Measurement of Youth Financial Literacy and Implications in Korea

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Abstract

Purpose: The purpose of this study is to analyze the measurement results of the financial comprehension test conducted ten times in order to study the financial comprehension. **Research design, data, and methodology:** In this study, correct answer rates in the Economics and Finance Literacy Certification Test were analyzed across ten rounds of tests taken by 6,662 high school students in Korea. **Result:** The analysis revealed that Korean high school students' level of financial literacy generally increased as the grade level increased, and the correct answer rates of students at autonomous high schools and special-purpose high schools were statistically different from those of students at general academic high schools and specialized high schools. **Conclusion:** We can therefore infer that students at specialized high schools face limitations in tackling financial problems due to their lack of proficiency in interpretation and calculation of data necessary for real life financial decision-making. In contrast, students at general academic high schools, special-purpose high schools, and autonomous high schools who do not learn finance as a part of their official curriculum at school were lacking in basic financial knowledge as well as knowledge about the financial system compared to students at specialized high schools, highlighting the need for a measure to address the deficiency.

Keywords: Financial Comprehension, Financial Education

JEL Classification Code: A21, G53, G41, I22

1. Introduction

Alan Greenspan, former Chairman of the Federal Reserve Board, once said that "while illiteracy makes one's life uncomfortable, financial illiteracy makes one's survival impossible", underscoring the importance of financial education. The subprime mortgage crisis in the United States in 2008 and the crises around Dongyang Group's CP and KIKO derivatives in Korea reveal that decisions made without adequate financial literacy among ordinary people can not only bankrupt the household but also pose a great threat to the overall macro economy.

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The Bank of Korea and the Financial Supervisory Service have been surveying and publishing the level of financial literacy among South Koreans, and the results from the 2016 survey show that the average score of those in their 20s was 60.2, lower than the overall average of 66.2. This is the lowest score among all age groups except for those in their 70s, and considering this age group's high level of education and their familiarity with multiple-choice questions, their level of financial literacy may be deemed even lower in reality, compared to that of other age groups. For adults in their 20s who are just beginning their financial life, low levels of financial literacy can directly lead to errors and unsound decision-making during financial transactions, and their unsound decision-making, in turn, can lead to failure of credit rating management, resulting in a downgrade of credit rating.

Financial ability is defined as the ability to use knowledge and skills to manage one's financial resources effectively for a lifetime of financial security (Jump$tart, 2015). Financial education increases financial literacy, and the increase in financial literacy positively impacts financial behavior and performance. In particular, financial knowledge and behavior acquired and formed in youth are likely to have a lasting influence even into their adulthood (Becker, 1993). This is why major countries including the members of the OECD are pitching the importance of financial knowledge and strengthening financial education to help people apply this knowledge in daily life. South Korea, on the other hand, is trailing behind in providing systematic financial education to adolescents, which increases the likelihood of adolescents' having bad credit ratings once they become adults in their 20s.

To provide an effective and systematic financial education for adolescents, it is necessary to determine the scope of financial knowledge that is necessary in adolescence and measure the current level of financial literacy among the adolescents. In 2011, the Financial Supervisory Service outlined essential financial knowledge for middle and high school students and announced the 'Financial Education Standards'. In addition, the Financial Supervisory Service distributes 'Life and Finance', a financial education textbook for adolescents, based on the 'Financial Education Standards'. The standards for financial education of adolescents have been established as described above, but systematic measurement of adolescents' financial literacy has not been implemented. The Bank of Korea and the Financial Supervisory Service conduct surveys of financial literacy every year for adults, but any surveys of financial literacy for adolescents tend to be one-off efforts. Unlike previous studies, this paper analyzes the results of a financial literacy survey of adolescents conducted on a regular basis. Therefore, the findings of this study can reveal meaningful insights regarding which areas of financial knowledge and reasoning are lacking in adolescents.

The structure of this paper is as follows. Chapter 2 introduces previous literature on the evaluation of financial literacy; Chapter 3 contains explanations of the questions written to measure the financial literacy of adolescents in this paper and the description of the participants; Chapter 4 is an analysis of the financial literacy test results; and Chapter 5 is the conclusion.

2. Literature Review

In the case of the United States, Jump$tart, a non-profit organization, has been conducting surveys and studies of financial literacy among the youth. Jump$tart has been measuring the financial literacy of 12th graders in public schools (third grade high school students in Korea) every two years since 1997. Despite the efforts of the policymakers, the average financial literacy score of American adolescents has dropped from 57.3 to 48.3 since the survey began, and the proportion of those who scored below the failing mark of 60 increased about 30%, from 44.2% to 73.9%.

The OECD developed 22 questions to measure the financial literacy of adults through the International Network in Financial Education (INFE) in 2008, and is using them to measure the financial literacy of its member countries. Furthermore, the OECD conducted a preliminary survey to measure financial literacy of students from 18 countries including the U.S., France and Italy in 2012 during the Program for International Student Assessment (PISA). According to the survey results, participants from Shanghai (China), a non-member country, had the highest score with an average of 603, and Belgium, Estonia, Australia, New Zealand, the Czech Republic, Poland and Latvia scored higher than the OECD average score of 500. On the other hand, Italy, the U.S., Israel, Spain and France had average scores that were below the overall average. Korea did not participate in the 2012 evaluation.

Although the UK does not conduct financial literacy surveys for adolescents, the Financial Conduct Authority (FCA) developed a model to measure financial capability and conducted a financial capability survey of adults in 2006. From the results of the survey, the FCA pointed out that the lack of preparation of around half of UK's citizens for unexpected situations such as changes in the financial environment or job loss is a

potential risk factor for economic recession, and proposed to enhance education in relevant areas (Bang Hye-young, 2010).

Evaluation of adolescents' financial literacy in Korea has been led by the Financial Supervisory Service (FSS). The FSS has been conducting financial literacy surveys of Korean adolescents since 2003. Every time the FSS conducted the survey, their subjects changed; in 2003, they measured the financial literacy of high school students in Seoul and the wider metropolitan area, and in 2004, they surveyed middle school students, and in 2005, elementary school students. After that, the survey region was extended nationwide. The FSS adjusted the questions and contents according to the subjects of the survey. They increased the number of questions and the scope of contents for students in higher grades; there were 20 questions in the survey for elementary school students, 25 for middle school students, 30 for high school students and 35 for college students. According to the results of the 2003 survey, the average score of Korean adolescents' financial literacy was 48.69, lower than the Jump$tart average of 57.6 from the survey conducted in the United States in 2000. The 2006 survey of high school students in ten schools in the Seoul metropolitan region had an average score of 48.2, an increase of 3.0 points from 2003.

Cho and Park (2006) measured the financial literacy of 552 third grade students from seven high schools in the Jeollanam-do region. The survey used the questions from the FSS's 2006 financial literacy survey for high school students in the metropolitan area. According to the survey results, the financial literacy score of high school students in Jeollanam-do was 46.5, 1.7 points lower than the 48.2 points of students in the metropolitan area.

In 2009, the FSS expanded the survey region nationwide and came up with a new set of survey questions by adding questions developed by Professor Hyun-ja Choi to the Jumpstart questions that were used previously. The average financial literacy score of Korean high school students from the 2009 survey was 55.3 points, which is an increase of 7.1 points compared to 2006. However, there are limitations in any direct comparison due to the difference in the survey questions, as mentioned above. The financial literacy survey of high school students conducted in 2011 used questions devised based on the Financial Education Standards developed by the FSS in 2010 together with KDI. With an average score of 59.3, the 2011 survey had the highest average score among the surveys conducted so far.

In another study, Gyu-seung Cheon (2010) measured the financial literacy of high school sophomores by using 20 five-option multiple-choice questions devised based on the Financial Education Standards. The average correct answer rate of all high school students was 40.1%, and the correct answer rate of female students was slightly higher than that of male students. As for the average correct answer rates by school types, the average correct answer rate of students from specialized high schools was lower than that of students from general academic high schools. Among specialized high school students, the average correct answer rate of commercial high school students who have taken finance-related subjects was higher than that of general academic high school students, but their correct answer rate of questions measuring complex thinking skills was lower than that of general academic high school students. Among the content areas of the survey, 'finance and decision-making' had the highest average score, whereas 'savings and investment' category had the lowest average score among the five content areas, despite high interest from students. In a study by Yoon-ho Lee (2015), a survey was conducted with the same set of questions as in Gyu-seung Cheon (2010), but with both college students and high school students as participants. The results showed that college students had a statistically higher average score than high school students by 1.4 points out of possible score of 20. Looking at the differences between school types, the average financial literacy score of commercial high school students was statistically higher compared to that of general academic high school students, with an average score that is 2 points higher than general academic high school students, out of possible score of 20. In the case of college students, there were no meaningful differences in scores between those who have taken economics/finance courses and those who have not. Humanities and social science students had a statistically higher average score than arts and athletics students. Interestingly, experience in financial transactions such as using bank books or cards led to higher financial literacy in both high school and college students. Young-soo Oh (2015) evaluated the financial literacy of high school students in the Daegu area using the questions from the FSS's financial literacy survey for adolescents. The results showed an average correct answer rate of 56.9%, higher than that of previous financial literacy surveys of adolescents. Unlike Kyu-seung Cheon (2010), the content area with the highest correct answer rate was 'income and expenditure management' (67.2%), but as in Kyu-seung Cheon (2010), the content area with the highest level of difficulty was 'savings and investment' (46.8%).

Recently studies have examined to discover the socio-economic and demographic variables that seem to influence financial knowledge. Herd et al. (2012) measured financial comprehension as the knowledge of his

own financial situations, instead of basic financial concepts. Filipiak and Walle (2015) showed a significant positive relationship between age and financial knowledge.

3. Methodology

3.1. Questions used for analysis

Questions used to measure the financial literacy of adolescents, shown in [Table 1], are based on Jeong-ho Kim's (2010) domestic financial education standards and the FSS's personal finance curriculum created for finance education of adolescents. [Table 1] below shows the contents of the Economics and Finance Literacy Certification Test, categorized according to the Financial Education Standards: 'financial markets and financial services', 'income and expenditure management', 'savings and investment', 'credit and debt management', 'risk and insurance', and 'financial regulations and taxation'

Table 1: Composition of Economics and Finance Literacy Certification Test

	Main Concepts and Contents
Ⅰ. Finance and Decision-making	· finition of finance, functions/characteristics/types of financial markets, role of financial institutions, government regulations · Currency, state of economy, price level, interest rate, exchange rate, tax, terms of financial transaction · Personal finance, protecting financial transactions and preventing financial accidents
Ⅱ. Income and Expenditure Management	· Reasonable budgeting, methods of expenditure · Disposable income, types of income, tax by income type, year-end tax return · Desire, scarcity, benefit analysis, opportunity cost, etc.
Ⅲ. Savings and Investment	· Savings, interest income, taxable products and taxes, non-taxable products, tax breaks, after-tax settlement · Deposit insurance system, protection for financial products, bankruptcy of finance companies, etc. · Definition and the nature of interest rate, determinants of interest rates, prices of bonds, key policy interest rates · Diversification of investments, indirect investment, portfolio, sunk cost, comparative analysis of investment information · Investment decision-making including real estate, securities, bonds and bank deposit · Ways of hedging investment risks, investor protection system
Ⅳ. Credit and Debt Management	· Concept of credit, various uses of credit, credit management including factors affecting credit rating · Concept of debt, cost of borrowing including loan interest · Determination of adequacy of the type and size of debt, repayment, method of repayment of principal and interest · Debtor rights, credit recovery plan
Ⅴ. Risk Management and Insurance	· Types of risk, concept of insurance, types of insurance and social insurance · Retirement, inheritance, gift, donation, preparation for old age with retirement planning
Ⅵ. Financial Regulations and Taxation	· Capital Market Consolidation Act · Deposit insurance system · Financial income tax, securities transaction tax, interest income tax

As the focus of this paper is to analyze financial literacy levels of adolescents, only the questions intended for adolescents (each test includes 25 questions) from all tests starting from the 11th Economics and Finance Literacy Certification Test that took place in October 2014 to the 20th Economics and Finance Literacy Certification Test that took place in November 2016 were analyzed.

[Table 2] shows in detail the percentage of questions that belong in the respective content area in the Economics and Finance Literacy Certification Test. 'Finance and decision-making' and 'income and expenditure management' questions each accounted for 10% of all the questions and 'savings and investment' questions accounted for the largest share at 40%. 'Credit and debt management' and 'risk and insurance' each accounted for 15% of all questions. Finally, the share of questions testing 'financial regulations and taxation' accounted

for 10%. Test questions of subjects in finance are broadly divided into the following categories: simple query, reading prompt, diagram interpretation, calculation, and situation analysis. Among them, the simple query, reading prompt and the diagram interpretation questions each account for 25% of all questions, while calculation problems account for 15% and the situation analysis problems account for the remaining 10%.

Table 2: Percentages of questions by content area and question type

Content Area	Percentage	Question Type	Percentage
Finance and Decision-making	10%	Calculation	15%
Income and Expenditure Management	10%	Simple query	25%
Savings and Investment	40%	Diagram interpretation	25%
Credit and Debt Management	15%	Situation analysis	10%
Risk and Insurance	15%	Reading prompt	25%
Financial Regulations and Taxation	10%		

3.2. Subjects of analysis

This study examines the measurements of financial literacy of 6,662 domestic high school students who have participated in the Economics and Finance Literacy Certification Test over 10 iterations of the test. [Table 3] shows the percentages of students from each school type out of all test takers. Students from specialized high schools accounted for the majority of the test takers at 87%, 9% were from general academic high schools, and 3% were from autonomous private high schools. Students from school types other than specialized high schools account for a small percentage of the total test takers. This is due to a sharp drop in participation from students preparing for college admission after the recent changes in the education policy forbidding the inclusion of extracurricular activities and certificates in student records for college admissions. On the other hand, due to changes in regulations for certifications related to finance which has limited the certificates that high school students can obtain, the number of students from specialized high schools taking the Economics and Finance Literacy Certification Test has increased as students turned to the Economics and Finance Literacy Certification Test as a substitute.

Looking at the test takers by grade, second grade high school students accounted for the largest share with 49%, and the shares of first grade and third grade students were 29% and 13%, respectively. Middle school students were excluded from the analysis due to the small sample size.

Table 3: Percentages of test takers by school type

School Type	Percentage	Grade	Percentage
General Academic HS	9%	Third grade High school	13%
Specialized HS	81%	Second grade High school	49%
Special-purpose HS	1%	First grade High school	29%
Autonomous HS	3%	Middle school & no response	9%

| Other | 0.40% | Total | 100% |

A large share of all test takers are female students, since most of the students majoring in finance and economics in specialized high schools in the commercial field tend to be female. More specifically, 82% of all test takers are female students, making up the majority of all test takers

3.3 Method of analysis

In order to measure the financial literacy levels of adolescents for this paper, test questions were classified into different content areas according to the Financial Education Standards, after which an average correct answer rate was calculated for each content area. T-test and ANOVA were conducted to check whether there were significant differences in the level of financial literacy for each content area according to gender, grade, and school type. Additionally, the average correct answer rate was calculated for each question type to measure financial literacy according to question type. T-test and ANOVA were performed to check for any significant difference according to gender, grade, and school type. Finally, to analyze the effect that financial knowledge in other content areas have on the financial literacy of each content area, multiple regression analysis was conducted by controlling gender, school type, and grade and using the correct answer rates of other content areas independent variables.

4. Results

4.1. Analysis of correct answer rate for each content area and question type

Looking at the average correct answer rate by content area, 'financial regulations and taxation' had the lowest correct answer rate at 50.9%, and 'credit and debt' had the highest average rate at 69.8%. As mentioned above, the average correct answer rate of 'savings and investment' questions, which make up the largest share of questions at 40% of the total of 25 questions, was 56.2%. In the 'financial regulations and taxation' area, simple query questions had a relatively low average correct answer rate of 41.9% compared to other question types. This is in contrast to the relatively high correct answer rate for simple query questions in other content areas. The low correct answer rate of simple query questions in the 'financial regulations and taxation' area indicates that adolescents didn't have as many opportunities to encounter concepts and terms about financial laws and taxation than those in other areas. Situation analysis questions in the same 'financial regulations and taxation' area had a high average correct answer rate of 75.2%. This indicates that adolescents exhibit competency in solving problems about regulation and taxation when there is enough information to deduce relevant concepts, even when they lack prior knowledge. In the 'savings and investment' area, the content area with the biggest share of questions, the average correct answer rate of calculation questions was 48.1%, lower than the average correct answer rates of calculation questions in other content areas. In particular, many of the questions that required calculating compound interest or rate of return of financial products had average correct answer rates under 30%. This is evidence that Korean adolescents lack the kind of computational skills needed to make financial decisions in real life. On the other hand, simple query questions in the 'savings and investment' area testing the 'three elements of investment' and 'types of financial products' had a correct answer rate that was higher than other question types within the same content area, at 63.2%.

Unlike the 'savings and investment' area, the average correct answer rate of simple query questions in the 'financial markets and services', 'income and expenditure management' and 'financial regulations and taxation' areas were relatively lower, at 40.1%, 35.0% and 41.9%, respectively. This shows that adolescents are not fully familiar with the characteristics of financial institutions, as well as concepts and terms related to the Capital Market Consolidation Act and the deposit insurance system. In the 'credit and debt' area, the average correct answer rate of simple query and reading prompt questions were 70.2% and 74.2%, respectively. Specifically, the correct answer rate of simple query questions about the differences between payment methods such as credit and debit cards and questions testing the concept of credit rating were above 80%, indicating that most adolescents had a correct understanding of such concepts. Simple query questions in the 'income and expenditure management' area had an average correct answer rate of 35.0%, the lowest among all question types in the same content area. This suggests that Korean adolescents do not have a firm grasp on concepts of income classification such as transfer income, property income, and business income. Calculation questions in

the 'income and expenditure management' area had an average correct answer rate of 48.2%, similar to the average correct answer rate of calculation questions in the 'savings and investment' area, but relatively low compared to the average correct answer rate of calculation questions in other content areas. Many of the calculation questions in the 'income and expenditure management' area were about calculating the given household's average propensity to consume or disposable income based on the data provided, and the average correct answer rates of these questions were low. In the 'financial regulations and taxation' area, questions involving the basic concepts of the Capital Market Consolidation Act and categorization of non-taxable income had low average correct answer rates. Therefore, the overall correct answer rate of questions about concepts of financial regulations in the 'financial regulations and taxation' area was low, despite the fact that these legal concepts and terms were a part of the essential knowledge included in the Financial Education Standards announced by the FSS.

Table 4: Average correct answer rate by content area and question type

Classification	Simple query	Situation analysis	Calculation	Reading Prompt	Diagram Interpretation	Overall Average
Financial Markets and Services	40.1	76.2	-	64.7	49.1	56.6
Income and Expenditure Management	35.0	60.7	48.2	66.7	56.9	52.3
Savings and Investment	63.2	57.3	48.1	54.8	59.0	56.2
Credit and Debt	70.2	62.2	-	74.2	63.9	69.8
Risk and Insurance	67.8	-	64.9	61.9	53.5	64.7
Financial Regulations and Taxation	41.9	75.2	-	43.2	-	50.9
Overall Average	57.3	66.3	50.2	59.2	57.0	

4. 2. Analysis of correct answer rates according to subject characteristics

[Table 5] below shows the level of financial literacy according to the characteristics of test takers in terms of the given group's average correct answer rate and standard deviation for each content area. Looking at the entire group of test takers, 'credit and debt' questions had the highest average correct answer rate at 69.8% and 'financial regulations and taxation' questions had the lowest correct answer rate at 50.9%. 'Risk and insurance' area had a relatively high average correct answer rate of 64.7% and 'financial markets and services', 'income and expenditure management' and 'savings and investment' areas had average correct answer rates of 56.6%, 52.3%, and 56.2%, respectively.

Looking at the test takers by their gender, 'credit and debt' area had the highest average correct answer rate for both male and female students as in the case for all test takers, with average correct answer rates of 66.9% for males and 70.5% for females. Likewise, for both male and female groups, 'financial regulations and taxation' area had the lowest average correct answer rates, as in the case for all test takers, at 49.7% for males and 51.1% for females. In the 'risk and insurance' area, the average correct answer rates were relatively higher than other content areas for both genders, at 61.3% for male students and 65.4% for female students. T-test was performed to check whether any differences between gender were statistically significant. Results of the t-test showed that male students had a higher average correct answer rate in the 'savings and investment' area, although this difference was not statistically significant. As shown in <Table 3-6>, this difference can be explained by male students' average correct answer rate for calculation questions being statistically higher than those of female students, unlike in the case of other question types. In other words, it may be assumed that the average correct answer rate of the 'savings and investment' area is higher for male students than that of female students due to the male students' higher average correct answer rate of calculation questions included in the 'savings and investment' area. For 'financial markets and services', 'credit and debt' and 'risk and insurance'

areas, female students had higher average correct answer rates than male students, and these differences were shown to be statistically significant.

  Looking at the average correct answer rate of each content area and their standard deviations by grade, the average correct answer rates in the 'financial markets and services' area increased with grade, at 51.7%, 58.1% and 65.2% for first, second, and third grade students, respectively. On the other hand, in the 'income and expenditure management' area, first grade students had an average correct answer rate of 49.3% and second grade students had a higher average at 54.2%, but third grade students had an average that was lower than second grade students, at 50.4%. In the 'savings and investment' area, the average correct answer rate increased with grade; first, second and third grade students had average correct answer rates of 51.4%, 57.6% and 60.7%, respectively. Both 'credit and debt' and 'risk and insurance' areas also had average correct answer rates that increased with grade. 'Financial regulations and taxation', the content area with the highest difficulty level among all content areas, had the lowest average correct answer rates across all grade levels, and as in the case of most content areas, the average increased with the students' grade, from 45.5% to 48.3% to 62.1%. ANOVA was performed to check for statistical differences between each grade's average correct answer rate for each content area, and the results showed that there are statistically significant differences in average correct answer rates across grades for all content areas. In particular, for the 'savings and investment' and 'risk and insurance' areas, the F values were 24.21 and 24.98, indicating a large difference between the correct answer rates across grades, and although the 'income and expenditure management' area showed statistically significant differences in average correct answer rates across grades with an F value of 4.81, the difference was relatively small compared to other content areas.

  Looking at each school type's average correct answer rate for each content area, the average correct answer rate was highest in the 'credit and debt' area and lowest in the 'financial regulations and taxation' area for all school types, as in the case of all test takers. Aside from 'credit and debt' and 'income and expenditure management' areas, students from autonomous high schools had the highest average correct answer rates for all content areas among all school types. Particularly, for the 'financial markets and services' area, the average correct answer rates of students from specialized high schools, general academic high schools and special-purpose high schools were similar to each other at 56.4%, 56.6% and 56.8%, whereas students from autonomous high schools had a much higher average correct answer rate of 70.0%. Special-purpose high schools had the highest average correct answer rate in the 'income and expenditure management' area at 69.6%, with autonomous high schools trailing closely behind at 65.8%, whereas students from specialized high schools and general academic high schools showed relatively lower level of understanding in the area, with average correct answer rates of 51.6% and 56.4%, respectively. In the 'savings and investment' area as well, autonomous high school and special-purpose high school students showed relatively high level of understanding, with average correct answer rates of 69.9% and 68.5%, whereas specialized high school and general academic high school students had relatively lower average correct answer rates for the content area at 55.6% and 58.5%, respectively. In the 'credit and debt' area, special-purpose high school and autonomous high school students had similar average correct answer rates, at 77.9% and 77.8%. Unlike other content areas mentioned above, students from specialized high schools had a slightly higher average correct answer rate than general academic high school students for this content area, with 67.9% for specialized high schools and 69.4% for general academic high schools. In the 'risk and insurance' area, autonomous high school and special-purpose high school students had average correct answer rates of 72.5% and 71.0%, respectively. For the same content area, specialized high schools' average correct answer rate was 64.7%, relatively higher than that of general academic high schools' 62.5%. In the 'financial regulations and taxation' area, the content area with the lowest correct answer rate for all school types, special-purpose high school students' average correct answer rate was 63.9%, higher than the 57.5% for autonomous high school students, unlike other content areas. Specialized high school and general academic high school students had average correct answer rates of 50.8% and 49.8% each for this content area.

  Lastly, ANOVA was performed to verify whether the differences in average correct answer rates across various school types for each content area were statistically significant. The results of the test revealed f values of 1.580 for 'financial markets and services' and 1.540 for 'credit and debt' area, indicating that the differences were not statistically significant in these content areas. On the other hand, the differences in average correct answer rates across various school types for the 'income and expenditure management', 'savings and investment', 'risk and insurance' and 'financial regulations and taxation' areas were all proven to be statistically significant. The 'savings and investment' area had the highest F value of 8.740. 'Financial regulations and taxation' area had an F value of 2.560 and showed statistical differences at the 5% significance level, but the differences were smaller compared to other content areas.

Table 5: **Average correct answer rate by content area for all test takers**

Classification (Num. of people)		Financial Markets and Services	Income and Expenditure Managements	Savings and Investment	Credit and Debt	Risk and Insurance	Financial Regulations and Taxation
All test takers (6662)		56.6 (38.7)	52.3 (38.1)	56.2 (21.8)	69.8 (31.3)	64.7 (0.263)	50.9 (30.3)
Gender	Male (1213)	51.6 (41.2)	51.1 (37.7)	57.1 (21.7)	66.9 (32.1)	61.3 (26.1)	49.7 (31.6)
	Female (5449)	57.7 (39.3)	52.6 (37.3)	56.0 (21.3)	70.5 (30.3)	65.4 (25.8)	51.1 (31.0)
	t value	-4.78*** (0.000)	-1.274 (0.203)	1.635 (10.2)	-3.693*** (0.000)	-5.033*** (0.000)	-1.405 (0.160)
Grade	1st grade (2010)	51.7 (41.6)	49.3 (37.9)	51.7 (20.8)	66.4 (31.0)	59.7 (26..0)	45.5 (30.0)
	2nd grade (3302)	58.1 (40.8)	54.2 (38.0)	57.6 (21.7)	70.9 (30.6)	64.2 (25.3)	48.3 (30..9)
	3rd grade (639)	65.2 (34.0)	50.4 (40.8)	60.7 (20.4)	72.5 (28.5)	73.3 (24.3)	62.1 (29.8)
	F value	11.29*** (0.000)	4.81*** (0.000)	24.21*** (0.000)	7.67*** (0.000)	24.98*** (0.000)	21.74*** (0.000)
School Type	Specialized (5883)	56.4 (39.5)	51.6 (37.2)	55.6 (21.5)	69.7 (30.9)	64.7 (25.9)	50.8 (31.4)
	General Academic (609)	56.6 (41.7)	56.4 (37.7)	58.8 (19.8)	69.3 (29.8)	62.5 (25.6)	49.8 (28.7)
	Autonomous (69)	70.0 (39.8)	65.8 (40.4)	69.9 (19.7)	77.8 (23.2)	72.5 (21.0)	57.5 (26.6)
	Special-purpose (54)	56.8 (36.4)	69.6 (31.4)	68.5 (19.6)	77.9 (26.9)	71.0 (24.7)	63.9 (30.9)
	F value	1.58 (0.148)	4.56*** (0.000)	8.74*** (0.000)	1.54 (0.148)	2.99*** (0.004)	2.56** (0.018)

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

As shown in <Table 3-6> below, the average correct answer rate of situation analysis questions was the highest among all question types for the entire group of test takers, at 66.3%. On the other hand, calculation questions had the lowest average correct answer rate at 50.2%. Simple query, reading prompt, and diagram interpretation questions had similar average correct answer rates at 57.3%, 59.2% and 57.0%, respectively. Looking at the average correct answer rate for each content area by gender, situation analysis questions had the highest average correct answer rate for both males and females, as in the case for all test takers, at 65.0% for males and 66.5% for females. For female students, the question type with the lowest average correct answer rate was the calculation type, at 48.9%. For male students, diagram interpretation questions had the lowest average correct answer rate at 55.5%. With the exclusion of calculation questions, female students had higher average correct answer rates than male students for all question types. There was a particularly big difference for simple query questions; female students had an average correct answer rate of 58.2% and male students had 52.8%. T-test was performed to verify whether the differences in average correct answer rates between genders were statistically significant. The results for the calculation questions showed a t-value of 5.232, indicating that the average correct answer rate of male students was higher than those of female students with statistical significance. On the other hand, female students' average correct answer rates were statistically higher than those of male students for simple query and reading prompt questions at the 1% significance level. For diagram interpretation questions, female students' average correct answer rate was statistically higher than those of male students at the 2% significance level.

Looking at average correct answer rates and standard deviations for each question type by grade, a pattern similar to that of the entire test taker group discussed above was found. Situation analysis questions had the highest average correct answer rates among all question types for all grades. For situation analysis questions, the average correct answer rate was higher for higher grades; first, second and third grade high school students had average correct answer rates of 60.7%, 66.6% and 71.1%, respectively. However, for calculation questions, a question type that was generally difficult for all test takers, third grade students' average correct answer rate was lower than that of second grade students. For calculation questions, first, second and third grade students had average correct answer rates of 50.1%, 54.8% and 48.2%, respectively. In the case of simple query questions, the average correct answer rate increased with grade; first grade students had an average correct answer rate of 51.1%, second grade students had 57.2%, and third grade students had 64.2%. The average correct answer rate also increased with test takers' grades in both reading prompt and diagram interpretation questions.

Verification process was carried out to check for statistical significance of the differences in average correct answer rates between grades for each question type. The results showed that simple query, situation analysis, reading prompt and diagram interpretation questions all had average correct answer rates that rose with each grade, and simple query and reading prompt questions showed statistical difference at the 1% significance level. Diagram interpretation questions showed statistical difference at the 2% significance level. Calculation questions, unlike other question types, had average correct answer rates that had negative correlation to grades, with statistical difference at the 1% significance level. This is because for calculation questions, third grade students' average correct answer rate was much lower than that of second grade students, as explained above. Variations in the average correct answer rates between school types for each content area were found to be different from the pattern of correct answer rates for all test takers, unlike the other analysis criteria discussed above, and showed different patterns according to the characteristics of the school type. Specialized high schools, the group with the highest number of test takers, had a distribution of correct answer rates that was similar to the one for all test takers across all question types. In the case of specialized school students, situation analysis questions had the highest average correct answer rate at 65.6%, while calculation questions had the lowest average correct answer rate at 48.6%. Simple query, reading prompt, diagram interpretation questions had similar average correct answer rates at 57.6%, 59.1% and 56.7%, respectively. Looking at students from general academic high schools, the question type with the highest average correct answer rate was situation analysis type, as in the case of specialized schools, at 70.2%. The lowest average correct answer rate was for simple query type, at 53.5%. General academic high schools' average correct answer rates of simple query and reading prompt questions were lower than that of specialized high school students, and the average correct answer rate of reading prompt questions was 58.3%. For situation analysis, calculation and diagram interpretation questions, general academic high school students had higher average correct answer rates than specialized high school students, at 70.2%, 61.9% and 57.3%, respectively. Autonomous high schools had the lowest average correct answer rate for simple query questions among all school types, at 53.0%. Autonomous high schools' average correct answer rates of situation analysis, calculation, reading prompt, and diagram interpretation questions were 77.1%, 73.5%, 71.7% and 70.2%, respectively. Autonomous high schools' average correct answer rates of situation analysis and diagram interpretation questions were the highest among all school types. Special-purpose high school students' average correct answer rates of simple query and calculation questions were 64.7% and 75.6% each, highest among all school types. The average correct answer rates of the remaining question types—situation analysis, reading prompt and diagram interpretation questions—were the second highest after autonomous high schools, at 72.2%, 64.6% and 67.2%, respectively.

ANOVA was performed to verify whether the differences in average correct answer rates across various school types for each question type were statistically significant. The results showed that for all question types, the differences in the average correct answer rates between school types were statistically significant. Among the question types, calculation questions had the highest F value at 14.510, indicating the biggest difference between school types among all question types. This is because for calculation questions, specialized school students had an average correct answer rate that was much lower than those of students from other school types.

Table 6: Average correct answer rate by question type for all test takers

Classification (Num. of people)		Simple query	Situation analysis	Calculation	Reading prompt	Diagram Interpretation
All test takers (6662)		57.3 (22.6)	66.3 (32.4)	50.2 (40.2)	59.2 (23.7)	57.0 (23.7)
Gender	Male (1213)	52.8 (27.2)	65.0 (32.9)	55.8 (41.4)	57.2 (24.6)	55.5 (23.5)

	Female (5449)	58.2 (26.4)	66.5 (32.2)	48.9 (39.8)	59.6 (23.4)	57.3 (22.9)
	t value	-6.496*** (0.000)	-1.394 (16.3)	5.232*** (0.000)	-3.167*** (0.002)	-2.363** (0.018)
Grade	1st grade (2010)	51.1 (27.1)	60.7 (33.0)	50.1 (40.3)	55.0 (23.5)	51.6 (22.1)
	2nd grade (3302)	57.2 (26.1)	66.6 (32.5)	54.8 (39.7)	60.3 (23.8)	57.1 (23.4)
	3rd grade (639)	64.2 (23.1)	71.1 (29.7)	48.2 (45.3)	64.8 (22.4)	64.5 (22.9)
	F value	24.01*** (0.000)	12.01*** (0.000)	6.05*** (0.000)	18.18*** (0.000)	29.63*** (0.000)
School Type	Specialized (5883)	57.6 (26.6)	65.6 (32.5)	48.6 (40.1)	59.1 (23.8)	56.7 (23.1)
	General Academic (609)	53.5 (27.0)	70.2 (30.5)	61.9 (38.4)	58.3 (21.9)	57.3 (22.1)
	Autonomous (69)	53.0 (26.5)	77.1 (26.9)	73.5 (40.9)	71.7 (19.2)	70.2 (20.4)
	Special-purpose (54)	64.7 (25.7)	72.2 (28.3)	75.6 (29.4)	64.6 (26.4)	67.2 (24.0)
	F value	3.170*** (0.002)	3.400*** (0.001)	14.510*** (0.000)	3.430*** (0.001)	5.650*** (0.000)

4. 3. Analysis of factors influencing correct answer rates for each content area

[Table 7] shows the results of regression analysis conducted to find out the factors influencing the average correct answer rate of each content area, taking the average correct answer rates of other content areas as independent variables. The results showed that knowledge in one content area had a positive effect on the understanding of other content areas. In most cases, the average correct answer rate of the content area taken as the dependent variable increased with statistical significance when there were increases in average correct answer rates of other content areas. This suggests that acquiring financial knowledge in one content area can be helpful in acquiring financial knowledge in other content areas. In terms of gender, correct answer rates were higher for male students in 'savings and investment', but for rest of the areas, i.e. 'financial markets and services', 'income and expenditure management', 'credit and debt management' and 'risk and insurance', female students' level of financial literacy was statistically higher. This aligns with the findings of Gyu-seung Cheon (2010), and, for this particular study, can be explained by the fact that the test taker group includes many female students from specialized high schools who have received finance-related education at school. Unlike other content areas, male students have a statistically higher average correct answer rate in the 'savings and investment' area because male students have statistically higher correct answer rates for calculation questions than female students, as can be seen on [Table-6]. In other words, we can infer that male students' higher ability to solve the calculation questions included in 'savings and investment' area led to the results shown below. Looking at the level of financial literacy by school grade, the results showed that correct answer rates were statistically higher for higher grades. Comparing the level of financial literacy across schools, for questions in 'income and expenditure management' and 'savings and investment', the correct answer rates of students at general academic high schools, special-purpose high schools, and autonomous high schools were significantly higher than those of students at specialized high schools. As was shown earlier in the analysis of financial literacy by gender, this difference can be attributed to the fact that the correct answer rates for students at specialized high schools were relatively lower for calculation and diagram interpretation questions compared to those of students at other schools. That is, the results can be explained by the high proportion of calculation and diagram interpretation questions in the 'income and expenditure management' and 'savings and investment' areas. As can be checked in the Appendix, in the model that controls for the question type, no significant difference was observed between the correct answer rates across the different school types.

Table 7: Regression analysis of factors affecting financial literacy by content area

Classification	Financial Markets and Services	Income and Expenditure Management	Savings and Investment	Credit and Debt	Risk and Insurance	Financial Regulations and Taxation
Financial Markets and Services		0.067***	0.043***	0.060***	0.030***	0.078***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Income and Expenditure Managements	0.074***		0.049***	0.046***	0.067***	0.018*
	(0.000)		(0.000)	(0.000)	(0.000)	(0.085)
Savings and Investment	0.193***	0.197***		0.323***	0.321***	0.298***
	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)
Credit and Debt	0.106***	0.074***	0.128***		0.036***	0.004
	(0.000)	(0.000)	(0.000)		(0.001)	(0.758)
Risk and Insurance	0.086***	0.173***	0.206***	0.058***		0.227***
	(0.000)	(0.000)	(0.000)	(0.001)		(0.000)
Financial Regulations and Taxation	0.153***	0.031*	0.131***	0.004	0.155***	
	(0.000)	(0.085)	(0.000)	(0.758)	(0.000)	
Male	-0.056***	-0.031**	0.014**	-0.036***	-0.031***	0.005
	(0.000)	(0.025)	(0.039)	(0.000)	(0.000)	(0.603)
1st grade	-0.030**	-0.016	-0.034***	-0.013	-0.012*	0.002
	(0.010)	(0.152)	(0.000)	(0.133)	(0.077)	(0.785)
3rd grade	0.047*	-0.077***	-0.008	-0.001	0.065**	0.101**
	(0.011)	(0.000)	(0.349)	(0.952)	(0.000)	(0.000)
General Academic HS	0.026	0.039**	0.035***	-0.003	-0.014	-0.018
	(0.186)	(0.032)	(0.00)	(0.820)	(0.222)	(0.184)
Autonomous HS	0.106**	0.085*	0.101***	0.028	0.025	-0.001
	(0.032)	(0.072)	(0.000)	(0.460)	(0.401)	(0.997)
Special-purpose HS	-0.073	0.141**	0.084***	0.071	-0.001	0.071
	(0.237)	(0.016)	(0.004)	(0.124)	(0.988)	(0.106)
Constant	0.171***	0.186***	0.240***	0.412***	0.260***	0.243***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	4,768	4,768	1,149	4,768	4,768	3,143
R-squared	0.078	0.069	0.371	0.144	0.220	0.171

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

5. Conclusion

In this study, correct answer rates in the Economics and Finance Literacy Certification Test were analyzed across ten rounds of tests taken by 6,662 high school students in Korea. The analysis revealed that Korean high school students' level of financial literacy generally increased as the grade level increased, and the correct answer rates of students at autonomous high schools and special-purpose high schools were statistically different from those of students at general academic high schools and specialized high schools. In terms of gender, the level of financial literacy was generally higher for female students than male students. In terms of content area, the correct answer rates for 'credit and debt' and 'financial regulations and taxation' areas were relatively higher and lower than those for other areas, respectively. Questions in 'financial regulations and taxation' were mainly related to personal finance, such as questions about the deposit insurance system and non-taxable financial products, and hence the fact that the area had a low correct answer rate shows that high school students have a weak understanding of financial knowledge relevant in real life.

Looking at the correct answer rates by question type, correct answer rates tended to be higher in general for situation analysis questions. Students at specialized high schools had very low correct answer rates for calculation questions compared to students at other schools, but had higher correct answer rates for simple query questions than students at other school types, except for special-purpose high schools. Hence, the results demonstrated that students at specialized high schools were well-aware of financial concepts in simple query questions through school classes and preparation of certification exams, but were lacking in terms of diagram interpretation and calculation skills. This implies that the current financial education curriculum at specialized high schools puts a disproportionate amount of focus on piecemeal memorization of concepts. We can therefore

infer that students at specialized high schools face limitations in tackling financial problems due to their lack of proficiency in interpretation and calculation of data necessary for real life financial decision-making. In contrast, students at general academic high schools, special-purpose high schools, and autonomous high schools who do not learn finance as a part of their official curriculum at school were lacking in basic financial knowledge as well as knowledge about the financial system compared to students at specialized high schools, highlighting the need for a measure to address the deficiency.

Unlike previous studies of financial literacy that analyzed one-off measurements, this study evaluated adolescents' level of financial literacy by comparing periodic measurements and hence was able to perform a multifaceted evaluation of adolescents' financial literacy by comparing the correct answer rates of different question types within each content area. However, because the test taker group mainly consists of female students from specialized high schools, one limitation lies in the fact that the data may not be representative of the level of financial literacy for all high school students in Korea.

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