbooks met the criteria at 84.61% and 76.92%. The results further revealed that there were more differences than similarities within and across textbooks in meeting the criteria for the problem solving.

Since much of the research methodology used in textbook research is content analysis, and this study makes use of content analysis as its research framework, a review of content analysis occurs in the next section.

Content Analysis

This section reviews researchers’ definitions of content analysis, the importance of content analysis, the history of content analysis, research procedures utilized in content analysis, and content analysis research studies.

Definitions of Content Analysis

Authors have offered many definitions of content analysis. Weber (1990) stated that content analysis is a research method that uses a set of procedures to make valid inferences from a document. Neuendorf (2002) identified content analysis as a systematic, objective, and quantitative examination of message characteristics. Buddenbaum and Novak (2001) asserted that content analysis is a set of procedures for investigating the content and meaning of messages, a survey of documents. Krippendorff (2004) stated that content analysis is a research method for making replicable and valid deductions from texts, or other meaning material, to their contexts.
These descriptions not only establish that content analysis is a legitimate research methodology, but also confirm that through the use of content analysis, valid inferences can be made by executing objective and systematic procedures on the context of the message analyzed.

Content analysis is an important research investigative tool for several reasons (Krippendorff, 1980, 2004). First, content analysis, an unobtrusive research technique, does not introduce errors into the data being analyzed. Second, content analysis accepts unstructured material and is even able to process symbolic forms of communication. Third, content analysis is able to process large volumes of data. Fourth, content analysis is able to accommodate a variety of research purposes. Fifth, content analysis has no historical or geographic bounds (Buddenbaum & Novak, 2001).

History of Content Analysis

Empirical studies investigating theological communications’ content date back to the late 1600s. In the late 1800s, content analysis, or quantitative newspaper analysis as it was termed, was employed to study such issues as journalistic ethical standards, public opinion, and mass marketing. However, as a research technique, the history of content analysis began at the start of the 20th century, and continued to grow with each new decade. During World War II, content analysis’ momentum increased with its use in propaganda analysis. Since then content analysis has been used, for example, to analyze psychological traits, to infer cultural change, to provide legal evidence, and to measure readability. The last major milestone within content analysis was the
introduction of computer technology to aid in the analysis of data (Holsti, 1969; Krippendorf, 1980, 2004; Neuendorf, 2002).

**Content Analysis Procedures**

According to Neuendorf, (2002) the typical procedures used in content analysis are: identify the content to be studied, identify the variables, identify the measures, identify the coding scheme, identify the sampling plan, determine the training and pilot reliability, code, determine final reliability, tabulate and report findings. Krippendorff (1980, 2004) stated that the components of content analysis are: unitizing, sampling, recording, reducing data, inferring, and narrating. To systematically and objectively obtain reliable and valid inferences, the general procedural format for a content analysis includes these steps: (a) identify the sampling unit, (b) identify the recording units, (c) develop the coding categories and coding forms, (d) evaluate the coding forms, (e) code the data and manage the recording process, and (f) analyze the data (Budd, Thorp, & Donohew, 1967; Hansen, Cottle, Negrine, & Newbold, 1998; Krippendorff, 1980, 2004; Neuendorf, 2002).

Once the purpose and focus of the content analysis are selected, the researcher chooses which type of documents to study. Then the researcher, from the universe of acceptable documents, identifies the study sample (Weber, 1990). After that, the researcher selects the sampling unit. To accomplish this, a sampling strategy is decided upon to reduce the data to an amount that is manageable yet representative (Budd et al., 1967; Holsti, 1969; Krippendorff, 1980, 2004).
The researcher next selects the recording units. These units are found within the sampling unit and identified through the researcher’s specific set of rules, definitions, and examples. Krippendorff (2004) stated that recording units are elements that are set apart for independent description, transcription, recording, or coding. Recording units may be a single word, symbol, theme, character, or item (Holsti, 1969). Once the recording units are selected and identified procedurally, the researcher develops the coding categories to systematize the data. The researcher creates instructions that will explicitly determine the placement of each datum into the correct category. According to Holsti (1969) “categories should reflect the purposes of the research, be exhaustive, be mutually exclusive, independent, and be derived from a single classification principle” (p. 95, italics in original). A “not applicable,” “other,” or “none of the above” category may be needed to place data that do not follow coding instructions in a category (Krippendorff, 1980, 2004). Finally, the researcher trains the coders to ensure that they thoroughly understand the coding instructions to be able to accurately place each datum in its correct category (Krippendorff, 1980, 2004, Neuendorf, 2002).

Following the coding process, the researcher analyzes and interprets the data. Content analysts utilize a variety of forms to report results. The forms can include raw numbers, percentages, proportions, and ratios. Neuendorf (2002) stated that for basic univariate frequencies, numeric frequencies, pie charts, and bar graphs can be used. Time lines can be used for longitudinal studies. For bivariate relationships tabular or cross-tabulation tables are used (Neuendorf, 2002).
To locate content analyses of mathematics textbooks, the researcher searched the following electronic databases: Academic Search Premier, Educational Resources Information Center (ERIC), The Electronic Journal, First Search, MathSciNet, ProQuest Digital Dissertations, and World Cat. The keys words used to locate studies were: content analysis, mathematics, and textbooks. Because over 300 matched one or more of the key words, the investigations presented in this chapter are limited to those analyses involving middle school textbooks published after 1990.

Jones (2004) studied the probability content of middle school mathematics textbooks from four recent eras of mathematics education: New Math, Back to Basics, Problem Solving, and Standards. The sample consisted of two middle level textbook series from each era. The study demonstrated adequate development of the auditing forms and coding procedures. The results established that the two standards era middle school mathematics textbooks series contained more probability content than the previous eras. The two standards era textbooks also contained more modeling real-world experiences.

Rock (1992) studied the quality of mathematics textbooks by examining select features of six philosophically different seventh grade level mathematics textbooks. For example, the Saxon’s Math 76 textbook represented the conventional mathematics approach of routine problems and practice and the Transition Mathematics textbook represented the development of higher-order thinking skills through a relevant and realistic problem solving approach. Rock developed an auditing tool to determine the content of the textbooks and to what extent each of key components: problem situations,
organizers (structure within the text content), varied and specific content, connections, and use of technological tools occurred within the textbooks. Rock limited her study to the pages containing any material pertaining to rational numbers. The researcher in this study provided adequate evidence of the development of the auditing tool. The analysis of the data determined that the quality of the content of the textbooks, in terms of the key features, was poor. For example, the mathematical contents were not presented in an open-ended non-routine problem solving manner or in a constructionist manner to build mathematical knowledge.

Siepka (1999) investigated to what extent the Connections standard in *Curriculum and Evaluation Standards for School Mathematics* (NCTM. 1989) was incorporated within mathematics textbooks. The researcher selected three pre-standards mathematics textbooks and three post-standards mathematics textbooks. Siepka examined two chapters from each of the six textbooks for examples and exercises addressing the Connections standard. The researcher in this study chose the chapters based on their inclusion in both the pre-standards and post-standards textbooks. All pages of the chapters containing exercises and examples were reviewed. During the pilot study it was determined that the connection problems required more categories. However, the researcher was not able to make the categories for the connections problems mutually exclusive, which compromised the findings with data overlap. The results revealed that connections to real-life situations and connections to other disciplines and real-life situations were the most common type of connections observed. The increase in connections examples and exercises from pre-standards to post-standards textbooks was approximately 5%, much less than anticipated by the researcher.
Carthon (2003) studied the degree of representation of males and females in southwest Georgia’s middle school mathematics textbooks. The researcher of this study selected only the most frequently-used sixth and seventh grade mathematics textbooks identified by school personnel. Carthon employed illustration and textual analysis methodologies. The researcher utilized Chi Square to test for significant differences. The results determined an equal occurrence of males and females. Males appeared in more customary roles such as physicians or engineers than females; and the publishers portrayed females in more non-conventional roles such as firefighters and law enforcement officers in both text and illustrations.

Irvin (1993) identified, analyzed, and compared writing assignments found in four middle school mathematics textbook series adopted by the state of Texas to the four mandated purposes of writing stated in Texas’ English Language Arts Framework (State Board of Education, 1988). The researcher in this study made three comparisons. The first compared the number and types, according to the English Language Arts Framework (State Board of Education, 1988), of writing assignments in the students’ edition and the teachers’ editions. The second compared texts to the communication standard in the Curriculum and Evaluation Standards for School Mathematics (NCTM, 1989). The third compared textbook series to textbook series. The range of writing assignments given by the publishers was 151 to 316. Most of the writing assignments corresponded to the Informative purpose and few matched the Literary, Expressive, or Persuasive purposes. Writing assignments corresponding to the Curriculum and Evaluation Standards for School Mathematics (NCTM, 1989) communication standard
varied with interpretation and application writing assignments ranging from 5% to 29% in student editions and 10% to 15% in teacher’s editions, respectively.

A search of the literature found no content analysis studies of middle school mathematics textbooks series and their alignment with prominent mathematical standards, personal financial standards, and thinking frameworks.

Summary and Focus of Study

This content analysis study of a middle school mathematics textbooks series will focus on these three selected criteria: the National Standards of K-12 Personal Finance Education (JumpStart Coalition, 2007), A Taxonomy for Learning, Teaching, and Assessing (Anderson et al. (2001), and the National Council of Teachers of Mathematics Standards (NCTM, 2000).

Research Questions

1. What is the distribution of the financial mathematical tasks in a middle school mathematics textbook series across the six categories of the National Standards in K-12 Personal Finance Education (JumpStart Coalition, 2007)?

2. What is the distribution of the financial mathematical tasks in a middle school mathematics textbook series across the thinking skills as identified by A Taxonomy for Learning, Teaching, and Assessing (Anderson et al., 2001)?

3. What is the distribution of the financial mathematical tasks in a middle school mathematics textbook series across the recommendations of the National Council of Teachers of Mathematics’ Standards (NCTM, 2000)?
CHAPTER III

METHODS

This study is a content analysis of the financial mathematical tasks found in a middle school mathematics textbooks series and to what extent the financial mathematical tasks align to: (a) the categories of the National Standards in K-12 Personal Finance Education (JumpStart Coalition, 2007), (b) the thinking skills as identified by *A Taxonomy of Learning, Teaching, and Assessing* (Anderson et al., 2001), and (c) the National Council of Teachers of Mathematics’ Standards (NCTM, 2000).

The procedural formats of content analyses vary. The steps for this content analysis are: (a) selecting the sample, (b) identifying the recording unit, (c) developing the coding forms, (d) evaluating the coding forms, (e) coding the data, (f) managing the recording process, and (g) analyzing the data.

Selecting the Sample

There are several middle school mathematics textbook publishers. From this accessible population, I chose *Math Concepts, Skills, and Problem Solving Courses 1, 2, and 3* (Glencoe McGraw-Hill, 2009) for this investigation because the series met the following four criteria: (a) most recent publication date, (b) alignment to the National Council of Teachers of Mathematics’ most recent document involving the NCTM standards, (c) popularity, and (d) representation.
Criteria Verification

First, the middle school mathematics textbook series, *Math Concepts, Skills, and Problem Solving Courses 1, 2, and 3* (Glencoe McGraw-Hill, 2009), has the most recent copyright date. The 2009 publication date gave the authors an adequate amount of time to align the financial mathematical tasks found within their middle school mathematical courses to the *Principles and Standards for School Mathematics* (NCTM, 2000), to the *Professional Standards for Teaching Mathematics* (NCTM, 1991, 2007), to the National Standards in Personal Finance (Jumpstart Coalition, 2002), and to the National Best Practice Guidelines for Personal Finance Education Materials (JumpStart Coalition, 2003, 2008).

Second, information describing the courses’ alignment to NCTM’s most recent document, *Curriculum Focal Points for Prekindergarten through Grade 8 Mathematics: A Quest for Coherence* (NCTM, 2006), is found within each student edition. This document provides an organized curricular approach developed around the NCTM standards. NCTM states that a focal point is an interrelated cluster of knowledge, skills, and concepts that students need to thoroughly understand for future mathematical learning at each grade level.

Third, based on a conversation with a textbook representative for Glencoe/McGraw Hill’s Middle School Marketing Manager, Texas and California, two of the three largest adoption states, have approved the purchase of Glencoe McGraw-Hill’s (2009) fully customized editions of *Math Concepts, Skills, and Problem Solving Courses 1, 2, and 3* (personal communication, February, 6, 2008). The customized editions are based on the same design of the national middle school textbook series. However, the
customized versions align with Texas’ and California’s states’ standards. Florida, Texas, and California are the largest adoption states (Barlow, 2005: Ezarik, 2005, Sewall, 2005). Because these states fund the purchase of textbooks for their school districts, they have tremendous market power (Barlow, 2005). Some publishers base the publication of their latest textbook editions or revisions on the adoption cycles of Texas and California (Stein, Stuen, Carnine, & Long, 2001). Because other non-adoption states tend to follow the textbook recommendations of the adoption states such as Texas and California, the 2009 series may represent a large portion of the middle school mathematics publishing market.

Fourth, *Math Concepts, Skills, and Problem Solving Courses 1, 2, and 3* (Glencoe McGraw-Hill, 2009) is a representative middle school mathematics textbook series because it has similar key demographical characteristics of the target population. First, like most middle school mathematics textbooks, *Math Concepts, Skills, and Problem Solving Courses 1, 2, and 3* (Glencoe McGraw-Hill, 2009) begins each lesson with an introduction and then progresses into examples, practice, practice and problem solving, and lesson testing and review. Second, *Math Concepts, Skills, and Problem Solving Courses 1, 2, and 3* (Glencoe McGraw-Hill, 2009) has hand-on activities, technology activities, and problem solving activities as most other middle school mathematics textbooks series. Third, as other mathematics textbook series, *Math Concepts, Skills, and Problem Solving Courses 1, 2, and 3* (Glencoe McGraw-Hill, 2009) follows the recommendations of the National Council of Teachers of Mathematics.
Description of the Textbook Series

The textbook series contains a sixth grade, a seventh grade, and an eighth grade textbook. The three textbooks have the same content arrangement. The authors begin by furnishing on the inside cover page the Internet Resources available for students, teachers, and parents. For example, the students can access on the Internet the student edition course, *eBook*, and other resources such as the personal tutor and a multilingual eGlossary. The authors next discuss NCTM’s (2006) Curriculum Focal Points for each textbook’s grade level and how to recognize their use within the textbook. After that, Start Smart, a review of a problem solving plan and five Focal Point topics (NCTM, 2006), follows the table of contents.

Each textbook is divided into units. Each unit begins with a presentation of what the authors identify as the “Big Ideas” contained within each unit. Each unit is divided into chapters. The chapters are divided into lessons. There are two types of lessons in each chapter: (a) the concepts and skills lessons, and (b) a Problem-Solving Investigation lesson.

Each concept and skills lesson begins with either a Mini Lab or a Get Ready for the Lesson activity. A Mini Lab is a short hands-on exercise. A Get Ready for the Lesson activity presents information and requires the students to answer the questions that follow the information. The authors divide these chapter lessons into three major sections: (a) instruction, (b) performance, and (c) assessment and preparation. The instructional section contains step-by-step explanations and examples of the concepts or skills being presented. The performance section contains three subsections: (a) Check Your Understanding, (b) Practice and Problem Solving, and (c) Test Practice. Included
within the Practice and Problem Solving subsection is a set of tasks labeled H.O.T. (Higher Order Thinking) Problems that require the use of complex thinking skills. The assessment and preparation section contains these subsections: (a) Spiral Review and (b) Get Ready for the Next Lesson. Other components found within each chapter are: Extend Activities, Explore Activities, A Mid-Chapter Quiz, a Study Guide and Review, a Practice Test, and a Cumulative Practice Test.

The Problem-Solving Investigation lesson contains two sections: (a) a presentation of a problem solving strategy, and (b) a mixture of mathematical tasks (MTs). In the presentation of the problem strategy a mathematical task is given and explained in light of this strategy and the problem solving plan recommended by this textbook series. The second section, Mixed Problem Solving, presents MTs that require the students to not only use the strategy presented in the first section, but also the other strategies discussed in previous chapters.

After the last chapter in each textbook is a part called “Looking Ahead to Next Year” that addresses the mathematical topics that will be covered in the next textbook of the series. The final part of each textbook is a Student Handbook divided into Built-In Workbooks and Reference resources. The Built-In Workbooks portion contains such items as extra practice tasks and tasks to help prepare for standardized tests. The Reference portion contains such items as an English-Spanish Glossary and selected answers to tasks found within each chapter. With the sample chosen, I next turned to identifying the recording unit, the financial mathematical task (FMT).
Identifying the Recording Unit

Recording units are smaller components of content obtained from the sampling unit. Recording units are the elements that the content analyst analyzes. Recording units can be classified into five categories: physical units, syntactical units, referential units, propositional units, and thematic units. This study uses physical units as its recording units. Physical units are those units that have physical boundaries. Krippendorff (1980, 2004) stated that physical units divide a medium by time, length, size, or volume rather than by the information found within its boundaries.

The physical recording unit for this study is the financial mathematical task (FMT). Even though the literature contained many definitions of tasks, none suited this investigation. I needed to develop a clear, understandable, and precise definition of a mathematical task (MT) and then expand it to form a FMT definition.

After examining the mathematical tasks within the series’ textbooks, I observed that FMTs are MTs with additional characteristics. A MT has the following characteristics: (a) physical delineations and (b) written communications. Physical delineations are the numbers or letters usually placed to the left of the task. Also, a MT may or may not have color-coded words or labels placed after or before its number to alert the students as to what type of task it is. Written communications are sentences, phrases, terms, expressions, or symbols used to convey the required solution(s) for the completion of the task and the information given to accomplish the task. A MT may contain adjacent resources such as tables, graphs, charts, diagrams, or pictures. The written communications can be found either within the task itself or above it. Table 1 contains examples of MTs.
### Table 1. Mathematical Tasks

<table>
<thead>
<tr>
<th>Numbered Mathematical Tasks</th>
<th>Numbered and Labeled Mathematical Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. A trucker made a 573-mil trip in 9.5 hours. What was the truck’s average speed?</td>
<td>3. Food. You ask the deli clerk for 3/4 lb. of turkey at $2.45/lb. What was the cost?</td>
</tr>
</tbody>
</table>
| 2. Solve the equation. Check your answer. \(7x = 3.5\) | 4. Number Sense. Which of the two Tasks has a sum that is less than 1? Explain your answer.  
a. \(\frac{1}{3} + \frac{2}{7}\)  
b. \(\frac{5}{12} + \frac{2}{3}\) |

In the first column, Numbered Mathematical Tasks, I give two examples. Example number one is a MT because it is numbered and it has written communications within its boundaries stating the given information and required solution. Example number two is a MT also for it is numbered and it has the written communications both within and above it. The second column contains MTs both numbered and labeled. MT number three is delineated by both a number and a label following the number. The label is alerting students that there is a connection between mathematics and the real world. Example number four’s label is reminding students that they need to be attentive to the solution. Solutions should always make sense, being neither too large nor too small.

A FMT is a MT that has the following additional characteristics: (a) financial words, monetary words, and monetary symbols, (b) a required financially related solution, and (c) assumes the problem solver has an understanding of monetary concepts.
It is essential that a FMT calls for a financially related solution. Table 2 contains examples of financial and non-financial mathematical tasks.

Table 2. Financial and Non-financial Mathematical Tasks

<table>
<thead>
<tr>
<th>Financial Mathematical Tasks</th>
<th>Non-financial Mathematical Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Groceries. If 2 lbs. of apples cost $3.45, what would six lbs. cost?</td>
<td>3. Jewelry. The line plot below represents the price of necklaces in one mall. Which measure best describes the data: mean, median, mode, or range? Explain.</td>
</tr>
<tr>
<td>2. Calculate the 8% sales tax on a $979 television purchase.</td>
<td>4. What is the total number of outcomes Tossing a penny, quarter, and a dime at the same time?</td>
</tr>
</tbody>
</table>

Example number one, delineated by a number and label, is a FMT because it contains financial terms and requires a financial solution. Example number two, delineated by just a number, also contains financial terms and requires a financial solution. On the other hand, even though example number three contains the word “price,” a financial term, it requires a statistical solution. Example number four is similar. The task contains the financial words penny, quarter and dime. However, the task requires a probability solution. The penny, quarter, and dime in the fourth example are simply used for manipulative purposes in the task.

While examining mathematical tasks, the sections, Practice and Problem Solving and Mixed Problem Solving, piqued my interest for several reasons. The title, Practice and Problem Solving, indicated that within its boundaries were tasks to practice the concept or skill just introduced, and tasks to solve using various strategies. The Practice
and Problem Solving segment appeared to contain the largest amount of tasks than any other part of each lesson’s sections. According to the table of contents, only one financial concept, simple interest, was the topic of a chapter’s lesson. This segment, Practice and Problem Solving, appeared to be a good opportunity to accommodate FMTs. The Practice and Problem Solving segment also includes a subset of tasks labeled, H.O.T. Problems. H.O.T. is the abbreviation for Higher Order Thinking. Tasks requiring higher order thinking skills are more complex and therefore would not usually be considered practice tasks. Higher order thinking skills are also of interest to me. I contacted Glencoe McGraw-Hill for permission to copy a typical Practice and Problem Solving segment. See Appendix F for the letter granting me permission. See Appendix G to view a typical Practice and Problem Solving section.

I also chose to study the FMTs found within the Mixed Problem Solving portion of the Problem-Solving Investigation lesson. This section usually has 11 to 14 mathematical tasks. The authors require the students to use not only the problem solving strategy reviewed on the previous page to solve the MTs, but also the problem solving strategies presented in previous chapters. This section provided an excellent opportunity for students to apply concepts, skills, problem solving strategies, and the problem solving plan recommended by this textbook series. See Appendix H to view a typical Mixed Problem Solving page.

To isolate the problem solving tasks from the practice tasks in the Practice and Problem Solving segment, I reexamined all the MTs within the Practice and Problem Solving section and the Mixed Problem Solving section. I observed that even though all the tasks are numbered; some tasks contained labels after their number and some did not.
With the use of labels and no labels for MTs, it appeared that the authors were differentiating the tasks into practice tasks and problem solving tasks. As I continued my examination of the Practice and Problem Solving segment, I also observed that the tasks in the subset H.O.T. Problems had numbers and labels. I surmised that authors would not insert practice tasks into a subset that required more complex thinking. Thus, I concluded that those tasks, found within the Practice and Problem Solving section and the Mixed Problem Solving section, that were denoted with numbers and labels, were the problem solving tasks, and those with just numbers were the practice tasks.

Table 3 contains examples of practice and problem solving tasks. In Table 3 tasks one and two are practice tasks because they do not have labels. Tasks three and four are problem solving tasks because they have the labels, Insurance and Internet, respectively after their numbers.

Table 3. Practice and Problem Solving Tasks

<table>
<thead>
<tr>
<th>Practice Tasks</th>
<th>Problem Solving Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Graph the inequality on a number line. ( x &lt; 3 )</td>
<td>2. Insurance. David has to pay $659.73 for car insurance this year. If he chooses to make 4 equal payments with an additional fee of $10 per payment, how much does he have to pay every three months?</td>
</tr>
<tr>
<td>2. Write the rate. $4.00 for 16 bottles of water.</td>
<td>4. Internet. A survey showed that 73% of seventh graders in one city used the internet at home. What fraction of the students used the Internet somewhere else.</td>
</tr>
</tbody>
</table>
Upon establishing the FMTs that were to be studied, I counted the number of these FMTs (76 in grade 6, 102 in grade 7, and 100 in grade 8), \( n = 278 \). I determined that the analysis of this number of FMTs would be manageable. See Appendices I-K for the distribution of the FMTs in each grade level textbook. I decided to sample all the lessons within each chapter in my study. I made this choice because I wanted to discover if the chapters containing such topics as geometry and measurement would also include FMTs.

Geometry and measurement chapters typically contain tasks concerned with polygons, two-and-three dimensional figures, and their measurements. With the recording units selected, I turned to developing the coding forms.

Developing the Coding Forms

Coding forms are data recording sheets that a content analyst utilizes to code data. According to Krippendorff (1980, 2004) coding forms contain explicit information in its simplest and most basic manner about each recording unit. The coding forms also contain administrative information and data organizational information. Administrative and data organizational information assist in the management of the data. For example, if data sheets get out of order, it is easy for the analyst to restore their sequence. Or if each recording unit has multiple coding forms, it is easy for the analyst to handle them because the administrative and demographical information is located on each coding form.

I developed three coding forms for my study investigating: (1) the categories of the National Standards in K-12 Personal Finance Education (JumpStart Coalition, 2007),
(2) the selected topic of types of thinking found within the discussion of Standard 1. Worthwhile Mathematics Tasks found in the *Professional Standards for Teaching Mathematics* (NCTM, 1991), and (3) the selected guideline of alignment to the NCTM standards found within the National Best Practices Guidelines for Personal Finance Education Materials (JumpStart Coalition, 2003). Each form relates to a research question.

Coding Form A has questions relating to the information found within each of the six categories of the National Standards in K-12 Personal Finance Education (JumpStart Coalition, 2007) and aligns with research question number one. Coding Form B contains questions relating to selected thinking skills as identified by *A Taxonomy for Learning, Teaching, and Assessing* (Anderson et al., 2001) and aligns with research question number two. Coding Form C includes questions relating to selected NCTM standards and aligns with research question number three.

**Coding Form A**

The purpose of Coding Form A is to facilitate the collection of the data that will determine the distribution of the FMTs in a middle school mathematics textbook series across the six categories of the National Standards in K-12 Personal Finance Education (JumpStart Coalition, 2007). The standards’ categories are: (a) Financial Responsibility and Decision Making, (b) Income and Careers, (c) Planning and Money Management, (d) Credit and Debt, (e) Risk Management and Insurance, (f) Saving and Investing. Coding Form A is horizontally oriented. In the upper-right-hand corner of the form is space for the recording unit’s number. Below the recording unit number is the title of
the coding form, Coding Form A (Financial Characteristics). The next line contains the title of the textbook and spaces to write the textbook’s number, page number, and the task’s textbook number.

Seven rows of questions divided into two columns follow the administrative and demographical information. Questions one through six align with each of the six financial standards categories’ information respectively. The last question asks if there may be another category of financial mathematical tasks that the previous questions did not consider (see Table 4).

Table 4. Location of Personal Finance Categories in Coding Form A

<table>
<thead>
<tr>
<th>Personal Finance Categories</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Responsibility and Decision Making</td>
<td>Question 1</td>
</tr>
<tr>
<td>Income and Careers</td>
<td>Question 2</td>
</tr>
<tr>
<td>Planning and Money Management</td>
<td>Question 3</td>
</tr>
<tr>
<td>Credit and Debt</td>
<td>Question 4</td>
</tr>
<tr>
<td>Risk Management and Insurance</td>
<td>Question 5</td>
</tr>
<tr>
<td>Saving and Investing</td>
<td>Question 6</td>
</tr>
</tbody>
</table>

I formulated the questions by using the category title, the overall competency wording of the standard, or the information found within the standards of the specific categories. Under each question are examples for that question. The examples provide illustrations, instances, models, or exemplars of what a financial mathematical task (FMT) aligned to that specific category may look like, may contain, or may be related to in a textbook. I generated the examples based upon the wording in the category title, the
overall competency wording of the standards, or the information found within the standards of the specific categories.

In the right-hand column of each row are coding response choices for each question. For each response there are three options: yes, no, or unsure. The choices should be mutually exclusive and exhaustive (Krippendorff, 1980, 2004; Neuendorf, 2002). Ideally, the best option to ensure mutual exclusivity is a dichotomous choice such as yes or no. However, occasionally coders do find that a dichotomous choice of yes or no cannot be made. If this circumstance should arise, I have included an unsure option if the coder is unsure of which response to choose. Underneath each response choice there are corresponding boxes for the coder to select. Following the seven rows of questions there is another row reserved for the researcher. In the right-hand area of that row is a box to check when the data from the coding form are transferred to the summary sheet (see Appendix L).

*Coding Form B*

The purpose of Coding Form B is to facilitate the collection of the data that will determine the distribution of the FMTs in a middle school mathematics textbook series across the thinking skills as identified by *A Taxonomy for Teaching, Learning, and Assessing* (Anderson et al., 2001). The thinking skills are: (a) Remember, (b) Understand, (c) Apply, (d) Analyze, (e) Evaluate, and (f) Create.

Coding Form B has the same format as Coding Form A: space for the collection of administrative data and space for the collection of recording unit data. Five rows of questions divided into two columns follow the administrative and demographical
information. Questions one through four align with the selected four thinking skills. I chose to eliminate questions for the thinking skills “remember” and “analyze.” I realized that students need to continually “remember” how to do the basic operations of addition, subtraction, multiplication, and division. Also students need to “analyze” tasks to some degree before they begin to solve them. Therefore, continually answering “yes” to these two questions would be redundant. The last question asks if there may be another type of thinking skill other than remembering or analyzing that the previous questions did not consider (see Table 5).

Table 5. Location of Thinking Skills in Coding Form B

<table>
<thead>
<tr>
<th>Thinking Skills</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remember</td>
<td>Deemed Redundant, No Question</td>
</tr>
<tr>
<td>Understand</td>
<td>Question 1</td>
</tr>
<tr>
<td>Apply</td>
<td>Question 2</td>
</tr>
<tr>
<td>Analyze</td>
<td>Deemed Redundant, No Question</td>
</tr>
<tr>
<td>Evaluate</td>
<td>Question 3</td>
</tr>
<tr>
<td>Create</td>
<td>Question 4</td>
</tr>
</tbody>
</table>

I formulated the questions by using the information found within *A Taxonomy for Learning, Teaching, and Assessing* (Anderson et al., 2001). Under each question are examples for that question. The examples provide illustrations, instances, models, or exemplars of what a financial mathematical task (FMT) aligned to that specific thinking skill may look like, contain, or be related to in a textbook. I also generated the examples based upon the wording found within Anderson et al.’s (2001) *A Taxonomy for Learning, Teaching, and Assessing.*
In the right-hand column of each row are coding response choices for each question. For each response there are three options: yes, no, or unsure. Occasionally coders do find that a dichotomous choice of yes or no cannot be made. Underneath each response choice there are corresponding boxes for the coder to select. Following the five rows of questions there is another row reserved for the researcher containing on the right-hand side a box to check when the data from the coding form is transferred to the summary sheet. See Appendix M.

*Coding Form C*

The purpose of Coding Form C is to facilitate the collection of the data that will determine the distribution of the FMTs in a middle school mathematics textbook series across the NCTM’s mathematics standards (NCTM, 2000). The mathematics standards are: (a) Numbers & Operations, (b) Algebra, (c) Geometry, (d) Measurement, (e) Data Analysis & Probability, (f) Problem Solving, (g) Reasoning & Proof, (h) Communication, (i) Connections, and (j) Representation.

Coding Form C has the same format as Coding Form A and B: space for the collection of administrative data and space for the collection of recording unit data. Five rows of questions divided into two columns follow the administrative and demographical information. Questions one through four align with four selected NCTM standards. The last question asks if there may be another type of mathematical related activity other than using numbers & operations, solving problems, communicating, or connecting that the previous questions did not consider.
I chose not to include questions aligning to 4 of the 10 NCTM standards because I deemed them redundant. I chose not to include the standard Number & Operations because students need to use numbers and operations to find solutions to FMTs. I eliminated Problem Solving because FMTs are problems. I did not include Communication because when solving a FMT the students communicate their solution methods and solutions either orally or in writing to their instructor. I chose to remove Connections because FMTs are connecting mathematics to the real world. Therefore, answering “yes” to questions involving these standards would be redundant. I also chose to not include the standards of Geometry and Measurement because it appeared that both standards’ objectives would not align with the personal finance categories, and answering “no” to these two questions would also be redundant (see Table 6).

Table 6. Location of NCTM Standards in Coding Form C

<table>
<thead>
<tr>
<th>NCTM Standards</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numbers &amp; Operations</td>
<td>Deemed Redundant, No Question</td>
</tr>
<tr>
<td>Algebra</td>
<td>Question 1</td>
</tr>
<tr>
<td>Geometry</td>
<td>Not Included in Study</td>
</tr>
<tr>
<td>Measurement</td>
<td>Not Included in Study</td>
</tr>
<tr>
<td>Data Analysis &amp; Probability</td>
<td>Question 2</td>
</tr>
<tr>
<td>Problem Solving</td>
<td>Deemed Redundant, No Question</td>
</tr>
<tr>
<td>Reasoning &amp; Proof</td>
<td>Question 3</td>
</tr>
<tr>
<td>Communication</td>
<td>Deemed Redundant, No Question</td>
</tr>
<tr>
<td>Connections</td>
<td>Deemed Redundant, No Question</td>
</tr>
<tr>
<td>Representation</td>
<td>Question 4</td>
</tr>
</tbody>
</table>

I formulated the questions by using the information found within NCTM’s (2000) Principles and Standards for School Mathematics. Under each question are examples for that question. The examples provide illustrations, instances, models, or
exemplars of what a FMT aligned to that specific mathematics standard may look like, contain, or be related to in a textbook. I also generated the examples based upon the wording for the standards found within NCTM’s (2000) *Principles and Standards for School Mathematics*.

In the right-hand column of each row are coding response choices for each question. For each response there are three options: yes, no, or unsure. Occasionally coders do find that a dichotomous choice of yes or no cannot be made. Underneath each response choice there are corresponding boxes for the coder to select. Following the five rows of questions there is another row reserved for the researcher containing on the right-hand area a box to check when the data from the coding form is transferred to the summary sheet (see Appendix N).

I completed developing the coding forms in such a manner that anyone who is trained to code will be able to (a) read the directions, (b) follow the rules, and (c) accurately code the data. Now I turned to evaluating the coding forms.

**Evaluating the Coding Forms**

The purpose of evaluating the content of the coding forms is to establish evidence of validity (Krippendorff, 1980, 2004; Weber, 1985). Validity denotes the extent to which the measurements in a study are really measuring what they are supposed to measure (Buddenbaum & Novak, 2001; Krippendorff, 1980, 2004; Neuendorf, 2002).

The formative evaluation of the coding forms for this study was a four-step process: (a) a content analysis expert’s review, (b) a financial expert’s review, (c) a
pseudo-coder’s review, and (d) a mathematics expert’s review. The content analysis expert reviewed the coding forms for appearance and structural concerns. The financial expert and the mathematical expert examined the coding forms for financial and mathematical content validity. The pseudo coder reviewed the coding forms in a one-on-one evaluation process (Dick & Carey, 1996).

First, I consulted a content analysis expert, an Associate Professor in the university’s College of Education, to review the coding forms’ format and general appearance. At our meeting she had no suggestions to improve the format and general appearance of the coding forms. However, she recommended that, for readability purposes, I needed to increase the clarity of the language in a few questions. I decided to follow her suggestions. As a result of our discussions I made the suggested revisions and adjustments to the coding forms.

To accommodate validity concerns I had content experts review the coding forms for content validity (Krippendorff, 2004). Content validity entails to what extent the content of the coding forms reflect and capture the financial, mathematical, and thinking concepts’ features found in the sets of criteria used for this study (Krippendorff, 1980, 2004; Neuendorf, 2002). To ensure content validity, the experts reviewed the coding forms to ascertain that the coding forms’ questions aligned to the NCTM standards, the personal finance categories, and the thinking skills. The experts also reviewed the coding forms for clarity and readability.

The financial expert, in the university’s College of Fine Arts and Applied Sciences, was the second to review the coding forms. First, she suggested that I remove the word “examples” found beneath each question, and place a notation on the bottom of
the page alerting the coder that directly underneath each question are examples. Doing so would provide more space for the questions and their examples. I decided to follow this suggestion. Second, she suggested that after each heading on the coding forms I place in parentheses the type of characteristics examined by that coding form. For example: Coding Form A (Financial Characteristics). I also decided to follow this recommendation.

Continuing the formative evaluation, I next met with my pseudo-coder, a former mathematics teacher who is highly familiar with standards and higher order thinking skills. A pseudo-coder is a person who has the same characteristics as the final data collection coders. We met three times. During our first session we accomplished two tasks: reviewing the written directions that I will use during coder training sessions and reviewing the three coding forms (see Appendix O). While using the written directions to familiarize her with the coding process and the coding forms, I realized that I needed to make minor modifications such as correcting a typing mistake and revising the structure of a sentence for greater clarity.

We first discussed the role and responsibilities of the coder. We discussed the need for coders to precisely follow the directives and procedures of the coding process. Next, we reviewed the coding form. I gave her instructions on how to fill in the administrative information and mark the boxes for her responses. Third, we read each question on each coding form and discussed it. At the end of this session we coded one FMT one-on-one with all three coding forms without any discrepancies.

During the second meeting we first reviewed the coding process and procedures. We then utilized all three coding forms to code six FMTs one-on-one. From the
discussions of our joint codings of these six FMTs, I again made a few minor modifications to the coding forms’ questions. For example, on Coding Form A for question number three, I limited spending to represent any means of payment other than credit card use.

At the beginning of the third session we attempted to code the first three FMTs independently. We sporadically talked to each other as we coded. The last five FMTs we coded independently. After we finished coding, we discussed our responses. When the responses differed, we explained our thought processing to each other, and came to a consensus. Again, from these discussions I made a few refinements. For example, on Coding Form A in question two I added company income and organizational income after personal income to include tasks pertaining to the sales income of companies and organizations. After my work with the pseudo-coder the questions on the coding forms now appeared more precise in their wording and specificity. In addition to making the refinements, I realized that I also refined, or focused, my thinking as well.

The final formative evaluator, a mathematical expert in the university’s College of Education, reviewed the revised coding forms. She stated that the three coding forms were suitable. For example, on Coding Form C she stated that the questions were appropriately written according to the NCTM standards. With the four-step process of formative evaluations complete, I now turned to executing the coding procedures.

Coding the Data

Before the collection of data occurs a content analyst: (a) trains the coder(s), (b) conducts one or more trial codings, and (c) carries out a pilot test.
Training the Coders

The purpose of training the coder(s) is to have the coder(s) become familiar with the coding forms, the coding process, and their responsibilities before the data collection begins (Krippendorff, 2004; Neuendorf, 2002). I conducted two coder training sessions: (a) one before the trial coding, and (b) one before the pilot test.

The coder training process used in this research study had six steps. First, I presented the coding process’s directives and procedures, and the coder responsibilities to the coder. During this presentation I addressed all of the coder’s questions. Second, I gave the coder copies of the coding forms. We reviewed and discussed each question the coder had on each form. Third, after all coder’s questions were answered, I demonstrated how to code. Fourth, I gave the coder copies of the photo-copied sheets of the textbook pages that contain the FMTs that we were going to code for the training session. Fifth, I again reminded the coder of the coding directives and procedures and his or her role in the coding process. Sixth, the coder and I coded five FMTs one-on-one and discussed each question on the coding forms or process that came up.

Trial Coding

The purpose of a trial coding is to evaluate the training of the coders, the coding process, and the coding forms. Performing a trial coding enables a researcher to test the objectivity and clarity of the coding forms, and measure reliability by determining the amount of agreement in the coding response decisions. Reliability indicates the extent to which the coding forms are able to generate dependably constant data throughout the variations in the measuring process over repeated trials no matter who codes the data.
(Buddenbaum & Novak, 2001; Krippendorff, 1980, 2004; Neuendorf, 2002). Another purpose for the trial coding for this study was to determine my competence to be the sole coder.

The trial coding had only one session with one other coder and me. The other trial coder was a teacher who had taught mathematics in a proprietary college for several years and was in her 13th year teaching mathematics at my school. I began the trail coding with a training session. I explained the directives, procedures, and responsibilities to the other coder. I then gave her copies of the coding forms and we discussed each question on each form. Next, I demonstrated how to code. I then gave her the copies of the photo-copied sheets of the textbook pages that contained the FMTs we were going to code. I again reminded her of the directives and procedures. We coded five FMTs one-on-one and discussed each question that emerged. Next we coded five FMTs independently. Since each FMT had 17 questions and 5 FMTs were coded, we made 85 response decisions. We agreed on 79 (92.9%) of the independent responses.

When I inquired about her trial coding experience, the other coder stated that she had no difficulty in understanding any of the explanations given throughout our session. She also revealed that she was able to work with the coding forms without difficulty. However, she did make a recommendation for Coding Form A. She proposed that I add this example to question one, “What is the least expensive?” to give another example of a question requiring a financially responsible decision. I decided that that was an appropriate additional example to add and made the refinement. With these encouraging results, I next turned to the pilot test.
Pilot Test

The purpose of the pilot test was threefold: (a) to assess the training of the coders, and the coding process, (b) to determine if any further refinements to the coding forms needed to be made, and (c) to verify my competence to be the sole coder for the study. Performing a pilot test further enables a researcher to test the objectivity and clarity of the coding forms, and measure reliability by determining the amount of agreement in the coding response decisions.

For the pilot test I asked the assistance of two mathematics teachers. One was a high school mathematics teacher currently serving at my school as a remedial specialist. The other person was the former mathematics teacher who served as the pseudo-coder for the evaluation of the coding forms.

The pilot test involved four steps: (a) training the coders, (b) coding the data and discussing the response decisions, (c) recording the response decisions and developing frequency tables, and (d) analyzing the results. I began the training session of the pilot test with the same training procedures used in the trial coding training sessions. Both coders had no difficulty understanding the directions, procedures, and explanations. Both quickly became familiar with the coding process. After we coded 5 FMTs one-on-one, we coded 10 FMTs independently. We compared our independent response decisions and discussed the discrepancies. We made 170 response decisions. We agreed on 158 (92.9%) decisions.

From our discussions throughout the training process, I considered the other two coders familiar enough with the coding procedures and directives to continue the pilot test. We agreed to independently code 25 FMTs at home. I gave each coder a binder
containing the photo-copied pages with the 25 fifth-grade FMTs. I chose to use Glencoe McGraw-Hill’s fifth-grade textbook’s FMTs for the pilot test for two reasons. First, I am using Glencoe McGraw-Hill’s middle school mathematics textbook series for my intended study. Second, the middle school textbook series and the fifth-grade textbook’s lessons have a similar organization. Before the training session ended, we again reviewed the coding directives, procedures, and responsibilities.

We convened again several days later with completed forms. We compared the response decisions for the 25 FMTs from the fifth-grade mathematics textbook. When discrepancies occurred, we discussed them. Consensus was reached on all discrepancies. Of the 425 response decisions made, 23 were discrepancies. The discrepancies were random errors for two reasons. First, the errors did not occur systematically. Second, the discrepancies were due to factors such as a coder missing a key word in a FMT, or a coder misinterpreting the meaning of a bolded word in a question. We agreed on 402 (94.5%) decisions.

During the coder debriefing, the coders stated that they could not offer any suggestions to improve the training of the coders or the coding process. They thought both the training session and the coding of the FMTs were conducted appropriately. During this discussion I also asked the two other coders if they had any suggestions to improve the coding forms. They recommended two refinements. The first adjustment was to add another example, bar graph, to Coding Form C’s fourth question on representation. The second suggestion was to eliminate one or two of the bolded verbs in questions two, three, and four on Coding Form B. They thought that decreasing the number of key words would not affect the understanding of the question and ease the
effort of the coder to read through all of the bolded terms to make a decision. I decided that their suggestions were beneficial. For example, in question four I decided to eliminate the words “generate” and “invent” and retain the words “create,” “produce,” “design,” and “plan.” See Appendices I-K for the final revisions of Coding Forms A-C.

With the first two steps of the pilot test completed, I turned to recording the data. First, I transferred the yes and no responses on the coding forms onto summary sheets for each coder (see Appendix P). Each FMT had its own summary sheet. The summary sheet has four columns. The first column’s cell is labeled Questions and the remaining cells underneath the first cell contain the question numbers found on each coding form. The remaining three columns align with each coding form. The top cell of each of the remaining three columns is labeled Form A, Form B, and Form C. Also in the top cell of each column underneath the form headings are the letters Y, N, and U. In the remaining cells underneath each top cell are three squares aligned horizontally. One square is aligned vertically to the Y, one to the N, and one to the U. Thus, if one of the coder’s response on Coding Form A question one was yes, I placed an X directly to the right of the number one in the first column, in the square underneath the Y in Form A’s column. When the three coders’ data were transferred to all summary forms for each coder, I turned to transferring the data from the each FMT’s summary form into an Excel program.

My Excel program contained three sheets, one for each coder. I set up each sheet of the Excel program in this manner. The first column contained the list of each individual criterion for each set of criteria. The remaining columns were numbered from one to 25. Each number corresponded to a numbered FMT. In each cell underneath
each number I recorded a yes response with a “1” and a no response with a “0.” After each coder’s responses were recorded, I then developed the formulas to calculate the frequency number and percentage frequency for each criterion. I calculated the frequency numbers by adding all the yeses (1s) for each criterion. I calculated the percentage frequency dividing the frequency number for each criterion by the total number of FMTs (25) coded (see Appendices Q-S).

The last step of the pilot test was analyzing the data. As for the National Standards in K-12 Personal Finance Education categories (JumpStart Coalition, 2007), the generated distribution tables for the three coders indicated that the FMTs gave the most focus (48.0%, 52.0%, and 56.0%) to the Planning and Money Management category. The FMTs gave no support (0.0%, 0.0%, 0.0%) to the categories Credit & Debt and Risk Management & Insurance. For the thinking skills as identified by A Taxonomy for Learning, Teaching, and Assessing (Anderson et al., 2001), the three generated distribution tables revealed that the majority of FMTs (64.0%, 72.0%, and 72.0%) addressed Apply. The FMTs gave the least support (8.0%, 4.0%, and 4.0%) to Evaluation. For the NCTM standards, the three generated distribution tables showed that the FMTs addressed (24.0%, 32.0%, and 32.0%) Reasoning & Proof the most. The FMTs aligned to (4.0%, 8.0%, and 4.0%) the NCTM standard Representation the least (see Appendix T).

With the first two objectives of the pilot test completed, I next turned to the final objective of the pilot test, verifying my competence to be the sole coder for this study. There are five reasons supporting my competence. First, the coding forms are well defined. Second, the coding decisions are designed to be objective. Third, I have
resolved any unanticipated difficulties with the coding forms within the trial coding and pilot test. Fourth, throughout the trial coding and the pilot test, the numbers of my response decisions in agreement with the other two coders were 92.9%, 92.9%, and 94.5%. Fifth, I am the best qualified to code for I have conducted two training sessions, one trial coding session, and one pilot test. Therefore, I believe I have established my competence to code without the need of a second coder. With the pilot test objectives completed, I next turned to managing the recording process.

Managing the Recording Process

Depending on the magnitude of data, managing the recoding process can be challenging and complex. Therefore, the content analyst needs to organize and control the coding, flow, storage, and retrievability of the data into a manageable process. Content analysts coordinate the recording process by the use of various means. Examples of some of the measures are: photocopying the pages to be analyzed, color coding the coding forms, hole-punching the forms, inserting the coding forms into large color-coded binders, dividing the different coding forms within the binders into sections, collating the data for each recording unit found on the multiple forms onto one summary sheet, and entering the data into a statistical software program.

To aid in the management of the coding forms for this study, I first photocopied the pages of each textbook in the textbook series that contain FMTs. Second, I assigned each FMT its own recording unit number. The record numbering began with the first FMT found in the first section of first chapter in the sixth grade textbook, *Math Connects Concepts, Skills, and Problem Solving: Course 1* (Glencoe McGraw-Hill,
The recording unit numbering continued in the same manner in the seventh grade textbook, *Math Connects Concepts, Skills, and Problem Solving: Course 2* (Glencoe McGraw-Hill, 2009) and then in the eighth grade textbook, *Math Connects Concepts, Skills, and Problem Solving: Course 3* (Glencoe McGraw-Hill, 2009). For example, the last FMT in the sixth grade textbook in the textbook series is numbered 76. The first FMT in the seventh grade textbook is numbered 77. The number of FMTs is \( n = 278 \). Since there are three coding forms for each recording unit, this step will generate 834 coding forms.

Third, I photocopied each coding form unto a different color of paper to aid in the differentiation and management of the coding forms. Coding Form A is pastel yellow. Coding Form B is pastel pink. Coding Form C is pastel green.

Fourth, I hole-punched the coding forms for storage in three large three-ring binders of different colors, one for each textbook grade level. Each binder holds the three coding forms for each recording unit found within each grade level textbook within the textbook series. The binders are divided into three sections corresponding to the three coding forms: Section A, Section B, Section C. This was done to keep the data for each grade level textbook together.

Fifth, after the data were collected, I collated the data for each FMT. I first transferred the data on each coding form for each FMT onto its summary sheet. See Appendix P. Second, I transferred the data from the summary sheet into the Microsoft Excel statistical program creating a frequency table for each grade level textbook. Each frequency table contained the data, the frequency numbers and the percentage frequency for each criterion used in this study. Third, from the three frequency tables I transferred
each criterion’s frequency number and percentage frequency onto a summation sheet. Then using the mathematical functions of Excel, I determined the frequency number and percentage frequency for each criterion for the entire textbook series.

Analyzing the Data

The final step of content analysis is analyzing the data. A content analyst during this process makes inferences and generalizations about the data. In quantitative content analysis the researcher generally works with descriptive statistical data such as frequency counts, percentages, ratios, proportions, and raw numbers (Hansen, Cottle, Negrine, & Newbold, 1998; Krippendorff, 1980, 2004; Neuendorf, 2002). I entered the data into an Excel spreadsheet for each research question and generated one frequency table for each grade level textbook. I then transferred the frequency numbers and percentage frequencies from the three frequency tables to a summation sheet. I used the three frequency tables and the summation sheet to analyze the data entered for each research question.

Research Question 1

What is the distribution of the financial mathematical tasks in a middle school mathematics textbook series across the categories of the National Standards in K-12 Personal Finance Education (JumpStart Coalition, 2007)?

I utilized a five-step procedure to address research question one. First, I transferred the decision responses from each FMT’s coding form for each personal finance category onto each FMT’s summary sheet (Appendix L). Second, from the summary sheet I transferred each FMT’s data into an Excel spreadsheet (frequency
table). Third, using the Excel program features, I calculated the frequency number and percentage frequency of each personal finance category for each grade level textbook. Fourth, using the Excel program, I calculated the frequency number and percentage frequency for each personal finance category for the textbook series on the summation sheet. Fifth, I analyzed the response patterns that emerged.

The frequency tables addressed research question one in several ways. First, the frequency numbers established the number of FMTs that focused on each personal finance category in each grade level textbook and within the middle school mathematics textbook series. Second, the frequency percentages allowed me to compare the support of the FMTs for the individual categories within and among the three grade level textbooks. Third, with the frequency percentages I was able to compare the FMTs supporting each personal finance category between the three grade level textbooks and the textbook series.

Research Question 2

What is the distribution of the financial mathematical tasks in a middle school mathematics textbook series across the thinking skills as identified by *A Taxonomy for Learning, Teaching, and Assessing* (Anderson et al., 2001)?

I utilized a five-step procedure to address research question two. First, I transferred the decision responses from each FMT’s coding form for each thinking skill investigated in this study onto each FMT’s summary sheet (Appendix P). Second, from the summary sheet I transferred each FMT’s data into an Excel spreadsheet (frequency table). Third, using the Excel program’s features, I calculated the frequency number and
the percent frequency of each thinking skill for each grade level textbook. Fourth, using the Excel program, I calculated the frequency number and the percentage frequency for each thinking skill for the middle school mathematics textbook series. Fifth, I analyzed the response patterns that emerged.

The frequency tables addressed research question two in several ways. First, the frequencies established the number of FMTs that supported each thinking skill in each grade level textbook and the middle school mathematics textbook series. Second, the frequency percentages allowed me to compare the support of the FMTs for each thinking skill within and among the three grade level textbooks. In addition, I compared the FMTs supporting each thinking skill between the three grade level textbooks and the middle school mathematics textbook series.

Research Question 3

What is the distribution of the financial mathematical tasks in a middle school mathematics textbook series across the recommendations of the National Council of Teachers of Mathematics’ Standards (NCTM, 2000)?

I utilized a five-step procedure to address research question three. First, I transferred the decision responses from each FMT’s coding form for each NCTM standard investigated in this study onto each FMT’s summary sheet (Appendix L). Second, from the summary sheet I transferred each FMT’s data into an Excel spreadsheet (frequency table). Third, using the Excel program’s features, I calculated the frequency number and percentage frequency of each NCTM standard for each grade level textbook. Fourth, using the Excel program, I calculated the frequency number and
percentage frequency for each NCTM standard for the middle school mathematics textbook series. Fifth, I analyzed the response patterns that emerged.

The frequency tables addressed research question three in several ways. First, the frequencies obtained established the number of FMTs that supported each NCTM standard in this investigation in each grade level textbook and in the middle school mathematics textbook series. Second, the frequency percentages allowed me to compare the support of the FMTs for each NCTM standard within and among the three grade level textbooks. In addition, I compared the FMTs supporting each NCTM standard between the three grade level textbooks and the middle school mathematics textbook series.
CHAPTER IV

RESULTS

This chapter is divided into two sections. The first section presents the results from Research Question 1, Research Question 2, and Research Question 3. The second section presents a summary of the chapter.

Overall Results for Research Question 1

Research Question 1 corresponds to the categories of the *National Standards in K-12 Personal Finance Education* (JumpStart Coalition, 2007). Research Question 1 investigated the distribution of the financial mathematical tasks (FMTs) found in a middle school textbook series, *Math Connects Concepts, Skills, and Problem Solving Course 1, 2, and 3* (Glencoe McGraw-Hill, 2009), across the categories of the personal finance standards. The textbook series consists of a sixth grade level mathematics textbook, a seventh grade level mathematics textbook, and an eighth grade level mathematics textbook. Table 7 presents the results of the distribution of the FMTs across the personal finance categories within each grade level textbook. I provide both the frequency count and frequency percentage outcome for each category. The frequency percentages for each category were derived by dividing the frequency number of FMTs supporting each category by the total number of FMTs in each grade level textbook.
Sixth Grade Level Textbook Results

In the sixth grade textbook I determined that there are 76 FMTs. Of those 76, two FMTs (2.6%) align to the first personal finance category, Financial Responsibility & Decision Making. Seven FMTs (9.2%) support the second personal finance category, Income & Careers. Fifty-four FMTs (71.1%) align to the third personal finance category, Planning and Money Management. One (1.3%) FMT supports the fourth personal finance category, Credit & Debt. One FMT (1.3%) aligns to the fifth personal finance category, Risk Management & Insurance. Ten FMTs (13.2%) support the sixth personal finance category, Saving & Investing. Finally, three FMTs (3.9%) do not support any of the personal finance categories (see Table 7).

Table 7. Distribution of FMTs across Personal Finance Categories

<table>
<thead>
<tr>
<th>Grade Level Textbooks</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of FMT</td>
<td>76</td>
<td>102</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Categories in the National Standards in K-12 Personal Finance Education</th>
<th>F</th>
<th>%</th>
<th>F</th>
<th>%</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Responsibility &amp; Decision Making</td>
<td>2</td>
<td>2.6</td>
<td>2</td>
<td>2.0</td>
<td>8</td>
<td>8.0</td>
</tr>
<tr>
<td>Income &amp; Careers</td>
<td>7</td>
<td>9.2</td>
<td>18</td>
<td>17.6</td>
<td>14</td>
<td>14.0</td>
</tr>
<tr>
<td>Planning &amp; Money Management</td>
<td>54</td>
<td>71.1</td>
<td>60</td>
<td>58.8</td>
<td>61</td>
<td>61.0</td>
</tr>
<tr>
<td>Credit &amp; Debt</td>
<td>1</td>
<td>1.3</td>
<td>3</td>
<td>2.9</td>
<td>7</td>
<td>7.0</td>
</tr>
<tr>
<td>Risk Management &amp; Insurance</td>
<td>1</td>
<td>1.3</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Saving &amp; Investing</td>
<td>10</td>
<td>13.2</td>
<td>23</td>
<td>22.5</td>
<td>16</td>
<td>16.0</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>3.9</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Summation</td>
<td>78</td>
<td>102.6</td>
<td>106</td>
<td>103.9</td>
<td>106</td>
<td>106</td>
</tr>
</tbody>
</table>

To facilitate the interpretation of the sixth grade level textbook data in the table, I include in the following examples: a FMT that does not support any of the six personal finance categories, a FMT that supports more than one personal finance category, and a
FMT that supports one portion of a personal finance category, namely the Income portion of the second personal finance category and not the Careers portion.

19. MONEY  Gary and Paz together have $756. If Gary has $489, how much does Paz have? Write and solve an addition equation to find how much money belongs to Paz.

Figure 1. An FMT that does not support a personal finance category

On page 647 in the sixth grade level textbook FMT 19 does not support any of the personal finance categories. The FMT does not state the source of the money or the type of financial transaction taken with the money. The money could have been earned, from an investment, winnings in a lottery, or a withdrawal from a bank. Without any indication of the source of the money or the type of financial transaction, I could not categorize the FMT.

20. INSURANCE  Aurelia pays $414.72 per year for auto insurance. Suppose she makes 4 equal payments a year. How much does she pay every three months?

Figure 2. An FMT that supports more than one personal finance category

On page 175 in the sixth grade level textbook FMT 20 supports two personal finance categories, Risk Management & Insurance and Planning & Money Management. First, its label, Insurance, focuses the students’ attention to Insurance, a portion of the Risk Management and Insurance category. Second, within the FMT scenario it states that the yearly amount of car insurance that Aurelia pays. Third, the second sentence
alerts the students that she would like to make four equal payments, a money management decision. Fourth, the wording of the question focuses students’ attention again on paying, which is a money management spending behavior. This FMT presents the relationship between the purchase of car insurance with money management spending.

30. MONEY Five friends earn a total of $50 doing yard work in their neighborhood. Each friend earns the same amount. Solve the equation $5f = 50$ to find $f$, the amount that each friend earns.

Figure 3. An FMT that supports only one portion of a personal finance category

On page 59 in the sixth grade level textbook FMT 30 supports one portion of a personal finance category. For the second personal finance category, Income & Careers, FMT 30 supports Income and not Careers. The FMT requires the students to determine an income quantity, what amount each friend earns.

The number of FMTs in the sixth grade level textbook is 76. Yet, the summation of the FMTs for the sixth grade level textbook is 78. There are three reasons for this occurrence. First, three FMTs support “other” and not any personal finance categories, leaving 73 tasks that do align to personal finance categories. Second, 71 FMTs support one personal finance category. Third, two FMTs support two personal finance categories. As a result, 74 FMTs were counted once because they either supported one personal finance category or the “other” category and two FMTs were counted twice because they support two personal finance categories. Thus, $(74 \times 1) + (2 \times 2) = \text{the summation frequency of 78}$. Also, the summation of the percentages of the categories is
102.6%. The reason for this is that the percentage for each category reflects the frequency number for that category. The percentages for each category were derived by dividing the frequency number of FMTs supporting each category by the total number of FMTs for the sixth grade level textbook. The summation percentage (102.6%) was also derived in the same manner. The summation frequency (78) was divided by the total number of FMTs (76) in the sixth grade level textbook (see Table 7).

Overall, the third personal category, Planning & Money Management received the greatest support (71.1%) of the FMTs. The fourth personal finance category, Credit & Debt, and the fifth personal finance category, Risk Management & Insurance, obtained the least amount of support (1.3%). Three FMTs (3.9%) did not support any of the personal finance standards. The three FMTs did not either state what type of financial behavior was involved, or describe the monetary amounts within the FMT’s boundaries.

**Seventh Grade Level Textbook Results**

In the seventh grade textbook I determined that there are 102 FMTs. Of those 102, two FMTs (2.0%) align to the first personal finance category, Financial Responsibility & Decision Making. Eighteen FMTs (17.6%) support the second personal finance category, Income & Careers. Sixty FMTs (58.8%) align to the third personal finance category, Planning and Money Management. Three (2.9%) FMTs support the fourth personal finance category, Credit & Debt. No FMT (0.0%) aligns to the fifth personal finance category, Risk Management & Insurance. Twenty-three FMTs
(22.5%) support the sixth personal finance category, Saving & Investing. All FMTs within the seventh grade textbook support the personal finance standards (see Table 7).

To facilitate the interpretation of the seventh grade level textbook data in the table, I include in the following examples: a FMT that supports more than one personal finance category and one FMT that supports one portion of a personal finance category, namely the Income portion of the second personal finance category and not the Careers portion.

32. MONEY  Last year, Mr. Engle’s total income was $52,000, while his total expenses were $53,800. Use the expression \( I - E / 12 \), where \( I \) represents total income and \( E \) represents total expenses, to find the average difference between his income and expenses each month.

Figure 4. An FMT that supports more than one personal finance category

On page 117 in the seventh grade level textbook FMT 32 supports more than one personal finance category. It supports the personal finance categories: Income & Careers and Planning & Money Management. The FMT required the students to determine the difference between the person’s income and expenses. Income, a second personal finance category topic, and expenses, a third personal finance category topic, are equally represented in the scenario. This FMT also is an example of a FMT that supports one portion of a personal finance category. It supports the Income portion of the second personal finance category, Income & Careers.

The number of FMTs in the seventh grade level textbook is 102. Yet, the summation of the FMTs for the seventh grade level textbook is 106. There are two
reasons for this occurrence. First, 98 FMTs support one personal finance category. Second, four FMTs support two personal finance categories. As a result, 98 FMTs were counted once and four FMTs were counted twice because they supported two personal finance categories. Thus, \((98 \times 1) + (4 \times 2) = 106\) the summation frequency of 106. The summation percentage (103.9\%) was determined by dividing the summation frequency (106) by the total number of FMTS (102) in the seventh grade level textbook (see Table 7).

Overall, in the seventh grade level textbook, the third personal category, Planning & Money Management received the greatest support (58.8\%) of the FMTs. The first personal finance category, Financial Responsibility & Decision Making, obtained the least support (2.0\%) of the FMTs. The fifth personal finance category, Risk Management & Insurance, had no support (0.0\%) (see Table 7).

*Eighth Grade Level Textbook Results*

In the eighth grade textbook I determined that there are 100 FMTs. Of those 100, eight FMTs (8.0\%) align to the first personal finance category, Financial Responsibility & Decision Making. Fourteen FMTs (14.0\%) support the second personal finance category, Income & Careers. Sixty-one FMTs (61.0\%) align to the third personal finance category, Planning and Money Management. Seven (7.0\%) FMTs support the fourth personal finance category, Credit & Debt. No FMT (0.0\%) aligns to the fifth personal finance category, Risk Management & Insurance. Sixteen FMTs (16.0\%) support the sixth personal finance category, Saving & Investing (see Table 7).
To facilitate the interpretation of the eighth grade level textbook data in the table, I include in the following examples: a FMT that supports more than one personal finance category and one FMT that supports one portion of a personal finance category, namely the Credit portion of the fourth personal finance category, Credit & Debt.

10. JOBS  James is looking at three different after-school jobs that are posted on the job board. The first job pays $6.25 per hour for 20 hours of work each week. The second job pays $2.75 per day for two hours of work, 5 days a week. The third job pays $105 for 15 hours of work each week. If he wants to apply for the job with the best hourly rate, which job should he choose? Explain your reasoning.

Figure 5. An FMT that supports more than one personal finance category

On page 153 in the eighth grade level textbook FMT 10 supports more than one personal finance category. This FMT supports the first personal finance category, Financial Responsibility & Decision Making, and the second personal finance category, Income & Careers. The FMT requires the students to make a financially responsible decision about the job that offers the best income for the amount of time worked.

14. CREDIT  For charging the cost of 4 equally priced shirts, Antonio’s father’s credit card statement shows an entry of -$74. What would the statement have shown for a charge of just one shirt?

Figure 6. An FMT that supports only one portion of a personal finance category
On page 59 in the eighth grade level textbook FMT 14 supports one portion of a personal finance category. This FMT supports the Credit portion of the fourth personal finance category, Credit & Debt.

The number of FMTs in the eighth grade level textbook is 100. Yet, the summation of the FMTs for the eighth grade level textbook is 106. There are two reasons for this occurrence. First, 94 FMTs support one personal finance category. Second, six FMTs support two personal finance categories. As a result, 94 FMTs were counted once and six were counted twice because they supported two personal finance categories. Thus, \((94 \times 1) + (6 \times 2) =\) the summation frequency number of 106. The summation percentage \((106.0\%)\) was determined by dividing the summation frequency \((106)\) by the total number of FMTS \((100)\) in the eighth grade level textbook (see Table 7).

Overall, in the eighth grade level textbook, the third personal category, Planning & Money Management received the greatest support \((61.0\%)\) of the FMTs. The fourth personal finance category, Credit & Debt, received the least amount of support \((7.0\%)\). The fifth personal finance category, Risk Management & Insurance, did not obtain any amount of support \((0.0\%)\).

*Middle School Mathematics Textbook Series Results*

The middle school mathematics textbook series, consisting of a sixth grade level textbook, a seventh grade level textbook, and eighth grade level textbook, contains 278 FMTs. Of those 278 FMTs, 12 FMTs \((4.3\%)\) align to the first personal finance category, Financial Responsibility & Decision Making. Thirty-nine FMTs \((14.0\%)\) support the
second personal finance category, Income & Careers. One hundred seventy-five FMTs (62.9%) align to the third personal finance category, Planning and Money Management. Eleven (4.0%) FMTs support the fourth personal finance category, Credit & Debt. One FMT (0.4%) aligns to the fifth personal finance category, Risk Management and Insurance. Forty-nine FMTs (17.6%) support the sixth personal finance category, Saving and Investing. Three FMTs (1.1%) do not support any of the personal finance categories. The frequency number for each category in the textbook series was obtained by summing each specific grade level textbook category frequency number. The frequency percentage for each textbook series category was obtained by dividing each category frequency number by 278, the total number of FMTs in the middle school textbook series (see Table 8).

Table 8. Distribution of FMTs across Personal Finance Categories in Textbook Series

<table>
<thead>
<tr>
<th>Categories in the National Standards in K-12 Personal Finance Education</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Responsibility &amp; Decision Making</td>
<td>12</td>
<td>4.3</td>
</tr>
<tr>
<td>Income &amp; Careers</td>
<td>39</td>
<td>14.0</td>
</tr>
<tr>
<td>Planning &amp; Money Management</td>
<td>175</td>
<td>62.9</td>
</tr>
<tr>
<td>Credit &amp; Debt</td>
<td>11</td>
<td>4.0</td>
</tr>
<tr>
<td>Risk Management &amp; Insurance</td>
<td>1</td>
<td>0.4</td>
</tr>
<tr>
<td>Saving &amp; Investing</td>
<td>49</td>
<td>17.6</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>1.1</td>
</tr>
<tr>
<td>Summation</td>
<td>290</td>
<td>104.3</td>
</tr>
</tbody>
</table>

The number of FMTs in the middle school mathematics textbook series is 278. Yet, the summation of the FMTs for the middle school mathematics textbook series is 290. There are three reasons for this occurrence. First, 263 FMTs support one personal
finance category. Second, 12 FMTs support two personal finance categories. Third, three FMTs did not support any personal finance category and were coded “other.” As a result, 267 FMTs were counted once, 12 were counted twice because they supported two personal finance categories, and three were also counted once because they did not support any personal finance category and were classified in the seventh category “other.” Thus, \((263 \times 1) + (12 \times 2) + (3 \times 1) = \) the summation frequency of 290. Also, the summation percentage of the entire textbook series is 104.3\%. The reason for this is that the summation percentage reflects the summation frequency number for the entire textbook series. The summation percentage was derived by dividing the summation frequency number (290) by the total number of FMTs (278) for the entire textbook series.

Overall, within the middle school mathematics textbook series, the third personal category, Planning & Money Management, received the greatest support (62.9\%) of the FMTs. The fifth personal finance category, Risk Management & Insurance, obtained the least amount of support (0.4\%) from the FMTs.

**Additional Results**

Next I compared the number of FMTs within each grade level textbook and the entire textbook series that support each category.

*Comparison of the Number of FMTs That Support Each Category*

For the first personal finance category, Financial Responsibility & Decision Making, two FMTs (2.6\%) align in the sixth grade level textbook with this category, two FMTs (2.0\%) in the seventh grade level textbook, eight FMTs (8.0\%) in the eighth grade
level textbook, and 12 FMTs (4.3%) in the entire textbook series. For the second personal finance category, Income & Careers, seven FMTs (9.2%) align in the sixth grade level textbook, 18 FMTs (17.6%) in the seventh grade level textbook, 14 FMTs (14.0%) in the eighth grade level textbook, and 39 FMTs (14.0%) in the entire textbook series. For the third personal finance category, Planning & Money Management, 54 FMTs (71.1%) align in the sixth grade level textbook, 60 FMTs (58.8%) in the seventh grade level textbook, 61 FMTs (61%) in the eighth grade level textbook, and 175 FMTs (62.9%) in the entire textbook series. For the fourth personal finance category, Credit & Debt, one FMT (1.3%) aligns in the sixth grade level textbook, three FMTs (2.9%) in the seventh grade level textbook, seven FMTs (7.0%) in the eighth grade level textbook, and 11 FMTs (4.0%) for the entire textbook series. For the fifth personal finance category, Risk Management & Insurance, only one FMT (1.3%) aligns in the sixth grade textbook, no FMTs align in the seventh or eighth grade level textbooks, and one FMT (0.4%) aligns for the entire textbook series. For the sixth personal finance category, Saving & Investing, ten FMTs (13.2%) align in the sixth grade level textbook, 23 FMTs (22.5%) in the seventh grade level textbook, 16 FMTs (16.0%) in the eighth grade level textbook, and 49 FMTs (17.6%) in the entire textbook series (see Table 9).
Table 9. Comparison of the Number of FMTs That Support Each Category

<table>
<thead>
<tr>
<th>Categories in the National Standards in K-12 Personal Finance Education</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Responsibility &amp; Decision Making</td>
<td>2</td>
<td>2.6</td>
<td>2</td>
<td>2.0</td>
</tr>
<tr>
<td>Income &amp; Careers</td>
<td>7</td>
<td>9.2</td>
<td>18</td>
<td>17.6</td>
</tr>
<tr>
<td>Planning &amp; Money Management</td>
<td>54</td>
<td>71.1</td>
<td>60</td>
<td>58.8</td>
</tr>
<tr>
<td>Credit &amp; Debt</td>
<td>1</td>
<td>1.3</td>
<td>3</td>
<td>2.9</td>
</tr>
<tr>
<td>Risk Management &amp; Insurance</td>
<td>1</td>
<td>1.3</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Saving &amp; Investing</td>
<td>10</td>
<td>13.2</td>
<td>23</td>
<td>22.5</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>3.9</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

The data indicate that for the personal finance category, Credit & Debt, as the students progress through the textbook series they may experience an increase in the percentage of FMTs (1.3%, 2.9%, 7.0%) that support Credit & Debt. The percentage of FMTs that support Financial Responsibility & Decision Making increases from the sixth grade level textbook (2.6%) to the eighth grade level textbook (8.0%). For Income & Careers, the percentage of FMTs supporting this category increases from the sixth grade level textbook (9.2%) to seventh grade level textbook (17.6%), and then decreases from seventh grade level textbook (17.6%) to eighth grade level textbook (14.0%). However, the eight grade level percentage is higher than the sixth grade level. The same holds true for the personal finance category of Saving & Investing. For Planning & Money Management, the percentage of FMTs supporting this category decreases from the sixth grade level textbook (71.1%) to the seventh grade level textbook (58.8%). Then the percentage of support by the FMTs increases from the seventh grade level textbook (58.8%) to the eighth grade level textbook (61.0%). Finally, for Risk Management &
Insurance, only one (1.3%) FMT in the sixth grade level textbook supports this personal finance category. There are no FMTs in the seventh and eighth grade level textbooks that align with Risk Management & Insurance.

*Percentage of FMTs within the Total Number of MTs*

Also I determined the percentage of FMTs within the total number of mathematical tasks (MTs) found in each grade level textbook and the entire textbook series within the Practice and Problem Solving and the Mixed Problem Solving sections of each chapter. A MT is a textbook task that has the following characteristics: (a) physical delineations and (b) written communications. A FMT is a MT with additional monetary characteristics. The percentage of the FMTs within the total number of MTs was determined by dividing the number of FMTs by the total number of MTs in each grade level textbook and the entire textbook series. The total number of MTs in the sixth grade level textbook within the chapter sections studied is 1,191. The total number of FMTs in the sixth grade textbook is 76 (6.3%). The total number of MTs in the seventh grade level textbook is 1,342. The total number of FMTs is 102 (7.6%). The total number of MTs in the eighth grade textbook is 1,200. The total number of FMTs in the eighth grade textbook is 100 (8.3%). The total number of MTs in the entire textbook series is 3,733. The total number of FMTs in the entire textbook series is 278 (7.4%) (see Table 10). The data indicate that as the students progress through the textbook series the number of FMTs that they may experience increases.
Table 10. Distribution of FMTs in Each Grade Level Textbook and Textbook Series

<table>
<thead>
<tr>
<th>Textbooks</th>
<th>No. of MTs</th>
<th>No. of FMTs</th>
<th>% of FMTs</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>1191</td>
<td>76</td>
<td>6.3</td>
</tr>
<tr>
<td>7</td>
<td>1342</td>
<td>102</td>
<td>7.6</td>
</tr>
<tr>
<td>8</td>
<td>1200</td>
<td>100</td>
<td>8.3</td>
</tr>
<tr>
<td>Textbook Series</td>
<td>3733</td>
<td>278</td>
<td>7.4</td>
</tr>
</tbody>
</table>

Distribution of FMTs That Support One or More Categories

To determine the richness and depth of the FMTs’ support of the personal finance categories, I determined the percentage of the FMTs that support either one personal finance category or more than one of the personal financial categories for each grade level textbook and the entire textbook series. I determined the percentage of support by each FMT for either one or more than one personal finance category by dividing the number of FMTs supporting one or more than one personal finance category by the total number of FMTs in each grade level textbook and the entire textbook series.

For the sixth grade level textbook three FMTs (3.9%) do not support any of the six personal finance categories. Seventy-one FMTs (93.4%) support one personal finance category. Two FMTs (2.6%) support two personal finance categories. For the seventh grade level textbook 98 FMTs (96.1%) support one of the personal finance categories. Four FMTs (3.9%) support two personal finance categories. For the eighth grade level textbook 94 FMTs (94.0%) support one personal finance category. Six FMTs (6.0%) support two personal finance categories. For the entire middle school mathematics textbook series, three FMTs (1.0%) do not support any personal finance category.
Two hundred sixty-three FMTs (94.6%) support one category. Twelve FMTs (4.3%) support two personal finance categories (see Table 11).

Table 11. Distribution of FMTs That Support One or More of the Personal Finance Categories

<table>
<thead>
<tr>
<th>Number of Personal Finance Categories Supported by Individual FMTs</th>
<th>Textbooks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>F  %</td>
</tr>
<tr>
<td>Zero</td>
<td>3  3.9</td>
</tr>
<tr>
<td>One</td>
<td>71 93.4</td>
</tr>
<tr>
<td>Two</td>
<td>2  2.6</td>
</tr>
</tbody>
</table>

The data indicate that as the students progress through the textbook series, the FMTs that they may encounter all support the personal finance categories. The data also indicate that FMTs tend to support only one personal finance category. Finally, the data indicate that as the students progress through the textbook series, they may experience an increase in FMTs that support more than one personal finance category.

*Distribution of FMTs across Specific Topics in Personal Finance Categories*

During the coding process determining the amount of support for each separate topic within four of the six personal finance categories piqued my interest. For the second personal finance category, Income & Careers, only one (2.6%) of the 39 FMTs supporting this category throughout the entire middle school mathematics textbook series align to a career topic. The other 38 FMTs (97.4%) support the topics of allowance, earnings, and monetary gifts. For the third category, Planning & Money Management, none of the 175 FMTs within the entire middle school mathematics textbook series support Planning. No FMT requires the students to prepare a budget in
any manner. Two FMTs (1.1%) of the 175 FMTs within the entire middle school mathematics textbook series focus on donating. For the fourth category, Credit & Debt, four FMTs (36.4%) focus on credit card transactions and six FMTs (54.5%) focus on debt (loan), and one FMT (9.1%) focuses on both credit and debt. For the sixth personal finance category, Saving & Investing, 37 FMTs (75.5%) out of the 49 FMTs in the entire middle school mathematics textbook series align with saving. Twelve FMTs (24.5%) support investing (see Table 12).

Table 12. Distribution of FMTs across Personal Finance Category Topics

<table>
<thead>
<tr>
<th>Personal Finance Categories</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Income &amp; Careers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td>38</td>
<td>97.4</td>
</tr>
<tr>
<td>Careers</td>
<td>1</td>
<td>2.6</td>
</tr>
<tr>
<td><strong>Planning &amp; Money Management</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planning</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Money Management</td>
<td>175</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Credit &amp; Debt</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Credit</td>
<td>4</td>
<td>36.4</td>
</tr>
<tr>
<td>Debt</td>
<td>6</td>
<td>54.5</td>
</tr>
<tr>
<td>Both Credit &amp; Debt</td>
<td>1</td>
<td>9.1</td>
</tr>
<tr>
<td><strong>Saving &amp; Investing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saving</td>
<td>37</td>
<td>75.5</td>
</tr>
<tr>
<td>Investing</td>
<td>12</td>
<td>24.5</td>
</tr>
</tbody>
</table>

Overall Results for Research Question 2

Research Question 2 corresponds to the thinking skills as identified by *The Taxonomy for Learning, Teaching, and Assessing* (Anderson et al., 2001). Research Question 2 investigated the distribution of the financial mathematical tasks found in a middle school textbook series across four of the six thinking skills. The revised Bloom’s
Taxonomy (Anderson et al., 2001) contains six thinking skills. They are in order from lower order to higher order: (a) Remember, (b) Understand, (c) Apply, (d) Analyze, (e) Evaluate, and (f) Create. During the development of the coding forms I removed the first thinking skill, Remember, and the fourth thinking skill, Analyze, from the coding forms because continually answering yes to the questions concerning these thinking skills seemed redundant.

The textbook series consists of a sixth grade level mathematics textbook, a seventh grade level mathematics textbook, and an eighth grade level mathematics textbook. Table 13 presents the results of the distribution of the FMTs across the four thinking skills within each grade level textbook. I provide both the frequency count and percentage outcome for each thinking skill. The percentages for each thinking skill were derived by dividing the frequency number of FMTs supporting each thinking skill by the total number of FMTs for each grade level textbook.

Sixth Grade Level Textbook Results

In the sixth grade textbook I determined that there are 76 FMTs. Of those 76, 19 FMTs (25.0%) align to the second thinking skill, Understand. Sixty-seven FMTs (88.2%) support the third thinking skill, Apply. Seven FMTs (9.2%) align to the fifth thinking skill, Evaluate. One (1.3%) FMT supports the sixth thinking skill, Create (see Table 13).
Table 13. Distribution of FMTs across Thinking Skills

<table>
<thead>
<tr>
<th>Grade Level Textbooks</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of FMT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thinking Skills</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>%</td>
<td>F</td>
</tr>
<tr>
<td>Understand</td>
<td>19</td>
<td>25.0</td>
<td>31</td>
</tr>
<tr>
<td>Apply</td>
<td>67</td>
<td>88.2</td>
<td>92</td>
</tr>
<tr>
<td>Evaluate</td>
<td>7</td>
<td>9.2</td>
<td>9</td>
</tr>
<tr>
<td>Create</td>
<td>1</td>
<td>1.3</td>
<td>2</td>
</tr>
<tr>
<td>Summation</td>
<td>94</td>
<td>123.7</td>
<td>134</td>
</tr>
</tbody>
</table>

To facilitate the interpretation of the sixth grade level textbook data in the table, I include in the following examples: a FMT that does not support any of the four thinking skills investigated on Coding Form B, a FMT that supports one thinking skill, and a FMT that supports more than one thinking skill.

26. MONEY You decide to buy a hat for $10.95 and a T-shirt for $14.20. How much change will you receive if you pay with a $50 bill?

Figure 7. An FMT that does not support any thinking skills in this study

On page 159 of the sixth grade level textbook, FMT 26 does not support any of the four thinking skills included in this study. It does not require the students to compare or classify for the thinking skill Understand. It does not require the students to use a formula or a strategy for the thinking skill Apply. It does not require the students to make a judgment for the thinking skill Evaluate. Finally, it does not require the students to produce or design something for the thinking skill Create.
Use any strategy to solve Exercises 6-14. Some strategies are shown below.

12. **MONEY** How much money will Rob save if he saves $2 a day for 25 weeks?

**Figure 8. An FMT that supports one thinking skill**

The above FMT is found on page 79 in the sixth grade level textbook. The authors included additional requirements for solving this task not found within the text of the FMT. The requirements offer two strategies: guess and check and make a table. Strategies are procedures to follow to obtain a solution. Therefore, this FMT supports the thinking skill Apply because the students need to use or apply a strategy to solve the FMT.

| 34. **MONEY** The formula $I = prt$ gives the simple interest $I$ earned on an account where an amount $p$ is deposited at an interest rate $r$ for a certain number of years $t$. Use the table to order the accounts from least to greatest earned after five years. |

**Figure 9. An FMT that supports more than one thinking skill**

The above FMT is found on page 379 in the sixth grade level textbook. Next to the FMT is a table with the first column labeled account, the second column labeled $p$ ($\), and the third column labeled $r$ ($\%$). Under each heading are three accounts with three different principals given and three different rates given. This FMT supports the thinking skill Apply because it requires the students to use a given formula. This FMT also requires the students to order the accounts from least to greatest after they apply the
formula to determine the interest for each account. To order the interest values the students need to compare the three values. Comparing is a cognitive process for the thinking skill Understand.

The number of FMTs in the sixth grade level textbook is 76. Yet, the summation of the FMTs for the sixth grade level textbook is 94. There are four reasons for this occurrence. First, four FMTs do not support any of the four thinking skills found on Coding Form B. Second, 55 FMTs support one thinking skill. Third, 12 FMTs support two thinking skills. Fourth, five FMTs support three thinking skills. As a result, 4 FMTs were not counted, 55 FMTs were counted once, 12 FMTs were counted twice, and five FMTs were counted three times. Thus, \((4 \times 0) + (55 \times 1) + (12 \times 2) + (5 \times 3) = \) the summation frequency of 94. Also, the summation percentage of the thinking skills is 123.7%. The summation percentage (123.7%) was derived by dividing the summation frequency (94) by the total number of FMTs (76) in the sixth grade level textbook (see Table 13).

Overall, the third thinking skill, Apply, received the greatest support (88.2%) of the FMTs. The second thinking skill, Understand, obtained the second highest support (25.0%) of the FMTs. The sixth thinking skill, Create, received the least support (1.3%).

*Seventh Grade Level Textbook Results*

In the seventh grade textbook I determined that there are 102 FMTs. Of those 102, 31 FMTs (30.4%) align to the second thinking skill, Understand. Ninety-two FMTs (90.2%) support the third thinking skill, Apply. Nine FMTs (8.8%) align to the fifth
thinking skill, Evaluate. Two (2.0%) FMTs support the sixth thinking skill, Create (see Table 13).

To facilitate the interpretation of the seventh grade level textbook data in Table 13, I include in the following examples: a FMT that supports one thinking skill, and a FMT that supports more than one thinking skill.

For Exercises 28 and 29, write an expression for each situation. Then evaluate to find the solution.

**29. BOOKS** Ian goes to the library’s used book sale. Paperback books are $0.25, and hardback books are $0.50. If Ian buys 3 paperback books and 5 hardback books, how much does he spend?

Figure 10. An FMT that supports one thinking skill

This FMT is found on page 40 in the seventh grade textbook. The authors included additional requirements for solving the task. The above FMT supports the thinking skill Apply, for the ancillary requirements above this FMT require the students to write an expression and then use that expression to find the solution.

Use the *look for a pattern* strategy to solve Exercises 4-6.

**5. MONEY** Peter is saving money to buy an MP3 player. After one month, he has $50. After 2 months, he has $85. After 3 months, he has $120. After 4 months, he has $155. He plans to keep saving at a same rate. How long will it take Peter to save enough money to buy an MP3 player that costs $295?

Figure 11. An FMT that supports more than one thinking skill
This FMT is located on page 113 and supports the thinking skills of Understand and Apply. The additional requirement to use the look for a pattern strategy is an application behavior. When students look for a pattern they continuously compare the intervals. Comparing is an understanding behavior.

The number of FMTs in the seventh grade level textbook is 102. Yet the frequency summation is 134. There are three reasons for this occurrence. First, 74 FMTs support one thinking skill. Second, 24 FMTs support two thinking skills. Third, four FMTs support three thinking skills. As a result, 74 FMTs were counted once, 24 FMTs were counted twice, and four FMTs were counted three times. Thus, \( (74 \times 1) + (24 \times 2) + (4 \times 3) = \) the summation frequency of 134. The summation percentage of the thinking skills is 131.4%. The summation percentage (131.4%) was determined by dividing the summation frequency number (134) by the total number of FMTs (102) in the seventh grade level textbook (see Table 13).

Overall, the third thinking skill, Apply, received the greatest support (90.2%) of the FMTs. The second thinking skill, Understand, obtained the second highest support (30.4%) of the FMTs. The sixth thinking skill, Create, received the least support (2.0%).

\textit{Eighth Grade Level Textbook Results}

In the eighth grade textbook I determined that there are 100 FMTs. Of those 100, 34 FMTs (34.0%) align to the second thinking skill, Understand. Ninety-seven FMTs (97.0%) support the third thinking skill, Apply. Seventeen FMTs (17.0%) align to the fifth thinking skill, Evaluate. None (0.0%) of the FMTs support the sixth thinking skill, Create (see Table 13).
To facilitate the interpretation of the eighth grade level textbook data in Table 13, I include in the following examples: a FMT that supports one thinking skill, and a FMT that supports more than one thinking skill.

21. BANKING  After you withdraw $50 from your savings account, the balance is $124. Write and solve an equation to find your starting balance.

Figure 12. An FMT that supports one thinking skill

This FMT is located on page 68 of the eighth grade level textbook and supports the thinking skill Apply. The FMT requires the students to use an equation that they developed to find the solution.

Use any strategy to solve Exercises 7-16. Some strategies are shown below.

13. SCHOOL SUPPLIES  Ethan wishes to buy 4 pens, 1 ruler, and 8 folders at the school store. The prices are shown in the table below. If there is no tax, is $11 enough to pay for Ethan’s school supplies? Explain.

Figure 13. An FMT that supports more than one thinking skill

This FMT is located on page 361. The additional requirement of using a strategy is an application behavior. Once the students calculate the cost of the items that Ethan wishes to purchase, they must compare their total to the $11 to determine if he has enough money to buy the items. Comparing is an understanding cognitive behavior.
The number of FMTs in the eighth grade level textbook is 100. Yet the frequency summation is 148. There are three reasons for this occurrence. First, 66 FMTs support one thinking skill. Second, 20 FMTs support two thinking skills. Third, 14 FMTs support three thinking skills. As a result, 66 FMTs were counted once, 20 FMTs were counted twice, and 14 FMTs were counted three times. Thus, \((66 \times 1) + (20 \times 2) + (14 \times 3) = \) the summation frequency of 148. The summation percentage \((148.0\%)\) was determined by dividing the summation frequency number \((148)\) by the total number of FMTs \((100)\) in the seventh grade level textbook (see Table 13).

Overall, the third thinking skill, Apply, received the greatest support \((97.0\%)\) of the FMTs. The second thinking skill, Understand, obtained the second highest support \((34.0\%)\) of the FMTs. The thinking skill, Create, received no support \((0.0\%)\).

Middle School Mathematics Textbook Series Results

The textbook series, consisting of a sixth grade level textbook, a seventh grade level textbook, and eighth grade level textbook, contains 278 FMTs. Of those 278 FMTs, 84 FMTs \((30.2\%)\) align to the second thinking skill, Understand. Two hundred fifty-six FMTs \((92.1\%)\) support the third thinking skill, Apply. Thirty-three FMTs \((11.9\%)\) align to the fifth thinking skill, Evaluate. Three FMTs \((1.1\%)\) support the sixth thinking skill, Create. The frequency number for each thinking skill in the textbook series was obtained by summing each specific grade level textbook thinking skill frequency number. The frequency percentage for each textbook series thinking skill was obtained by dividing each thinking skill frequency number by 278 (see Table 14).
Table 14. Distribution of FMTs across Thinking Skills in Textbook Series

<table>
<thead>
<tr>
<th># of FMTs</th>
<th>Thinking Skills</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>278</td>
<td>Middles School Mathematics Textbook Series</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Understand</td>
<td>84</td>
<td>30.2</td>
<td></td>
</tr>
<tr>
<td>Apply</td>
<td>256</td>
<td>92.1</td>
<td></td>
</tr>
<tr>
<td>Evaluate</td>
<td>33</td>
<td>11.9</td>
<td></td>
</tr>
<tr>
<td>Create</td>
<td>3</td>
<td>1.1</td>
<td></td>
</tr>
<tr>
<td>Summation</td>
<td>376</td>
<td>135.3</td>
<td></td>
</tr>
</tbody>
</table>

The number of FMTs in the middle school mathematics textbook series is 278. Yet, the summation of the FMTs for the middle school mathematics textbook series is 376. There are four reasons for this occurrence. First, four FMTs do not support any of the thinking skills investigated within the study. Second, 195 FMTs support one thinking skill. Third, 56 FMTs support two thinking skills. Fourth, 23 FMTs support three thinking skills. As a result, four FMTs were not counted, 195 were counted once, 56 were counted twice, and 23 were counted three times. Thus, (4 x 0) + (195 x 1) + (56 x 2) + (23 x 3) = the summation frequency of 376. Also, the summation percentage of the thinking skills of the entire textbook series is 135.3%. The summation percentage (135.3%) was determined by dividing the summation frequency number (376) by the total number of FMTs (278) in the entire textbook series.

Overall, the third thinking skill, Apply, received the greatest support (92.1%) of the FMTs. The second thinking skill, Understand, obtained the second highest support (30.2%) of the FMTs. The sixth thinking skill, Create, received the least amount of support (1.1%).
Additional Results

Next I compared the number of FMTs supporting each thinking skill within each grade level textbook and the entire textbook series.

Comparison of the Number of FMTs That Support Each Thinking Skill

For the thinking skill Understand, 19 FMTs (25.0%) align in the sixth grade level textbook, 31 FMTs (30.4%) align in the seventh grade level textbook, 34 FMTs (34.0%) align in the eighth grade level textbook, and 84 FMTs (30.2%) align in the entire textbook series. For the thinking skill Apply, 67 FMTs (88.2%) align in the sixth grade level textbook, 92 FMTs (90.2%) align in the seventh grade level textbook, 97 FMTs (97.0%) align in the eighth grade level textbook, and 256 FMTs (92.1%) align in the entire textbook series. For the thinking skill Evaluate, 7 FMTs (9.2%) align in the sixth grade level textbook, 9 FMTs (8.8%) align in the seventh grade level textbook, 17 FMTs (17.0%) align in the eighth grade level textbook, and 33 FMTs (11.9%) align in the entire textbook series. For the thinking skill Create, 1 FMT (1.3%) align in the sixth grade level textbook, 2 FMTs (2.0%) align in the seventh grade level textbook, no FMTs align in the eighth grade level textbook, and 3 FMTs (1.1%) align in the entire textbook series (see Table 15).

Table 15. Comparison of the Number of FMTs That Support Thinking Skills

<table>
<thead>
<tr>
<th>Thinking Skills</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>Series</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>%</td>
<td>F</td>
<td>%</td>
</tr>
<tr>
<td>Understand</td>
<td>19</td>
<td>25.0</td>
<td>31</td>
<td>30.4</td>
</tr>
<tr>
<td>Apply</td>
<td>67</td>
<td>88.2</td>
<td>92</td>
<td>90.2</td>
</tr>
<tr>
<td>Evaluate</td>
<td>7</td>
<td>9.2</td>
<td>9</td>
<td>8.8</td>
</tr>
<tr>
<td>Create</td>
<td>1</td>
<td>1.3</td>
<td>2</td>
<td>2.0</td>
</tr>
</tbody>
</table>
The data indicate that for the thinking skills, Understand and Apply, the percentage of FMTs supporting these thinking skills appears to increase as the students progress through the entire textbook series. For the thinking skill, Evaluate, the percentage of support decreases from the sixth grade level textbook (9.2%) to the seventh grade level textbook (8.8%). However, the percentage increases as the students progress from the seventh grade level textbook (8.8%) to the eighth grade level textbook (17.0%). The thinking skill, Create, has an increase in support of the FMTs from the sixth grade level textbook (1.3%) to the seventh grade level textbook (2.0%). The FMTs’ support drops to zero in the eighth grade level textbook.

*Distribution of FMTs That Support One or More Thinking Skills*

To determine the richness and depth of the FMTs’ support of the thinking skills, I also determined the number of FMTs that supported one or more than one of the four thinking skills being investigated within this study. Only four of the six thinking skills were studied because two of the thinking skills, Remember and Analyze, were deemed redundant during the development of the coding forms. To find a solution for a FMT a student must remember numbers and operations as well as analyze the FMT to determine which numbers and operations should be used (see Table 16).

Table 16. Distribution of FMTs that Supported One or More of the Thinking Skills

<table>
<thead>
<tr>
<th>Number of Thinking Skills Supported by Individual FMTs</th>
<th>6</th>
<th>F</th>
<th>%</th>
<th>7</th>
<th>F</th>
<th>%</th>
<th>8</th>
<th>F</th>
<th>%</th>
<th>Series</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero</td>
<td>4</td>
<td>5.3</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>4</td>
<td>1.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>55</td>
<td>72.4</td>
<td>74</td>
<td>72.5</td>
<td>66</td>
<td>66.0</td>
<td>195</td>
<td>70.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two</td>
<td>12</td>
<td>15.8</td>
<td>24</td>
<td>23.5</td>
<td>20</td>
<td>20.0</td>
<td>56</td>
<td>20.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three</td>
<td>5</td>
<td>6.6</td>
<td>4</td>
<td>3.9</td>
<td>14</td>
<td>14.0</td>
<td>23</td>
<td>8.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The results indicate that as the students progress through the textbook series the percentage of FMTs not supporting any thinking skill decreases. The progression of FMTs supporting one thinking skill and two thinking skills does increase from the sixth grade level textbook to the seventh grade level textbook. However, from the seventh grade level textbook to the eighth grade level textbook the progression decreases for these two types of FMTs. The progression of FMTs supporting three thinking skills dips slightly from the sixth grade level textbook to the seventh grade level textbook. However, from the seventh grade level textbook to the eighth grade level textbook the progression does increase.

*Comparison of Lower and Higher Order Thinking Skills*

As with the personal finance categories, I also focused on an additional thinking skills interest. The interest involved comparing the total number of lower order thinking skills to the total number of higher order thinking skills supported by the FMTs within each grade level textbook and the entire textbook series. According to Anderson et al. (2001) the lower order thinking skills are: Remember, Understand, Apply, and Analyze. The higher order thinking skills are: Evaluate and Create. The lower order thinking skills investigated in this study were Understand and Apply. The higher order thinking skills investigated in this study were Evaluate and Create.

In the sixth grade level textbook, 86 FMTs (113.2%) support the lower order thinking skills and 8 FMTs (10.5%) support the higher order thinking skills. The two percentages do not total 100% because 17 FMTs support more than one thinking skill and 4 FMTs do not support any of the thinking skills investigated within the study. In
the seventh grade level textbook, 123 FMTs (120.6%) support the lower order thinking skills and 11 FMTs (10.8%) support the higher order thinking skills. In the eighth grade level textbook, 131 FMTs (131.0%) support the lower thinking skills and 17 FMTs (17.0%) support the higher order thinking skills. For the entire textbook series 340 FMTs (122.3%) support the lower order thinking skills and 36 FMTs (12.9%) support the higher order thinking skills (see Table 17).

Table 17. Comparison of Lower Order Thinking Skills and Higher Order Thinking Skills

<table>
<thead>
<tr>
<th>Textbook</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thinking Skills</td>
<td>F</td>
<td>%</td>
<td>F</td>
<td>%</td>
</tr>
<tr>
<td>Lower Order</td>
<td>86</td>
<td>113.2</td>
<td>123</td>
<td>120.6</td>
</tr>
<tr>
<td>Higher Order</td>
<td>8</td>
<td>10.5</td>
<td>11</td>
<td>10.8</td>
</tr>
</tbody>
</table>

The data indicate that the number of FMTs supporting the higher order thinking skills increases as the students progress through the middle school textbook series. The data also indicate that as the students progress through the textbook series the number of FMTs supporting the lower order thinking skills increases. Finally the data indicate that the number of FMTs supporting the lower order thinking skills and the higher order thinking skills are not balanced.

Overall Results for Research Question 3

across the NCTM standards. The National Council of Teachers of Mathematics recommends ten standards. The standards in order are: (a) Numbers & Operations, (b) Algebra, (c) Geometry, (d) Measurement, (e) Data Analysis & Probability, (f) Problem Solving, (g) Reasoning & Proof, (h) Communication, (i) Connections, and (j) Representation.

During the development of the coding forms I removed from the coding forms the questions concerning the first NCTM standard, Numbers & Operations, the sixth NCTM standard, Problem Solving, the eighth NCTM standard, Communication, and the ninth NCTM standard, Connections, because these four standards were deemed redundant. I deemed Numbers & Operations redundant because students use numbers and operations to solve mathematical tasks. Financial Mathematical tasks are problems to solve. Students communicate their solutions either verbally or in writing. Finally, FMTs are tasks that connect mathematics to the real world. I also did not include any questions on the coding forms pertaining to the third standard, Geometry, and the fourth standard, Measurement, because these two standards appeared to not align with the personal finance standards.

The textbook series consists of a sixth grade level mathematics textbook, a seventh grade level mathematics textbook, and an eighth grade level mathematics textbook. I provide both the frequency count and percentage outcome for each NCTM standard. The percentages for each NCTM standard were derived by dividing the frequency number of FMTs supporting each NCTM standard by the total number of FMTs for each grade level textbook. Table 17 presents the results of the distribution
within each grade level textbook of the FMTs across the four NCTM standards investigated in this study.

**Sixth Grade Level Textbook Results**

In the sixth grade textbook I determined that there are 76 FMTs. Of those 76, 33 FMTs (43.4%) align to the NCTM standard, Algebra. Seventeen FMTs (22.4%) support the NCTM standard, Data Analysis & Probability. Twelve FMTs (15.8%) align to the NCTM standard, Reasoning & Proof. Four (5.3%) FMTs support the NCTM standard, Representation (see Table 18).

Table 18. Distribution of FMTs across NCTM Standards

<table>
<thead>
<tr>
<th>Textbooks No. of FMT</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCTM Standards</td>
<td>76</td>
<td>102</td>
<td>100</td>
</tr>
<tr>
<td>Algebra</td>
<td>33</td>
<td>40</td>
<td>55</td>
</tr>
<tr>
<td>Data Analysis &amp; Probability</td>
<td>17</td>
<td>16</td>
<td>21</td>
</tr>
<tr>
<td>Reasoning &amp; Proof</td>
<td>12</td>
<td>23</td>
<td>24</td>
</tr>
<tr>
<td>Representation</td>
<td>4</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>Summation</td>
<td>66</td>
<td>90</td>
<td>108</td>
</tr>
</tbody>
</table>

To facilitate the interpretation of the sixth grade level textbook data in the table, I include in the following examples: a FMT that does not support any of the four NCTM standards investigated on Coding Form C, a FMT that supports one NCTM standard, and a FMT that supports more than one NCTM standard.

7. MONEY The Hamres are buying a new car. They will pay $350 per month for 4 years. How much will they spend in all for the car?

Figure 14. An FMT that does not support any NCTM standard in this study
On page 27 in the sixth grade level textbook the authors placed this FMT. The FMT does not support any of the NCTM standards studied in Coding Form C. It does not require the students to develop an equation, work with data, explain their work, or make a representation of any type.

30. MONEY Five friends earn a total of $50 doing yard work in their neighborhood. Each friend earns the same amount. Solve the equation $5f = 50$ to find $f$, the amount that each friend earns.

Figure 15. An FMT that supports one NCTM standard

On page 59 in the sixth grade level textbook the authors placed this FMT. This FMT supports the NCTM standard, Algebra. This FMT requires the student to work with the given equation.

23. FOOD The Student Council is raising money by selling bottled water at a band competition. The table shows the prices for different brands. Which brand is the best buy? Explain you reasoning.

Figure 16. An FMT that supports more than one NCTM standard

On page 175 in the sixth grade level textbook the authors placed this FMT. To the right of this FMT the authors have a table with the following information in three columns. The first column lists the brands: Brand A, Brand B, and Brand C. The second column lists the quantities of the brands: 6-pack, 12-pack, and 24-pack. The third column lists the prices: $3.45, $5.25, and $10.99. The FMT supports the Data Analysis & Probability NCTM standard by requiring the students to analyze the data.
found within the table. The FMT also supports the Reasoning & Proof NCTM standard by requiring the students to explain their reasoning.

The number of FMTs in the sixth grade level textbook is 76. Yet the frequency summation is 66. There are four reasons for this occurrence. First, 25 FMTs do not support any NCTM standard investigated in this study. Second, 37 FMTs support one NCTM standard in this investigation. Third, 13 FMTs support two NCTM standards. Fourth, one FMT supports three NCTM standards. As a result, 25 FMTs were not counted, 37 FMTs were counted once, 13 FMTs were counted twice, and 1 FMT was counted three times. Thus, \((25 \times 0) + (37 \times 1) + (13 \times 2) + 1 \times 3 = \) the summation frequency of 66. The summation percentage (86.9%) was determined by dividing the summation frequency number (66) by the total number of FMTs (76) in the sixth grade level textbook (see Table 17).

Overall, the second NCTM standard, Algebra, received the greatest support (43.4%) of the FMTs. The fifth NCTM standard, Data Analysis & Probability, obtained the second highest support (22.4%) of the FMTs. The tenth NCTM standard, Representation, received the least amount of support (5.3%).

**Seventh Grade Level Textbook Results**

In the seventh grade textbook I determined that there are 102 FMTs. Of those 102, 40 FMTs (39.2%) align to the second NCTM standard, Algebra. Sixteen FMTs (15.7%) support the fifth NCTM standard, Data Analysis & Probability. Twenty-three FMTs (22.5%) align to the seventh NCTM standard, Reasoning & Proof. Eleven (10.8%) FMTs support the tenth NCTM standard, Representation (see Table 17).
To facilitate the interpretation of the seventh grade level textbook data in Table 17, I include in the following examples: a FMT that does not support any NCTM standard in this study, a FMT that supports one NCTM standard, and a FMT that supports more than one NCTM standard.

5. FIELD TRIPS  To attend a field trip to a museum, each student will have to pay $6.00 for transportation and $5.75 for admission. If there are 65 students attending the field trip, how much money will their teacher need to collect?

Figure 17. An FMT that does not support any NCTM standard in this study

On page 28 in the seventh grade level textbook the authors placed this FMT. The FMT does not support any of the NCTM standards studied in Coding Form C. It does not require the students to develop an equation, analyze data, explain their work, or make a representation of any type.

36. MUSIC  A Web site charges $0.99 to download a song onto an MP3 player and $12.49 to download an entire album. Write an expression that gives the total cost in dollars to download $a$ albums and $s$ songs.

Figure 18. An FMT that supports one NCTM standard

On page 46 in the seventh grade level textbook the authors placed this FMT. This FMT supports the NCTM standard, Algebra. This FMT requires the student to develop an algebraic expression.
Write an addition expression to describe each situation. Then find each sum and explain its meaning.

30. BANKING   Stephanie has $152 in the bank. She withdraws $20. Then she deposits $84.

Figure 19. An FMT that supports more than one NCTM standard

Before the above FMT on page 98 the authors placed additional requirements for the tasks that followed. Developing an expression supports the NCTM standard Algebra. The requirement to explain its meaning supports the Reasoning & Proof NCTM standard.

The number of FMTs in the seventh grade level textbook is 102. Yet the frequency summation is 90. There are four reasons for this occurrence. First, 33 FMTs do not support any NCTM standard studied in this investigation. Second, 49 FMTs support one NCTM standard. Third, 19 FMTs support two NCTM standards. Fourth, one FMT supports three NCTM standards. As a result, 33 FMTs were not counted, 49 were counted once, 19 FMTs were counted twice, and one FMT was counted three times. Thus, \((33 \times 0) + (49 \times 1) + (19 \times 2) + (1 \times 3) = \) the summation frequency of 90. The summation percentage of the NCTM standards is 88.2%. The summation percentage (88.2%) was determined by dividing the summation frequency number (90) by the total number of FMTs (102) in the eighth grade level textbook (see Table 18).

Overall, the NCTM standard, Algebra, received the greatest support (39.2%) of the FMTs. The NCTM standard, Reasoning & Proof, obtained the second highest
support (22.5%) of the FMTs. The NCTM standard, Representation, received the least support (10.8%).

Eighth Grade Level Textbook Results

In the eighth grade textbook I determined that there are 100 FMTs. Of those 100, 55 FMTs (55.0.0%) align to the second NCTM standard, Algebra. Twenty-one FMTs (21.0%) support the fifth NCTM standard, Data Analysis & Probability. Twenty-four FMTs (24.0%) align to the seventh NCTM standard, Reasoning & Proof. Eight FMTs (8.0%) support the tenth NCTM standard, Representation (see Table 18).

To facilitate the interpretation of the eighth grade level textbook data in Table 18, I include in the following examples: a FMT that does not support any NCTM standard in this study, a FMT that supports one NCTM standard, and a FMT that supports more than one NCTM standard.

9. FURNITURE  Ms Ruiz makes an initial down payment of $150 when purchasing a sofa. She pays the remaining cost of the sofa over 12 months, at no additional charge. If her monthly payment is $37.50, what was the original price of the sofa?

Figure 20. An FMT that does not support any NCTM standard in this study

On page 63 the authors placed this FMT that does not support any of the NCTM standards investigated in this study. The students are not required to develop an equation, analyze data, explain their work, or make a representation for the solution to this FMT.
14. CREDIT  For charging the cost of 4 equally priced shirts, Antonio’s father’s credit card statement shows an entry of -$74. What would the statement have shown for a charge of just one shirt?

Figure 21. An FMT that supports one NCTM standard

Above tasks 12 through 14 on page 59 the authors stated that the students should write an equation to solve each task. This FMT supports the NCTM standard Algebra.

26. STOCK MARKET  The changes in the price of a certain stock each day from Monday to Thursday of one week were -$2.25, + $0.50, +$1.50, and + $0.75. If the overall change in the stock prices for the week was -$0.50, write an equation that can be used to find the change in the price on Friday and explain two methods of solving this equation. Then solve the equation and explain its meaning in the context of the situation.

Figure 22. An FMT that supports more than one NCTM standard

The authors placed this FMT on page 69 in the eighth grade textbook. This FMT supports two NCTM standards: Algebra and Reasoning & Proof. The FMT supports the NCTM standard Algebra because it requires the students to write an equation. It also supports Reasoning & Proof because it requires the students to explain the meaning of the FMT within its context.

The number of FMTs in the eighth grade level textbook is 100. Yet the frequency summation is 108. There are four reasons for this occurrence. First, 16 FMTs do not support any NCTM standard in this investigation. Second, 64 FMTs support one NCTM standard. Third, 16 FMTs support two NCTM standards. Fourth, four FMTs
support three NCTM standards. As a result, 16 FMTs were not counted, 64 FMTs were counted once, 16 FMTs were counted twice, and four FMTS were counted three times. Thus, $(16 \times 0) + (64 \times 1) + (16 \times 2) + (4 \times 3) = \text{the summation frequency of 108}$. The summation percentage of the NCTM standards that were investigated is 108.0%. The summation percentage (108.0%) was determined by dividing the summation frequency number (108) by the total number of FMTs (100) in the eighth grade level textbook (see Table 18).

Overall, the NCTM standard, Algebra, received the greatest support (55.0%) of the FMTs. The NCTM standard, Reasoning & Proof, obtained the second highest support (24.0%) of the FMTs. The NCTM standard, Representation, received the least support (8.0%).

*Middle School Mathematics Textbook Series Results*

The textbook series, consisting of a sixth grade level textbook, a seventh grade level textbook, and an eighth grade level textbooks, contains 278 FMTs. Of those 278 FMTs, 128 FMTs (46.0 %) align to the second NCTM standard, Algebra. Fifty-four FMTs (19.4 %) support the fifth NCTM standard, Data Analysis & Probability. Fifty-nine FMTs (21.2%) align to the seventh NCTM standard, Reasoning & Proof. Twenty-three FMTs (8.3%) support the tenth NCTM standard, Representation (see Table 19).
Table 19. Distribution of FMTs across NCTM Standards in Textbook Series

<table>
<thead>
<tr>
<th>NCTM Standards</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algebra</td>
<td>128</td>
<td>46.0</td>
</tr>
<tr>
<td>Data Analysis &amp; Probability</td>
<td>54</td>
<td>19.4</td>
</tr>
<tr>
<td>Reasoning &amp; Proof</td>
<td>59</td>
<td>21.2</td>
</tr>
<tr>
<td>Representation</td>
<td>23</td>
<td>8.3</td>
</tr>
<tr>
<td>Summation</td>
<td>264</td>
<td>95.0</td>
</tr>
</tbody>
</table>

The number of FMTs in the middle school mathematics textbook series is 278. Yet the frequency summation is 264. There are four reasons for this occurrence. First, 74 FMTs do not support any NCTM standard investigated in this study. Second, 150 FMTs support one NCTM standard. Third, 48 FMTs support two NCTM standards. Fourth, six FMTs support three NCTM standards. As a result, 74 FMTs were not counted, 150 FMTs were counted once, 48 FMTs were counted twice, and six FMT were counted three times. Thus, \((74 \times 0) + (150 \times 1) + (48 \times 2) + (6 \times 3)\) = the summation frequency of 264. The summation percentage of the NCTM standards is 95.0%. The summation percentage was derived by dividing the summation frequency number (264) by the total number of FMTs (278) for the entire middle school textbook series (see Table 19).

Overall, the second NCTM standard, Algebra, received the greatest support (46.0%) of the FMTs. The seventh NCTM standard, Reasoning & Proof, obtained the second highest support (21.2%) of the FMTs. The tenth NCTM standard, Representation, received the least amount of support (8.3%).
Additional Results

Next I compared the number of FMTs supporting each NCTM standard within each grade level textbook and the entire textbook series.

Comparison of the Number of FMTs That Support Each NCTM Standard

For the NCTM standard Algebra, 33 FMTs (43.4%) align in the sixth grade level textbook, 40 FMTs (39.2%) align in the seventh grade level textbook, 55 FMTs (55%) align in the eighth grade level textbook, and 128 FMTs (46.0%) align in the entire textbook series. For the NCTM standard Data Analysis & Probability, 17 FMTs (22.4%) align in the sixth grade level textbook, 16 FMTs (15.7%) align in the seventh grade level textbook, 21 FMTs (21.0%) align in the eighth grade level textbook, and 54 FMTs (19.4%) align in the entire textbook series. For the NCTM standard Reasoning & Proof, 12 FMTs (15.8%) align in the sixth grade level textbook, 23 FMTs (22.5%) align in the seventh grade level textbook, 24 FMTs (24.0%) align in the eighth grade level textbook, and 59 FMTs (21.2%) align in the entire textbook series. For the NCTM standard Representation, four FMTs (5.3%) align in the sixth grade level textbook, 11 FMTs (10.8%) align in the seventh grade level textbook, 8 FMTs (8.0%) align in the eighth grade level textbook, and 23 FMTs (8.3%) align in the entire textbook series (see Table 20).
Table 20. Comparison of the Number of FMTs That Support Each NCTM Standard

<table>
<thead>
<tr>
<th>NCTM Standards</th>
<th>6</th>
<th></th>
<th>7</th>
<th></th>
<th>8</th>
<th></th>
<th>Series</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>%</td>
<td>F</td>
<td>%</td>
<td>F</td>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Algebra</td>
<td>33</td>
<td>43.4</td>
<td>40</td>
<td>39.2</td>
<td>55</td>
<td>55.0</td>
<td>128</td>
<td>46.0</td>
</tr>
<tr>
<td>Data Analysis &amp; Probability</td>
<td>17</td>
<td>22.4</td>
<td>16</td>
<td>15.7</td>
<td>21</td>
<td>21.0</td>
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<td>Reasoning &amp; Proof</td>
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<td>22.5</td>
<td>24</td>
<td>24.0</td>
<td>59</td>
<td>21.2</td>
</tr>
<tr>
<td>Representation</td>
<td>4</td>
<td>5.3</td>
<td>11</td>
<td>10.8</td>
<td>8</td>
<td>8.0</td>
<td>23</td>
<td>8.3</td>
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</tbody>
</table>

The data indicate that for the NCTM standard Algebra as the students progress from the sixth grade level textbook (43.45) to the eighth grade level textbook (55%) they experience an increase in the number of FMTs supporting Algebra. The seventh grade level textbook does indicate a decline (39.2%) from the sixth grade level textbook to the seventh grade level textbook. For Data Analysis & Probability, the support of the FMTs declines somewhat from the sixth grade level textbook (22.4%) to the eighth grade level textbook (21.0%). The data for Reasoning & Proof indicate that there is a continual increase in the FMTs support (15.8%, 22.5%, and 24.0%). For the NCTM standard Representation, the number of FMTs supporting it increases from the sixth grade level textbook (5.3%) to the seventh grade level textbook (10.8%) and then the support declines (8.0%) in the eighth grade level textbook.

*Distribution of FMTs Supporting One or More NCTM Standard*

To determine the richness and depth of the FMTs’ support of the NCTM standards, I also determined the number of FMTs that supported one or more of the four NCTM standards being investigated within this study. Only four of the NCTM standards were investigated in this study because FMTs already support four of the NCTM standards: Numbers & Operations, Problem Solving, Connections, and
Communications. The NCTM standards Geometry and Measurement appeared to not align with the personal finance standards and therefore were not included in this study (see Table 21).

Table 21. Distribution of FMTs that Supported One or More of the NCTM Standards

<table>
<thead>
<tr>
<th>Number of NCTM Standards Supported by Individual FMTs</th>
<th>Textbooks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Zero</td>
<td>25</td>
</tr>
<tr>
<td>One</td>
<td>37</td>
</tr>
<tr>
<td>Two</td>
<td>13</td>
</tr>
<tr>
<td>Three</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>76</td>
</tr>
</tbody>
</table>

The results indicate that the number of FMTs not supporting any NCTM standard investigated in this study decreases throughout the series from the sixth grade level textbook to the seventh grade level textbook, and to the eighth grade level textbook. The progression of FMTs supporting one NCTM standard does increase from the sixth grade level textbook (48.7%) to the eighth grade level textbook (64.0%) with a slight decline (48.0%) in the seventh grade level textbook. The support for two NCTM standards by FMTs does increase from the sixth grade level textbook (17.1%) to the seventh grade level textbook (18.6%). However, the support declines in the eighth grade level textbook (16.0%). The support of three NCTM standards by one FMT appears to remain constant from the sixth grade level textbook (1.3%) to the seventh grade level textbook (1.0%). The support then increases from the seventh grade level textbook (1.0%) to the eighth grade level textbook (4.0%).
Distribution of FMTs across Specific Topics in NCTM Standards

To address a third additional interest, I determined the number of FMTs within the entire textbook series that supported separate topics within a NCTM standard. For Data Analysis & Probability, the data indicate that only one (1.9%) of the FMTs supporting Data Analysis & Probability supports Probability. The remaining 53 FMTs (98.1%) support Data Analysis.

Worthwhile Financial Mathematical Tasks

During the analysis of the distribution of FMTs across the National Standards in K-12 Personal Finance Education (JumpStart Coalition, 2007), the thinking skills as identified by A Taxonomy for Learning, Teaching, and Assessing (Anderson et al., 2001), and the National Council of Teachers of Mathematics Standards (NCTM, 2000), there emerged from the data analysis several worthwhile or rich FMTs. Financial mathematical tasks (FMTs) are worthwhile when they follow the recommendations set forth by Standard 1: Worthwhile Mathematical Tasks (NCTM, 1991). Within this study I determined that worthwhile FMTs require students to exercise their higher order thinking skills, experience more than one NCTM standard investigated in this study, and apply several personal finance concepts and skills contained within the personal finance categories. The examples that follow demonstrate many of the recommendations in Standard 1 and the criterion that emerged from the data analysis.

The first worthwhile FMT example is on page 598 in the seventh grade level textbook.
PAINTING  For Exercises 18 and 19, use the diagram that shows one side of a storage barn.

19. Each gallon of paint costs $20 and covers 350 square feet. Find the total cost to paint this side once. Justify your answer.

Figure 23. An FMT that supports two NCTM standards

This FMT supports two NCTM standards investigated in this study: Algebra and Reasoning & Proof. It also supports the NCTM standards Geometry and Measurement not included in this study. This FMT also supports the personal finance category, Planning & Money Management and the thinking skills of Apply and Evaluate, a higher order thinking skill. In all, this FMT supports five of the criteria investigated within this study and two NCTM standards not included in the study.

The second worthwhile FMT example is on page 617 in the seventh grade level textbook. Below the task is a diagram of a three-dimensional office area with the room measurements given.

24. MONEY  The diagram shows the dimensions of an office. It costs about 11 cents per year to air condition one cubic foot of space. On the average, how much does it cost to air condition the office for one month?

Figure 24. An FMT that supports one NCTM standard

This FMT supports one of the investigated NCTM standards, Algebra. It also supports the NCTM standards Geometry and Measurement. This FMT also supports the personal finance category, Planning & Money Management and the thinking skills of
Understand and Apply. In all this FMT supports four of the criteria investigated within this study and two NCTM standards not included in the study.

The worthwhile third FMT example is on page 153 in the eighth grade level textbook.

10. James is looking at three different after-school jobs that are posted on the job board. The first job pays $6.25 per hour for 20 hours of work each week. The second job pays $12.75 per day for two hours of work, 5 days a week. The third job pays $105 for 15 hours of work each week. If he wants to apply for the job with the best hourly rate, which job should he choose? Explain you reasoning.

Figure 25. An FMT supporting two personal finance categories

This FMT supports two personal finance categories, Financial Responsibility & Decision Making and Income & Careers. The FMT also supports three thinking skills: Understand, Apply, and Evaluate. The NCTM standard, Reasoning & Proof, is supported because the last requirement is to explain your reasoning. In all, this FMT supported six criteria found on Coding Forms A-C.

The fourth FMT example is from the sixth grade level textbook on page 374.

26. SELECT A TECHNIQUE Gene charges a base fee of $5 for each lawn he mows plus $2 for the number of hours it takes to complete the job. Which of the following techniques might Gene use to determine an expression he can use to represent the total charge for mowing a lawn based on the number of hours? Justify you selection(s). Then use the technique(s) to solve the problem.

   Mental math   number sense   estimation

Figure 26. An FMT that supports three thinking skills
This FMT supports three thinking skills: Understand, Apply, and Evaluate. It also supports the personal finance category Income & Careers. This FMT supports two NCTM standards: Algebra and Reasoning & Proof. In all, this FMT supported six criteria found on Coding Forms A-C.

Chapter Summary

This study has three research questions. The data for each research question was analyzed by specific grade level textbooks and the entire middle school mathematics textbook series, *Math Connects Concepts, Skills, and Problem Solving Course 1, 2, and 3* (Glencoe McGraw-Hill, 2009). The first research question was aligned to the categories of the *National Standards in K-12 Personal Finance Education* (JumpStart Coalition, 2007). I designed Research Question 1 to answer what was the distribution of the financial mathematical tasks (FMTs) in a middle school mathematics textbook series across the personal finance categories. The personal finance category with the most FMT support (62.6%) was Planning & Money Management. The personal finance category with the least FMT support (0.4%) was Risk Management & Insurance.

The second research question aligned with the thinking skills identified by *A Taxonomy for Learning, Teaching, and Assessing* (Anderson et al., 2001). I designed Research Question 2 to answer what was the distribution of the FMTs in a middle school mathematics textbook series across Bloom’s revised taxonomy of thinking skills. The thinking skill that received the most FMT support (92.1%) was Apply. The thinking skill that received the least FMT support (1.1%) was Create.
The third research question aligned with the NCTM standards. I designed Research Question 3 to answer what was the distribution of the FMTs in a middle school mathematics textbook series across the NCTM standards. I did not include four of the ten standards because FMTs already align with those standards. They are: 1) Numbers & Operations, 6) Problem Solving, 8) Communications and 9) Connections. I also did not include two other NCTM standards, Geometry and Measurement, because they did not appear to relate to the personal finance standards. The NCTM standard that received the most FMT support (46.0%) was Algebra. The NCTM standard that received the least FMT support (8.3%) was Representation.
CHAPTER V
DISCUSSION

This content analysis examined the distribution of financial mathematical tasks
(FMTs) in a middle school mathematics textbook across the National Standards in K-12
Personal Finance Education categories (JumpStart Coalition, 2007), the thinking skills as
identified by *A Taxonomy for Learning, Teaching, and Assessing* (Anderson et al.,
2001), and the National Council of Teachers of Mathematics Standards (NCTM, 2000).
Two hundred seventy-eight FMTs, recording units for this study, were taken from the
Practice and Problem Solving sections and the Mixed Problem Solving sections found in
each chapter in each grade level textbook in the middle school mathematics textbook
series, *Math Connects Concepts, Skills, and Problem Solving Course 1, 2, and 3*
(Glencoe McGraw-Hill, 2009). The series contains sixth grade, seventh grade, and
eighth grade mathematics textbooks. Although I did analyses on each individual
textbook, the findings will be reported for the textbook series. Because the personal
finance standards and the NCTM standards were written in grade level bands, this is the
most appropriate manner to present the results.

This chapter is divided into four sections. The first section is the summary of the
findings. The second section is the discussion of the findings. The third section
addresses the implications of and recommendations from this investigation. The fourth
section contains suggestion for future research.
Summary of Findings

Three major findings and several additional findings emerged from this study. These findings are directly connected to Research Question 1, Research Question 2, and Research Question 3. Each research question’s major and ancillary findings follow.

Research Question 1


The first major finding is that the FMTs found within the series did not equally address the personal finance categories. Approximately 63% of the FMTs focused on the personal finance category Planning & Money Management. Nearly 18% of the FMTs aligned to Saving & Investing. Less than half of a percent of the FMTs covered Risk Management & Insurance.

Selected ancillary findings include, four of the six personal finance categories had an increase in support from the sixth grade textbook to the eighth grade textbook. Throughout the textbook series the number of FMTs within the total amount of MTs in each grade textbook continually increased from the sixth, to the seventh, and to the eighth grade textbook. Approximately 95% of the FMTs addressed one personal finance category and about 5% aligned to two personal finance categories.
Research Question 2

The data from Research Question 2 determined the distribution of the FMTs across the thinking skills as identified by *A Taxonomy of Learning, Teaching, and Assessing* (Anderson et al., 2001). The six thinking skills are: Remember, Understand, Apply, Analyze, Evaluate, and Create. Two of the six thinking skills, Remember and Analyze, were not included in the study because they were deemed redundant. Mathematical tasks (MTs) and FMTs require students to remember numbers and operations as well as to analyze what to do and how to proceed.

The FMTs within the series did not uniformly align to the four thinking skills that were investigated in this study. Not surprising, the thinking skill Apply received the most focus (92.1%). Then in descending order the alignment was Understand (30.2%), Evaluate (11.9%), and Create (1.1%).

Selected ancillary findings include, three-fourths of the thinking skills investigated in this study had an increase in support from the sixth grade to the eighth grade textbook. The alignment of FMTs to two or more thinking skills increased from the sixth to the eighth grade textbook. The percentages of FMTs focusing on the lower order thinking skills continually increased from the sixth (113.2%), to the seventh (120.6%), to the eighth grade textbook (131.0%). The percentages of FMTs addressing the higher order thinking also did the same. The percentages were: sixth (10.5%), seventh (10.8%), and eighth (17.0%). The textbook series percentage for the lower order thinking skills (122.3%) and percentage for the higher order thinking skills (12.9%) were decidedly unbalanced.
Research Question 3

The data from Research Question 3 determined the distribution of the FMTs across the NCTM standards (NCTM, 2000). The standards are: Numbers & Operations, Algebra, Geometry, Measurement, Data Analysis & Probability, Problem Solving, Reasoning & Proof, Communication, Connections, and Representation. The standards, Geometry and Measurement, were not included in the study because they initially appeared to not align with the personal finance categories. Deemed redundant, the standards, Numbers & Operations, Problem Solving, Reasoning & Proof, Communication, and Connections were also not included in the study.

The FMTs found within the textbook series did not uniformly align to the four NCTM standards investigated in this study. Not surprising, Algebra received 46.0% of the FMTs’ focus. In descending order, the FMTs supported Reasoning & Proof (21.2%), Data Analysis & Probability (19.4%), and Representation (8.3%).

Selected ancillary findings include, three-fourths of the investigated NCTM standards had an increase support from the sixth to the eighth grade textbook. Almost 20% of the FMTs aligned to two or more NCTM standards investigated in this study. The textbook series contained several worthwhile financial mathematical tasks.

Discussion of Findings

In this section the findings are compared with previous studies’ findings and personal finance programs, resources, and materials available for classroom use.
Research Question 1

Research Question 1 examined the distribution of the FMTs, found in a representative middle school mathematics textbook series, across the National Standards in K-12 Personal Finance Education categories (JumpStart Coalition, 2007). In this study I used the National Standards in K-12 Personal Finance Education as criteria for examining FMTs as suitable agents of financial literacy education. The potential exists for mathematics textbooks to be used as teaching tools for financial literacy education because some financial literacy concepts and skills align to mathematical concepts and skills.

This research study is unique because no other content analysis has investigated the distribution of personal finance standards across textbook content. In previous studies other researchers utilized the personal finance standards as criteria to investigate the level of financial knowledge of fourth graders and high school students (Lucey, 2002; JumpStart Coalition, 1997, 2000, 2002, 2004, 2006, 2008). Other financial literacy programs and organizations have aligned their materials to the personal finance standards. Because there are no other research studies’ findings with which I can compare my findings, I will compare my research findings to another middle school program, Junior Achievement’s (JA) Finance Park and a financial literacy education resource book for use in middle school, Money Math: Lessons for Life (Suiter & McCorkle, 2001, 2008) (see Table 22).

The table compares three financial literacy education tools that are used by educators in the classroom. Money Math: Lessons for Life (Suiter & McCorkle, 2001, 2008) is a financial literacy education resource book for middle school students. The
book contains four lessons. Each lesson contains on the average of 4.5 activities that allow students to experience financial concepts through mathematics. I calculated the frequency percentage by dividing the number of lessons fulfilling the competency by the total number of lessons. It is not surprising that the authors chose not to include the categories of Credit & Debt and Risk Management & Insurance. Middle school students would unlikely encounter these categories in their own personal lives.

Table 22. Comparison of Money Math, JA Finance Park, and This Study

<table>
<thead>
<tr>
<th>Personal Finance Categories</th>
<th>Money Math All 4 Lessons Met Overall Competency</th>
<th>JA Finance Park Standards Met in Program</th>
<th>This Study FMTs Aligned to Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Responsibility &amp; Decision Making</td>
<td>100.0%</td>
<td>66.7%</td>
<td>4.3%</td>
</tr>
<tr>
<td>Income &amp; Careers Planning &amp; Money Management</td>
<td>100.0%</td>
<td>100%</td>
<td>14.0%</td>
</tr>
<tr>
<td>Credit &amp; Debt</td>
<td>0.0%</td>
<td>50.0%</td>
<td>4.0%</td>
</tr>
<tr>
<td>Risk Management &amp; Insurance</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Saving &amp; Investing</td>
<td>100.0%</td>
<td>83.3%</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

Junior Achievement (JA) Finance Park is a middle school program that has students learning financial concepts and skills in the classroom during four classroom sessions. During the fifth session the students go off-campus to a site where they make every day financial decisions as their parents would. In the sixth lesson session the students discuss their decisions based upon previous financial literacy lessons and their experiences at the off-campus site. I calculated the frequency percentage by dividing the standards met by the total number of personal finance standards within that category.

(50%) in JA Finance Park align to Credit & Debt. Like *Money Math: Lessons for Life*, no lessons align to Risk Management & Insurance.

Both *Money Math: Lessons for Life* and Finance Park address the personal finance standards more strongly than the FMTs that were the focus of my study. The FMTs (62.9%) appear to have a somewhat similar alignment to JA Finance Park (71.4%) for the category Planning & Money Management. In every other category the textbook series weakly addresses the other categories.

**Research Question 2**

Research Question 2 investigated the distribution of the FMTs across the thinking skills as identified by *A Taxonomy for Learning, Teaching, and Assessing* (Anderson et al., 2001). Lower order thinking skills are used for remembering or classifying information. Higher order thinking skills are employed for making judgments and creating new solutions, plans, or hypotheses.

The analyses revealed that the textbook series did not address the four thinking skills investigated in this study in a balanced manner. The data in this research study indicate that the FMTs required a greater number of lower order thinking skills (Understand and Apply) than higher order thinking skills (Evaluate and Create). These findings concur with Nicely’s (1991) studies. He reported that textbooks published in the 60s, 70s, and 80s contained a substantial amount of problem tasks that addressed lower order thinking skills. No textbook in his studies emphasized his identified highest level of thinking, Evaluate.
Jones (2004) analyzed the probability content of eight middle school mathematics textbooks from four eras (New Math, Back to Basics, Problem Solving, and Standards). Using his own auditing tool he reported that within six of the series studied at least 85% of the tasks focused on lower levels of cognitive processing. Only two of the series, a Back to Basics (26%) and a Standards (59%), had larger proportions of higher order cognitive processing. In my research study a large number (122.3%) of FMTs focused on the lower order thinking skills and 12.9% of the FMTs addressed the higher order thinking skills. Therefore, my findings do not agree with Jones (2004). I found that the FMTs in the standards-based text of my study did not emphasize higher order thinking at the same level as Jones’ findings.

In another study, Rock (1992) investigated the quality of six, seventh grade mathematics textbooks by determining the alignment of the textbooks to several key mathematical content features exemplifying the reform movement. One of six Model of Quality features she studied was Problem Situations. She reported that all of the six textbooks studied did not meet the six quality criteria exemplifying reform ideals. For example, she indicated that the textbooks were not problem-based, most of the questions were not problems, the problems were usually contained in specific sections, and a large amount of the questions were designated for individual response rather than group work. A relationship exists between problem solving and thinking skills. The more challenging the task, the more higher order thinking skills are required to calculate the solution. Thus my study agrees with Rock’s investigation in that most of the problems or tasks found then and now in textbooks do not require students to solve them at a higher order thinking level.
With few investigations with which to compare my study, I now turn to comparing its findings to several financial resources mentioned in Chapter 2. *Money Math: Lessons for Life* (Suiter & McCorkle, 2008) is an updated version of *Money Math: Lessons for Life* (Suiter & McCorkle, 2001). Thinking skills, understand, apply, and evaluate are necessary to complete the exercises of this resource. Of particular note is Lesson 4, Spreading the Budget. This lesson is devoted to developing a budget and creating a spreadsheet for the budget. Twenty-five percent of this financial resource requires students to utilize the higher order thinking skill Create. The middle school textbook series used for this study did not have any FMT supporting planning a budget.

Junior Achievement’s Biz Kid$ financial program offers a five episode (lesson) Core Curriculum. Within this core curriculum is Episode 116: “Budgeting: You Can’t Manage What You Don’t Know.” This episode contains two days of student activities among which is requiring students to create a pamphlet informing their peers of what a budget is and why it is important to have one. Budgeting is 20% of Biz Kid$ core curriculum. None of the FMTs found in my study supported budgeting, a higher order thinking skill.

JA Finance Park, another Junior Achievement program has six units. I reviewed the key learning objectives of these units. Unit three requires students to evaluate sample budgets and develop spending plans. Unit four asks the students to create a personal budget. Unit five requires the students to create a family budget and evaluate stock holdings. Fifty percent of the units supported the higher order thinking skills of Evaluate and Create. Of the 31 objectives found in the six units of this financial resource, two objectives (6.5%) supported Evaluate and three objectives (9.7%)
supported Create. In my study 11.9% of the FMTs supported Evaluate and none of the FMTs supported Create. When comparing the support of the higher order thinking skill Create, the finding of my study does not agree with the review of the three financial resources available as supplements to the mathematics textbooks.

Research Question 3

Research Question 3 investigated the distribution of the FMTs across the NCTM standards. The analyses revealed that the FMTs found within the textbook series did not address the four NCTM standards investigated in this study in a balanced manner. My search for scholarly studies investigating the distribution of tasks across the NCTM standards revealed nothing. Because there are no other research studies’ findings with which I can compare my findings, I will compare my research findings to the textbook series chapter’s alignment to the NCTM standards investigated in this research study (see Table 23).

Table 23. Comparison of Chapters’ Focus and FMTs’ Alignment

<table>
<thead>
<tr>
<th>NCTM Standard</th>
<th>Chapters’ Focus</th>
<th>FMTs’ Alignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algebra</td>
<td>61.1%</td>
<td>46.0%</td>
</tr>
<tr>
<td>Data Analysis &amp; Probability</td>
<td>13.9%</td>
<td>19.4%</td>
</tr>
<tr>
<td>Reasoning &amp; Proof</td>
<td>Permeated Throughout</td>
<td>21.2%</td>
</tr>
<tr>
<td>Representation</td>
<td>Permeated Throughout</td>
<td>8.3%</td>
</tr>
</tbody>
</table>
I did the review of the chapters’ focus using the information in each of the three teacher’s editions to determine how much of the textbook series was devoted to each standard. I obtained each chapter’s focus from page T14’s table of Focal Points and Connections to the Focal Points for that grade level textbook. For example, I added the number of chapters that addressed Algebra in each section of the table for each textbook. Then I added the three values (24) and divided by 36, the number of chapters in the textbook series, to determine the number of chapters (66.7%) in the textbooks that focused on Algebra. Reviewing Table 22, I discovered that for Data Analysis & Probability the chapter focus (13.9%) and the FMTs’ focus (19.4%) are closely similar. With the discussion of the findings completed, I now turn to the implications and recommendations of this study based on the data that emerged.

Implications and Recommendations

In this section I present, based on the data, the inferences that can be gleaned and suggestions that can be offered to educators, authors and publishers, and financial literacy advocates. The recommendations are given in the areas of: curriculum development, professional development, and financial literacy education.

Financial literacy education at all age levels has been a long standing concern. This study is concerned with the financial literacy education of middle school students. Financial literacy education is the process of teaching students how to make every day financial decisions with their own best interests in mind. In the foreword of *Money Math: Lesson for Life* (Suiter & McCorkle, 2001) Duguay stated that instruction in financial concepts and skills at the middle school level is important because these
students need to learn how to manage their money in a responsible manner. Otherwise students may learn in a trial-and error manner which may have detrimental consequences.

Middle school students need not only to prepare for all facets of their adult life including the financial portion, but also make financially responsible decisions now. The cost of phone texting, the balance of a credit card, and the choice between needs and wants challenge many middle school students daily. Thus, Duguay (Suiter & McCorkle, 2001, 2008) offered that financial literacy education can no longer be relegated to the electives of Economics, Family and Consumer Sciences, and Business courses in high school. Financial literacy education needs to be permeated throughout all grade levels and all classes, especially mathematics.

Curriculum Development

The data of this research study indicate that FMTs do not uniformly address the personal finance categories, the thinking skills, and the NCTM standards. These findings suggest that students using this textbook series in their mathematics classroom to learn financial literacy topics and skills may not be experiencing all the topics and skills of a balanced financial literacy education and exercising their higher order thinking skills. With this in mind, I offer my recommendations.

Textbooks

Educators, especially those depending on textbook tools, must become aware of the deficiencies of textbook content if they rely on them to teach financial literacy. Furthermore, most FMTs are not written at levels requiring higher order thinking from
students. Since textbook authors already align the text to NCTM standards, they need to be as familiar with the personal finance standards as they are with the mathematics content standards. To include activities that meet NCTM standards, focus on personal finance categories, and challenge students’ thinking could be easily accomplished. I offer several examples in Table 24. I chose the activities in the table based on 8th grade expectations for the personal finance categories in the National Standards in K-12 Personal Finance Education (JumpStart Coalition, 2007). Those expectations outline the concepts and skills required of a financially literate eighth grade student (see Table 24).

The first column contains the number of the activity. The second column contains the activity as it would be found in a middle school mathematics textbook at the eighth grade expectations level. The third column contains the personal finance category the activity’s expectation level in which it is found. The fourth column contains the higher order thinking skills required to complete the activity. The last column contains NCTM standards that each activity supports.
Table 24. Supplemental Activities for Increasing Classroom Financial Literacy Education

<table>
<thead>
<tr>
<th>Activity</th>
<th>Finance Categories</th>
<th>Thinking Skills</th>
<th>NCTM Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Calculate the funds for someone planning to go to college in four years will need. In a table list the items that need to be purchased or rented and their costs. Include funding sources and amounts from each source in the table. Write a narrative that explains the spending and saving choices made.</td>
<td>Financial Responsibility &amp; Decision Making</td>
<td>Evaluate Create</td>
</tr>
<tr>
<td>2</td>
<td>In a table compare two potential career choices. After listing educational costs, initial salaries, potential advancements and their salaries, write a narrative that explains the decisions made.</td>
<td>Income &amp; Careers</td>
<td>Evaluate Create</td>
</tr>
<tr>
<td>3</td>
<td>Do a comparative case study of household costs to rent or purchase a home. In a table list the monthly expenses of renting and owning a home. Compare the total costs with the first year’s salary of a career choice. In a narrative, discuss the advantages and disadvantages of each choice, state which is the choice and why.</td>
<td>Planning &amp; Money Management</td>
<td>Evaluate Create</td>
</tr>
<tr>
<td>4</td>
<td>Make a table to display car loan repayment options. Use an on-line financial calculator to determine total cost of repaying a $20,000 car loan for rates of 3%, 5%, and 7% over 3 years, 4 years, and 5 years. Evaluate the options and in a narrative explain the choice selected.</td>
<td>Credit &amp; Debt</td>
<td>Evaluate Create</td>
</tr>
<tr>
<td>5</td>
<td>In a table, list the cost of the insurances listed both with and without deductibles: auto, homeowner or renter, and health. In a narrative, explain the choices made for the insurance plans selected.</td>
<td>Risk Management &amp; Insurance</td>
<td>Evaluate Create</td>
</tr>
<tr>
<td>6</td>
<td>Calculate the amount of money needed for an emergency fund. In a table list the individual amounts needed and reason for its inclusion. In a narrative describe how the funds will be obtained from and evaluate that course of action.</td>
<td>Saving &amp; Investing</td>
<td>Evaluate Create</td>
</tr>
</tbody>
</table>

Note. A = Algebra; DA&P = Data Analysis & Probability; R&P = Reasoning & Proof; R = Representation.

I decided to list one activity for each of the six categories of the personal finance standards, keeping in mind that other categories may be addressed to a lesser degree.

For example, in activity number three, although the primary category is Planning & Money Management, dimensions of each of the other categories are included. For each activity I listed the higher order thinking skills that students must exercise to accomplish
the activity. However, some lower order thinking skills also are necessary. For example, to complete activity number 1 students must Understand and Apply (lower order thinking skills) in addition to Evaluate and Create (higher order thinking skills). Notice that each of the activities meet several NCTM standards investigated in this research study. Each activity aligns to Representation, a serious omission from this study’s analysis of FMTs.

**Teacher modifications**

To have students solve worthwhile FMTs educators need to select, modify, or develop worthwhile FMTs that will improve the distribution of FMTs along the previously mentioned three sets of criteria. Worthwhile mathematical tasks as defined in this study are those that require students to exercise their higher order thinking skills, experience more than one NCTM standard, and apply several personal finance concepts and skills. To aid in the selection, modification, and development of FMTs, I suggest that educators consider utilizing a task auditing tool. An auditing tool assists educators as they review or develop a task to determine the personal finance categories, the thinking skills, and the NCTM standards that students are required to exercise as they solve the task.

Three such tools would be useful. These three are: the Task Analysis Guide (Stein & Smith, 1998), the tool developed by Prestage and Perks (2007), and the coding tool I developed for this study. The Task Analysis Guide aids in the determination of a task’s cognitive demand. The Task Analysis Guide recognizes four alternate categories of cognitive demand: Memorization, Procedures without connections to concepts or
meaning, Procedures with connections to concepts and meaning, and Doing mathematics. Prestage and Perks’ (2007) tool aids educators in developing, modifying, and extending tasks for classroom use. Their tool assists educators in changing different aspects of a task, adding additional components to a task, or removing components from a task. My coding tool allows educators to determine the level of thinking skills required by the FMT, the type and number of personal finance categories the FMT supports, and the NCTM standards investigated in this study that the FMT aligns with.

Educators can focus on the synergistic relationship of the two NCTM standards, Geometry and Measurement, and the personal finance category Planning & Money Management. For example, new home builders need to calculate the cost (Planning & Money Management) of flooring by the square foot (Measurement). Landscapers need to determine the cost (Planning & Money Management) of mulch by the cubic yard (Measurement) needed for a circular (Geometry) garden. Shipping costs (Planning & Money Management) are computed by the mile (Measurement) for items that need to be transported across the country. Making students aware of and prepared to make these types of measurements and calculations is valuable realistic practice for their adult lives. Using this synergistic relationship, teachers could add a financial dimension to their geometry class.

Another recommendation I strongly suggest to educators is to select, modify, or develop FMTs that support Representation. The results of this study demonstrate that only 8.3% of the FMTs found within the mathematics textbook series supported Representation. Financial information is often represented in graphs, histograms, charts, tables, and other pictorial illustrations. The ability to understand these financial
representations located in various media such as newspapers, magazines, financial Websites, and television news casts is essential. Using given financial representations to solve FMTs or creating financial representations to model given data may lead to a greater understanding of the ever challenging and complex financial marketplace.

Supplements on the market

Educators should consider the option of using other financial literacy programs, resource materials, and computer programs to provide a balanced financial literacy education for students. A few examples are: *Money Math: Lessons for Life* (Suiter & McCorkle, 2001, 2008), JA Finance Park, and JA’s *Biz Kid$. Because “elem” is in *Biz Kid$ URL, I called my JA regional representative and she assured me that *Biz Kid$ is appropriate for Grades 4-8 (personal communication, July 14, 2009). *Biz Kid$ is a multi-media, multi-faceted program. It includes a weekly 30-minute TV show, classroom activities, Website, and eNewsletter ([www.ja.org/programs/programs_elem_bizkids.shtml](http://www.ja.org/programs/programs_elem_bizkids.shtml)). JA Finance Park is a six-lesson program in which students learn about creating a budget on campus in the fourth lesson, apply it off campus in the fifth lesson, and discuss their experiences in the sixth lesson. Using mathematics *Money Math: Lessons for Life* introduces basic financial concepts to middle school students. Students learn about building wealth, careers, and budgeting concepts, skills and tools. Since the FMTs in this study did not address budgeting, educators could consider using the lessons that support budgeting in *Money Math: Lessons for Life* in their classroom.

Teachers could use children’s financial trade books in the classroom. Examples are: *The Teen Girl’s Gotta-Have-It Guide to Money: Getting Smart about Making It*,
Saving It, and Spending It (Blatt, 2008) and The Kid’s Guide to Money: Earning It, Saving It, Spending It, Growing It, Sharing It (Otfinoski, 1996), The Totally Awesome Money Book for Kids (Berg & Bochner, 2002), Make More Than Your Parents (Bundlie, O’Donnell & Diliddo, 2003), and It’s a Money Thing: A Girls’ Guide to Managing Money (The Women’s Foundation of California, 2008). Teachers could assign each student to read a financial literacy trade book. Then the students could discuss them in modified literature circles or round table discussions with teacher assisted discussion questions. For descriptions of the trade books mentioned above (see Table 25).

Professional Development

Educators, curriculum specialists, and school administrators need professional development in the area of financial literacy education. These groups must acquaint themselves with the results of this study and familiarize themselves with the National Standards in K-12 Personal Finance Education (JumpStart Coalition, 2007).

Educators should request sessions on teaching personal finance topics. Curriculum specialists should investigate and select appropriate in-service presentations for their teachers’ needs. School administrators should allot release time for these sessions. JA and JumpStart Coalition have a speakers’ bureau to offer workshop presentations on their financial literacy product or resource materials.

If the school district is not able to provide in-service or staff development presentations another option could be to attend a seminar, college class, or conference. In November 2009 JumpStart Coalition, in partnership with the National Education Association (NEA), will offer the first national educator conference focused on personal
finance education in Grades K-12. In April 2006 the Federal Reserve Bank of Cleveland hosted a JumpStart Coalition workshop, Building Capacity for Financial Education, for middle school educators. Educators learned about identity theft, insurance, investing, saving, and teen monetary decisions. Included in the event was a tour of the Learning Center and Money Museum where students learn through activities and exhibits about such things as bartering, the history of money, counterfeit bills, and more.

Table 25. Trade Book Supplements for Use in Classrooms

<table>
<thead>
<tr>
<th>Author</th>
<th>Copyright</th>
<th>Title</th>
<th>Content Description</th>
<th>Grade Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>J. Blatt</td>
<td>2008</td>
<td><em>The Teen Girl’s Gotta-Have-It Guide to Money: Getting Smart About Making It, Saving It, and Spending it</em></td>
<td>Types of jobs students can do at various age levels, Working for oneself, Working for others, Interviewing, Resume Writing, Activities to Earn Money, Spending Money, Saving Money (long and short terms), Donations to Charities, Savings Accounts and Compound Interest, Bonds, Stock Market, Credit Cards, Money Mishaps</td>
<td>Middle School, High School</td>
</tr>
<tr>
<td>M. Bundle, K. O’Donnell, &amp; Dr. B. Diliddo</td>
<td>2003</td>
<td><em>Make More Than Your Parents</em></td>
<td>Earning Money, Spending Money, Saving Money, Investing Money, Hatching Ideas, Making a Business Plan, Games and other Financial Books</td>
<td>Middle School, High School</td>
</tr>
<tr>
<td>S. Otfinoski</td>
<td>1996</td>
<td><em>The Kid’s Guide to Money: Earning It, Saving It, Spending It, Growing It, Sharing It</em></td>
<td>Ways to Earn Money, Tips on Starting a Business, Tips on Spending Money, Banking and Savings Accounts, Giving Money, Giving Money in other ways, Borrowing Money, Investing Money</td>
<td>Upper Elementary, Middle School, High School</td>
</tr>
</tbody>
</table>
Because I attended several women and money conferences within the past five years, I suggest that women educators take advantage of these yearly one-day financial workshops that are targeted to women and their finances. For example, in 2009, Ohio Treasurer Kevin L. Boyce’s women and money workshop, Smart Money Choices: The Changing Middle Class, offered thirteen financial topics including: budgeting, credit and debt management, insurance, and kids and money. Participants in these yearly workshops receive a reference book containing information on all the topics presented.

Educators can be learners while on student fieldtrips to such financial institutions as the Federal Reserve Bank of Cleveland and its Learning Center and Money Museum, local banks, savings and loan associations, and credit unions. Financial speakers from the local community, at no cost to the school, are willing to accommodate educators’ financial literacy education needs. For example, for well over 15 years I have asked a financial planner to speak to my seventh grade class before I assign a stock project. I ask him to speak about why people invest, types of investments, how to read stock information in a newspaper, when to invest, where to invest, what amounts to invest, and investing terminology. However, since most of my students now have Internet service in their homes, next year he will be teaching how to read stock information on-line.

Another suggestion would be to contact a local insurance agency for a speaker.

Educators, curriculum specialists, and school administrators could form Study Groups or Reading Circles to discuss selected articles, book chapters, or books dealing with personal finance education, thinking skills, worthwhile tasks, and teaching children about money. Some examples of books to read and that can be obtained in local bookstores are: *The First National Bank of Dad: The Best Way to Teach Kids about*
Money (Owen, 2003), Capitate Your Kids (Whitcomb, 2000), Clark Smart Parents, Clark Smart Kids (Howard & Meltzer, 2005), and Raising Financially Fit Kids (Godfrey, 2003). The advice given in these financial books could not only be used in the classroom, but in the home as well.

Another suggestion to obtain programs and materials for professional development or discussion circles is to contact the nearest college of education and inquire if it has a financial literacy education center or an economics education center. The H. Kenneth Barker Center for Economic Education in the College of Education at The University of Akron has well over 5,000 references in the curriculum library in various economic areas. Some examples are Kids & Money, Personal Finance, Money, Math, Economic Education, Entrepreneurship, and Consumer Education. The programs the center provides are offered as professional development workshops that qualify for graduate credit.

Financial Literacy Education

Financial literacy advocates need professional development activities focused on the mathematics content currently taught in middle school. Mathematics content in textbooks is chosen because of its alignment to the NCTM standards. Textbooks contain many more topics than can be thoroughly taught in one year. Therefore, financial literacy advocates need to be made aware of and realistic about how to include additional financial literacy topics into an already crowded mathematics curriculum. According to Lois Vitt, founder and director of the Institute for Socio-Financial Studies, past observations led her to state that financial literacy advocates are unread in areas of
education literature. However, she also offered that this may be changing (personal communication, July 5, 2009). Therefore, I suggest that attendance at a NCTM conference, classroom observations, and discussions with curriculum specialists might enlighten financial literacy advocates in the areas of mathematics education research and Bloom’s Taxonomy.

Textbooks are deficient as a vehicle for teaching financial literacy concepts and skills. Therefore I suggest this course of action. Financial literacy experts should be co-learners with educators. They must know what mathematics educators are required to teach and the mathematics standards that drive the content to be taught. JA Finance Park and *Money Math: Lessons for Life* (Suiter & Meltzer, 2005) are clearly aligned to the NCTM standards. Alignment of financial materials, kits, and programs to the NCTM standards will lead to a greater potential for financial literacy education to be incorporated into the mathematics curriculum.

Financial literacy experts also must provide professional development for educators. They should increase their efforts through public forums to raise community awareness of the need for financial literacy education and the means to accomplish it. Finally financial literacy experts ought to increase their efforts to secure funding for the distribution of financial literacy materials in print, CD, DVD, and download forms to classroom teachers. For example, several years ago a federal credit union in my community donated over 25 of NEFE’s High School Financial Planning Program textbooks for my eighth grade mathematics class, thus sparking my own commitment to financial literacy education. My experience using such materials suggests that parents
Financial literacy experts need to know how far reaching are the effects of their efforts.

Future Research

The authors of the National Strategy for Financial Literacy (Financial Literacy & Education Commission, 2006) pronounced the necessity to evaluate the means, methods, and materials of financial literacy education by calling for continuous research investigating best practice and resource materials. Although I did obtain matrices developed by Junior Achievement and Money Math: Lessons for Life, to report their products’ alignment to the personal finance standards, more needs to be done. Future studies should continue to pursue the direction of research I have initiated. Suggestions for future endeavors follow.

Since I was the sole coder in this study, replication of my work should be done to ascertain if similar results would be obtained by another researcher. It would be advantageous to study FMTs in other middle school textbook series using the coding forms developed for this research study. Information gleaned from these studies could be used to develop benchmarks for further research and add to the literature on how best to modify or develop worthwhile financial mathematical tasks. Researchers could investigate the FMTs in other grade level mathematics textbooks using this research study’s coding forms. Studying the FMTs in elementary and high school mathematics textbooks would give researchers a comprehensive picture of K-12 financial literacy education. The emerging data could be helpful in making curriculum decisions.
Investigating the FMTs in mathematics textbooks with different instructional approaches may prove informative. Some approaches to consider for further study are: incrementally-based (Saxon), contextual-based (CORD Communications), problem-based (Key Curriculum Press), and standards-based (Glencoe McGraw-Hill). Researchers may discover that one instructional approach is better suited for the development, modification, or selection of worthwhile financial mathematical tasks. In addition, analysis of financial topics and thinking skills in economics, family and consumer sciences, and personal finance textbooks could be accomplished by the modification of the coding forms developed for this study.

Investigating the resource materials of financial literacy programs offered by other organizations like Junior Achievement and NEFE (National Endowment for Financial Education) for their tasks’ alignment to thinking skills levels and the NCTM standards may be of assistance to educators. Many of these organizations align their programs and resource materials to the personal finance standards and the NCTM standards. A list of programs and materials can be found on the JumpStart Website in its clearinghouse section (http://www.jumpstart.org/search.cfm).
REFERENCES


Federal Reserve Bank of Minneapolis. (2002). Economic and financial literacy from the schoolhouse to the statehouse. The Region, 16(3), 18-23.


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Office of Financial Education. (2002). *Integrating financial education into school curriculum: Giving America’s youth the educational foundation for making effective financial decisions throughout their lives by teaching financial concepts as part of math and reading curricula in elementary, middle, and high schools*. Washington DC: Author (ERIC Document Reproduction Service No. ED471873)


Wakefield, J. (1998, June). *A brief history of textbooks: Where have we been all these years?* Paper presented at the meeting of the Text and Academic Authors, St. Petersburg, FL.


APPENDICES
APPENDIX A

STANDARD 1: WORTHWHILE MATHEMATICAL TASKS

National Council of Teachers of Mathematics, 1991

*Professional Standards for Teaching Mathematics*, pg 25

The teacher of mathematics should pose tasks that are based on –

- sound and significant mathematics;
- knowledge of students’ understandings, interests, and experiences;
- knowledge of the range of ways that diverse students learn mathematics;

and that

- engage students’ intellect;
- develop students’ mathematical understandings and skills;
- stimulate students to make connections and develop a coherent framework for mathematical ideas;
- call for problem formulation, problem solving, and mathematical reasoning;
- promote communication about mathematics;
- represent mathematics as an ongoing human activity;
- display sensitivity to, and draw on students’ diverse background experiences and dispositions;
- promote the development of all students’ dispositions to do mathematics.
APPENDIX B

NATIONAL BEST PRACTICES GUIDELINES
FOR PERSONAL FINANCE EDUCATION MATERIALS
(JUMPSTART COALITION’S FIRST EDITION, 2003)

Objectivity

- Materials are objective in content and tone, and often include differing viewpoints. The materials do not deceive or mislead.
- Materials are informative and do not promote a specific brand or provider.
- Materials identify their content creator and list contact information.
- Materials identify organizations that provide substantial funds for development and dissemination.
- Recommended sources of additional information also meet objectivity guidelines.

Aligned to Standards

- Materials correlate to one or more of the national Standards in Personal Finance developed by JumpStart that are available on the web at www.jumpstart.org.
- Materials correlate to state or national standards in one or more of the discipline standards created by the following organizations:
  - Business National Business Education Association http://www.nbea.org
Design

Teaching and Learning

• Materials use plan-language. Technical terms, abbreviations, and acronyms are clearly defined.

• Materials require little additional teacher preparation.

• Materials include student learning objectives and assessment tools, background information, lesson plans, and activities that stimulate student participation.

• Materials appeal to contemporary student interests and identify resources for additional information.

• Lesson plans and activities address a variety of learning styles. Such as visual, auditory, touch and group interaction.

• Copyright restrictions and terms of use are clearly stated.

Target Group

• Materials identify target educational settings, such as traditional classrooms, home schooling, after-school or youth clubs, rural and urban settings.

• Materials identify the intended user, such as teacher, parent, or student.

• The reading level is appropriate for the target group. Materials reflect diversity in areas such as age, race, gender, and household income.
• Text, illustrations, and learning activities are culturally sensitive and appropriate for the target groups. Text is translated if necessary.

Accurate and Up-to-Date

• Materials are regularly revised to be accurate, relevant, and current.
• The date of original publication is clearly stated, along with dates of subsequent revisions.

Available and Accessible

• Resources are readily available to teachers and learners.
• Web-based resources are accessible using the technology and software typically found in schools and public libraries.
• The price for materials, if any, is reasonable compared to similar resources.
• Materials that are also available in special needs formats such as other languages, audio, and Braille are clearly identified.
• New or updated materials are submitted to the JumpStart Personal Finance Clearinghouse at www.jumpstartclearinghouse.org.

Assessment

• Materials are tested before publication under conditions that realistically replicate the target settings and audiences.
• Feedback from teachers and learners shapes development and revision of materials.
• Materials include assessment tools, such as pre-and post-tests and/or examples of acceptable work where appropriate.
- Assessment tools measure both student knowledge and behavioral change as a result of teaching and learning.
APPENDIX C

THE COGNITIVE PROCESS DIMENSION IN

A TAXONOMY FOR LEARNING, TEACHING, AND ASSESSING

Remember

Understand

Apply

Analyze

Evaluate

Create
APPENDIX D

NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS STANDARDS:

PRINCIPLES AND STANDARDS FOR SCHOOL MATHEMATICS (2000)

Numbers and Operations

   Algebra
   Geometry
   Measurement

Data Analysis and Probability

   Problem Solving
   Reasoning & Proof

Communication

Connections

Representation
APPENDIX E

NATIONAL STANDARDS IN K-12 PERSONAL FINANCE EDUCATION


Financial Responsibility and Decision Making

Overall Competency: Apply reliable information and systematic decision making to personal financial decisions.

Standard 1: Take responsibility for personal financial decisions.

Standard 2: Find and evaluate financial information from a variety of sources.

Standard 3: Summarize major consumer protection laws.

Standard 4: Make financial decisions by systematically consider alternatives and consequences.

Standard 5: Develop communication strategies for discussing financial issues.

Standard 6: Control personal information.

Income and Careers

Overall Competency: Use a career plan to develop personal income potential.

Standard 1: Explore career options.

Standard 2: Identify sources of personal income.

Standard 3: Describe factors affecting take-home pay.

Planning and Money Management

Overall competency: Organize personal finances and use a budget to manage cash flow.
Standard 1: Develop a plan for spending and saving.

Standard 2: Develop a system for keeping and using financial records.

Standard 3: Describe how to use different payment methods.

Standard 4: Apply consumer skills to purchase decisions.

Standard 5: Consider charitable giving.

Standard 6: Develop a personal financial plan.

Credit and Debt

Overall Competency: Maintain creditworthiness, borrow at favorable terms, and manage debt.

Standard 1: Identify the cost and benefits of various types of credit.

Standard 2: Explain the purpose of a credit record and identify borrowers’ credit report rights.

Standard 3: Describe ways to avoid or correct debt problems.

Standard 4: Summarize major consumer credit laws.

Risk Management and Insurance

Overall competency: Use appropriate and cost-effective risk management strategies.

Standard 1: Identify common types of risks and basic risk management methods.

Standard 2: Explain the purpose and importance of property and liability insurance protection.

Standard 3: Explain the purpose and importance of health, disability, and life insurance protection.
Saving and Investing

Overall Competency: Implement a diversified investment strategy that is compatible with personal goals.

Standard 1: Discuss how saving contributes to financial well-being.

Standard 2: Explain how investing builds wealth and helps meet financial goals.

Standard 3: Evaluate investment alternatives.

Standard 4: Describe how to buy and sell investments.

Standard 5: Explain how taxes affect the rate of return on investments.

Standard 6: Investigate how agencies that regulate financial markets protect investors.
APPENDIX F

PERMISSION LETTER

February 2, 2009

Maryanne Hamburg
678 Far Ave
Wadsworth, OH 44281

Dear Ms. Hamburg:

You have our permission to include pages 441 and 647 from Math Connects: Concepts, Skills & Problem Solving, Course 1 (© 2009) in your forthcoming dissertation, provided that you agree:

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5) That this permission is non-exclusive, not transferable, and pertains solely to the particular term, territory, medium, usage and distribution specified above.

Please feel free to contact me if you have any questions.

Sincerely,

Mark Schaefer
Permission Coordinator
818-615-2662 (phone)
818-615-2699 (fax)
mark.schaefer@mcgraw-hill.com

www.mheducation.com
APPENDIX G

TYPICAL PRACTICE AND PROBLEM SOLVING SECTION

Determine whether each conclusion is valid. Justify your answer:

4. The principal of a high school randomly selects 50 students to participate in a school improvement survey. Of these, 38 said that more world language courses should be offered. As a result, the principal decides to offer both Japanese and Italian language classes.

5. To evaluate their product, the manufacturer of light bulbs inspects the first 50 light bulbs produced on one day. Of these, 2 are defective. The manufacturer concludes that about 4% of light bulbs produced are defective.

6. To evaluate its service, a restaurant asks its customers to call a number and complete a telephone survey. The majority of those who replied said that they prefer broccoli instead of carrots as the vegetable side dish. As a result, the restaurant decides to offer broccoli instead of carrots.

7. To determine which type of pet is preferred by most customers, the manager of a pet store surveys every 15th customer that enters the store.

8. To determine which school dance theme most students favor, 20 students from each grade level at Lakewood Middle School are surveyed. The results are shown in the table. Based on these results, the student council decides that the dance theme should be *Unforgettable*.

<table>
<thead>
<tr>
<th>Theme</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Sassy Night</em></td>
<td>25</td>
</tr>
<tr>
<td><em>Unforgettable</em></td>
<td>36</td>
</tr>
<tr>
<td><em>All the Hair</em></td>
<td>11</td>
</tr>
</tbody>
</table>

9. To determine whether 15 boxes of porcelain tea sets have been cracked during shipping, the owner of an antique store examines the first two boxes. None of the tea sets have been cracked, so the owner concludes that none of the tea sets in the remaining boxes are cracked.

10. **LAWN**: A researcher randomly surveyed 100 households in a small community to determine the number of households that use a professional lawn service. Of these, 27% of households use a professional lawn service. If there are 786 households in the community, how many can be expected to use a professional lawn service?

11. **PASTA**: A grocery store asked every 20th person entering the store what kind of pasta they preferred. The results are shown in the table. If the store decides to restock their shelves with 450 boxes of pasta, how many boxes of lasagna should they order?

<table>
<thead>
<tr>
<th>Pasta</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Macaroni</em></td>
<td>36</td>
</tr>
<tr>
<td><em>Spaghetti</em></td>
<td>50</td>
</tr>
<tr>
<td><em>Rigatoni</em></td>
<td>12</td>
</tr>
<tr>
<td><em>Lasagna</em></td>
<td>44</td>
</tr>
</tbody>
</table>

12. **FURNITURE**: The manager of a furniture store asks the first 25 customers who enter the store if they prefer dining room tables made of oak, cherry, or mahogany wood. Of these, 17 said they prefer cherry. If the store manager orders 80 dining room tables in the next shipment, how many should be made of cherry wood?
APPENDIX H
TYPICAL MIXED PROBLEM SOLVING PAGE

For Exercises 3–5, make a model to solve the problem.

3. **CARS** Fiona counted the number of vehicles in the parking lot at a store. She counted a total of 12 cars and motorcycles. If there was a total of 40 wheels, how many cars and motorcycles were there?

4. **ART** Miguel is making a drawing of his family room for a school project. The room measures 18 feet by 21 feet. If he uses a scale of 1 inch = 1 foot, what are the dimensions of the family room on the drawing?

5. **MEASUREMENT** Francis has a photo that measures 10 inches by 8 1/2 inches. If the frame he uses is 1 1/4 inches wide, what is the perimeter of the framed picture?

Use any strategy to solve Exercises 6–13. Some strategies are shown below.

**PROBLEM-SOLVING STRATEGIES**
- Draw a diagram.
- Use simple examples.
- Make a model.

6. **DONATIONS** Hickory Point Middle School collected money for a local shelter. The table shows the total amount collected by each grade level. Suppose the school newspaper reported that $5,000 was collected. Is this estimate reasonable? Explain.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>ninth</td>
<td>1,572</td>
</tr>
<tr>
<td>tenth</td>
<td>2,146</td>
</tr>
<tr>
<td>eleventh</td>
<td>1,429</td>
</tr>
</tbody>
</table>

7. **TRACK** Wei can jog one 400-meter lap in 1 1/2 minutes. How long will it take her to run 1,600 meters at the same rate?

8. **BIRD HOUSES** About how many square inches of the bird house will be painted if only the outside of the wood is painted?

9. **BOXES** Juliet is placing 20 cereal boxes that measure 8 inches by 2 inches by 12 inches on a shelf that is 3 feet long and 11 inches deep. What is a possible arrangement for the boxes on the shelf?

10. **MONEY** At the beginning of the week, Marissa had $48.50. She spent $2.75 each of five days on lunch, bought a sweater for $14.95, and Jacob repaid her $10 that he owed her. How much money does she have at the end of the week?

11. **MEASUREMENT** How many square feet of wallpaper are needed to cover a wall that measures 15 3/4 feet by 6 1/2 feet and has a window that measures 2 feet by 4 feet?

12. **BASEBALL** A regulation baseball diamond is a square with an area of 8,100 square feet. If it is laid out on a field that is 177 feet wide and 301 feet long, how much greater is the distance around the whole field than the distance around the diamond?

13. **DVDS** Marc currently has 68 DVDs in his collection. By the end of the next four months, he wants to have 92 DVDs in his collection. How many DVDs must he buy each month to obtain his goal?
APPENDIX I

RECORDING UNIT COUNT FOR SIXTH GRADE TEXTBOOK

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Number of Units</th>
<th>Number of Mathematical Tasks</th>
<th>Number of Financial Mathematical Tasks</th>
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<tr>
<td>1</td>
<td>9</td>
<td>94</td>
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</tr>
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<td>Total</td>
<td>100</td>
<td>1191</td>
<td>76</td>
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APPENDIX J

RECORDING UNIT COUNT FOR THE
SEVENTH GRADE TEXTBOOK

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Number of Units</th>
<th>Number of Mathematical Tasks</th>
<th>Number of Financial Mathematical Tasks</th>
</tr>
</thead>
<tbody>
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<td>1</td>
<td>10</td>
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## APPENDIX K

### RECORDING UNIT COUNT FOR EIGHTH GRADE TEXTBOOK

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<th>Number of Financial Mathematical Tasks</th>
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### CODING FORM A (FINANCIAL CHARACTERISTICS)

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<th>Task #</th>
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| 1. Does the task **specifically remind** the students to **make a financially responsible decision**?  
- Which car payment plan is a financially responsible choice? Explain your reasoning.  
- What is the better buy? Which is the least expensive? | | | |
| 2. Does the task require students to obtain a solution related to a **personal income, company income, organizational income or a career decision**?  
- How much will John earn working six hours every day for five weeks?  
- What will their total sales be if Company A sells 70% of their inventory?  
- In Table A, what company offers the most health care benefits for new employees? | Yes | No | Unsure |
| 3. Does the task require students to make a **budget** or to **spend money without the use of a credit card**?  
- Use the information in the chart to create a budget for Amy that will include saving 10% of her pay each week.  
- Using the ad found at the top of the page, what is the cost of 2 pair of slacks and 3 tops? | Yes | No | Unsure |
| 4. Does the task require students to calculate a solution related to **credit card use or debt**?  
- How much did Jake put on his credit card on the first day of his trip?  
- Anna wants to pay off her $5,000 credit card debt. If she doesn't charge any more items on her credit card and pays the credit card company $250 each month, how long will it take Anna to pay off her credit card debt? | Yes | No | Unsure |
| 5. Does the task require students to calculate a solution related to **risk management and insurance**?  
- How much will Cathy's car insurance payments be if she chooses to pay every three months? | Yes | No | Unsure |
| 6. Does the task require students to calculate a solution related to **saving or investing**?  
- How much will Bill save in one year if he puts 15% of his paycheck in the bank each week at 3% simple interest?  
- Molly has $50 to invest this month. Which stocks can she purchase? | Yes | No | Unsure |
| 7. Does the problem ask the students to calculate **any other kind of financial solution not listed in questions 1 to 6**?  
What kind of a financial solution is asked for? | | | |

*Do not write in this space.*
**CODING FORM B (COGNITIVE CHARACTERISTICS)**

<table>
<thead>
<tr>
<th>Book Title: Math Connects Concepts, Skills, and Problem Solving Course</th>
<th>Page #</th>
<th>Task #</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Does the task require the students to <strong>compare, classify, convert, or give an example</strong> of the given information?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>• Classify Jane’s purchases as needs or wants.</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>• Compare the interest earned on $1000 for 4% and 8%.</td>
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<td>☐</td>
</tr>
<tr>
<td>2. Does the task require students to <strong>apply or use a procedure, a formula, an equation or given operations to obtain a solution</strong>?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>• How long will it take to double $600 at 7% interest using the Rule of 72?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>• Use a problem solving strategy to solve the task.</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>3. Does the task require students to <strong>evaluate, critique, or judge the solution obtained</strong>?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>• Which is the better buy?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>• Jacob chose to pay for his purchase with cash rather than a credit card. Was this a good choice?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4. Does the task require the students to <strong>create, produce, design, or plan</strong> something for the solution?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>• Using the information in Table B, make a three-month budget for Lisa to follow.</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>5. Does the task require the students to use <strong>another type of thinking skill other than remembering or analyzing not mentioned in 1 - 4?</strong></td>
<td>Yes</td>
<td>No</td>
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* Bulleted lines found beneath each question are examples of what a PMT may require a student to do.
<p>| | | | |</p>
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<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>1. Does the task specifically require the students to develop or work with given equations or expressions involving variables to solve the task or be the solution?</td>
<td>Yes</td>
<td>No</td>
<td>Unsure</td>
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<tr>
<td></td>
<td>Which of the following equations can Mary use to find the total cost of six admission tickets plus parking?</td>
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<tr>
<td></td>
<td>Write an expression to represent the total cost of Luke’s purchases.</td>
<td></td>
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<tr>
<td></td>
<td>Use the equation given to find the cost of staying four weeks at the resort.</td>
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</tr>
<tr>
<td>2. Does the task require the students to analyze or distinguish among data found in a specific format such as a graph or find the probability of an event?</td>
<td></td>
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<tr>
<td></td>
<td>Using the pie chart of Joan’s budget, which financial categories take at least 1/8 of her budget?</td>
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<tr>
<td></td>
<td>What is the probability of winning the raffle if you purchased 4 of the 100 tickets sold?</td>
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<tr>
<td>3. Does the task require the students to state, explain, evaluate, defend, justify, or give proof for their reasoning?</td>
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<tr>
<td></td>
<td>Explain your answer.</td>
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<tr>
<td></td>
<td>Evaluate your answer.</td>
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<td>Show how you solved the task.</td>
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<tr>
<td>4. Does the task require the students to make a representation other than an equation of the task or solution?</td>
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<tr>
<td></td>
<td>Make a line graph of stock A’s daily closing prices found in Table 3.</td>
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<td>Make a bar graph or a pie chart of John’s investments’ gains.</td>
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<td></td>
<td>Create a graphic organizer to classify the major types of decisions one has to make when creating a budget.</td>
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<td>5. Does the task ask the students to do other math related activities other than using numbers and operations, solving problems, communicating, or making associations to find a solution?</td>
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<td></td>
<td>What kind of activity is asked for?</td>
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* Bulleted lines found beneath each question are examples of what a FMT may require of a student.
APPENDIX O

SCRIPT FOR CODER TRAINING

1. Give initial remarks.
   You need to understand what to do and how to do it before you can begin to code. You need to carefully and precisely follow the correct procedures when you are coding. You need to select yes if the financial mathematical task (FMT) has the characteristic mentioned in the question on a coding form, and no if it does not. If you are unable to make a decision, then select unsure. It is the coder’s responsibility to follow the coding procedures exactly to ensure everyone is being consistent.

2. Review and explain each coding form’s questions and examples.
   Let us first review the questions on each coding form before we go any further with the coding process itself. If at any time you have a question about my explanation of each question and its examples, please ask. We both need to have the same understanding of each question when we code.

   **Coding Form A (Financial Characteristics)**
   Q1. If the FMT requires the student to focus on any aspect of making a financially responsible choice; select yes to this question.
   Q2. If the FMT requires the student to focus anything pertaining to earning money, inheriting money, getting an allowance or a monetary gift, select yes to this question. Also, if the FMT requires the student to focus on anything that concerns a career topic or skill, select yes to that question.
   Q3. If the FMT requires the student to focus on anything related to budgeting, managing money (example: checking account), or spending money without the use of a credit card, select yes to that question.
   Q4. If the FMT requires the student to focus on anything concerning the use of a credit card, select yes to this question. If the FMT requires the student to focus on a debt or a loan, select yes to this question. When a person takes out a loan, that person incurs a debt.
   Q5. If the FMT requires the student to focus on any kind of insurance matter, select yes to this question.
   Q6. If the FMT requires the student to focus on any type of saving and investing concern such as bank accounts, stocks, bonds, mutual funds, or real estate, select yes to this question.
   Q7. If the FMT requires the student to focus on any other type of financial literacy topic or concern not found in the previous questions, select yes to this question.
Coding Form B (Thinking Skills)

Q1. If the FMT requires the student to focus on comparing, converting, classifying, or giving an example to obtain a solution after reading the information within the FMT, select yes to this question.

Q2. If the FMT requires the student to focus on anything that pertains to applying a procedure, formula, an equation, or given operations to obtain a solution for the FMT, select yes to this question. Procedures are multi-step processes, ways of doing something. Examples are rounding, problem solving strategies, finding the mean, and using proportions.

Q3. If the FMT requires the student to focus on anything concerning his or her evaluating, critiquing, or judging his or her solution or method of arriving at the solution, select yes to this question.

Q4. If the FMT requires the student to focus on creating, producing, designing, or planning something for the solution to a FMT, select yes to this question. The student should be required to develop a unique solution not usually required in previous MTs.

Q5. If the FMT requires the student to think in a manner not questioned by any of the above questions, select yes to this question.

Coding Form C (Math Characteristics)

Q1. If the FMT requires the student to specifically focus on developing or working with a given equation or expression that may involve the use of variables to solve a FMT, select yes to this question.

Q2. If the FMT requires the student to focus on analyzing data in a specific format such as a graph or find the probability of an event, select yes to this question. For example, the student is required to review a given table or chart, determine what needs to be done with specific data found within it, and reach a solution.

Q3. If the FMT requires the student to focus on stating, explaining, evaluating, defending justifying, or giving proof for his or her solution or solution method, select yes to this question.

Q4. If the FMT requires the student to focus on making a representation such as a model, chart, diagram, graphic organizer, picture, construction, figure, or graph, select yes to this question.

Q5. If the FMT requires the student to do other mathematical activities other than using numbers and operations, solving problems, communicating, or making associations to find a solution, select yes to this question.

3. Demonstrate how to code and review coding process and response guidelines.

Now that you are familiar with the questions and examples on each coding form, let’s turn to the coding process. You will be given three coding forms for each FMT and pages copied from a mathematical textbook containing numbered FMTs. Fill in the demographical information on the top of the coding form for each FMT. Then answer questions on the coding forms.

Coding Process: First, look for any additional directions or requirements for a FMT on the top of the copied page or above the FMT that may pertain to the FMT you are about
to code. These requirements are to be coded as well as those requirements within the FMT. Second, read the FMT. Third, read each question and its examples on each coding form. Fourth, make your response decision to each question on each coding form.

4. Code five FMTs one-on-one.
First let’s begin with Coding Form A. Together we will code all five FMTs with Coding Form A. This will keep us focused on the same type of characteristics before we move on to another set of characteristics. Let’s fill in the demographical information for the first FMT. Now let us look at the entire page that the FMT is located on. Are there any additional requirements on the top of the page or above the FMT to also consider as we code each FMT? Let us read the FMTs silently and then read aloud each question and its examples to determine our response to the question. If we agree on the same response decision, we will discuss why we agree and move on to the next FMT. If we do not agree, we will discuss our reasoning for our responses and reach consensus. Let’s begin with Coding Form A. *We are now finished with Coding Form A. Are there any questions about the Coding Form A or the coding process? *Let’s now turn to Coding Form B. We will follow the same procedures as we did for Coding Form A. *We are now finished with Coding Form B. *Let’s turn to Coding Form C. We will follow the same procedures for Coding Form C. *We have finished our one-on-one coding. Do you have any final questions on any coding form or the coding process?

5. Re-review coding process.
We are now ready to code ten FMTs independently. Here are your new coding forms and FMTs. Remember fill in the demographical information on each FMT first. Then look for any additional directions or requirements that might pertain to the FMT on the top of the page or above the FMT. Read the FMT. Read each question and its examples on each coding form. Finally, make your response decision to each question on each coding form.

I will now move to the other end of the table. We will not talk to each other for the independent coding process. When we are finished with the independent coding we will come together and review our response decisions. If the responses are in agreement we discuss our reasoning for further clarification. If the responses do not agree, we discuss our reasoning and come to a consensus. Consensus may be in the form of one of us understanding the point of view of the other and agreeing with it. Or consensus may be in the form of both of us reaching a common insight neither of us had before our discussion.

7. Inquiry of the coding forms, coding process, and coding experience.
There is one last question I need to ask you. Would you please evaluate the coding forms, the coding process, and the coding experience for me? For example, do I need to make any minor adjustments to the coding forms to make any question more
understandable? Do I need to refine my directions in any manner for the coding process? Thank you for your time. Thank you for your help in this study.
## APPENDIX P

### SUMMARY SHEET FOR CODING FORMS A-C

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## Pilot Coding for 5th Grade Textbook for Coder 2

### Coding Form A

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APPENDIX S

PILOT CODING FOR 5TH GRADE TEXTBOOK

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