The Stock Market Game™ Study: Brief Report

Submitted July 2009

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Prepared with a grant from

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Investor Education
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3901_08/09

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INTRODUCTION

The Stock Market Game™

The Stock Market Game is an educational program supported by the Securities Industry and Financial Markets Association (SIFMA) Foundation for Investor Education. The program is designed to teach students the importance of saving and investing by building their financial literacy skills. Students manage imaginary investments online, competing against other individuals and teams both in their classroom and around the world. To supplement the hands-on game play, The Stock Market Game provides teachers with a series of unit-based lessons to assist student instruction.

Research Questions

Learning Point Associates was awarded a grant by the FINRA Investor Education Foundation to conduct a study of the impact of The Stock Market Game on students and teachers. Specifically, the study was designed to answer four research questions:

1. What is the impact of The Stock Market Game on academic achievement in mathematics for students in Grades 4–10?

2. What is the impact of The Stock Market Game on investment knowledge for students in Grades 4–10?

3. How do teachers implement The Stock Market Game?

4. What is the effect of The Stock Market Game on teacher investment practices?

Structure of the Report

After a description of the study methodology, the findings are reported in the following four sections:

- The impact on student achievement

- A description of teacher implementation practices and student experiences

- The effect of implementation on student learning

- The effect on teacher investment practices

STUDY METHODOLOGY

Overall Design

During the 2008–09 school year, Learning Point Associates conducted a randomized controlled trial (RCT) and surveyed Stock Market Game teachers nationwide. The RCT examined the causal impact of playing the 15-week version of The Stock Market Game on student achievement, and the nationwide survey provided information on implementation of the game and teacher investment practices. Prior to the study, data-collection instruments were developed, administered, psychometrically evaluated, and, where appropriate, revised. This time was also used to refine study logistics, including study recruitment, communications with teachers, and online instrument administration. Final data were analyzed psychometrically to create summarized scale scores, and statistically using hierarchical linear modeling[1] to measure program impact and implementation.

Tests and Surveys

Four types of instruments were developed for this study. These instruments included several age-appropriate student versions.

- Mathematics test (Grades 4–6, Grades 7–10)

- Investor knowledge test (Grades 4–5, Grades 6–8, Grades 9–10)

- Student survey (Grades 4–6, Grades 7–10)

- Teacher survey

The student mathematics and investor knowledge tests included pretest and posttest versions, administered before and after a 15-week game session. The mathematics tests were built from publicly available items from the National Assessment of Educational Progress (NAEP), a highly credible test known as "the Nation's Report Card." The tests assessed the mathematical concepts related to The Stock Market Game,[2] including number properties and operations, data analysis and probability, and, for Grades 7–10, algebra. The investor knowledge tests were developed with the help of experts in the area of testing financial literacy and aligned to the curriculum content of The Stock Market Game.[3]

The student surveys were designed to measure students' engagement with the game, how much students enjoyed and learned from interacting with each other, their development of financial life skills, and the application of student learning outside the classroom.

The teacher survey was designed to measure how teachers implemented the game and to provide a profile of teacher investment practices. Measurement of the game's implementation focused on teacher classroom practices, use of game-related materials, and making connections with the outside world. Measurement of teacher investment practices focused on the influence of teaching The Stock Market Game on engaging in financial planning, conducting financial research, and using investment products and services.

Sample

Teachers were invited to sign up to participate in the RCT several months before the fall 2008 semester began. Approximately 1,200 teachers signed up to participate. Of those who met the eligibility requirements (i.e., teaching the 15-week game and having students in Grades 4–10), 823 were selected to be a part of the study. Of these, 406 were randomly assigned to play The Stock Market Game (the treatment group) and 417 were assigned not to play (the control group). Not all the selected teachers participated in the study.[4] Of the 823 who were selected, 568 teachers confirmed participation; 296 teachers and their students participated as the treatment classrooms and 272 teachers and their students participated as the control classrooms.

Of these 568 teachers, 555 teachers submitted student test data. There were 522 classrooms that provided student test data for the investor knowledge test (269 treatment, 253 control) and 509 classrooms that provided student test data for the mathematics tests (265 treatment, 244 control).

The nationwide survey was sent to approximately 12,300 teachers, and 4,804 surveys were completed, including responses from 230 treatment teachers and 229 control teachers. In addition, 2,731 students in 187 treatment classrooms responded to the student survey. Table 1 summarizes the teachers and students who participated in the study.

Table 1. Summary of Study Participants

Sample	Treatment	Control	Non-RCT	Total
Randomly assigned classrooms	406	417	n/a	823
Confirmed classroom participants	296	272	n/a	568
Classrooms submitting test data				
Mathematics	265	244	n/a	509
Investor knowledge	269	244	n/a	522
Individuals submitting survey data				
National survey of teachers	230	229	4,345	4,804
Survey of (treatment) students	2,731	n/a	n/a	2,731

Characteristics of Treatment and Control Groups

The interpretation of the results of random assignment studies is based on the assumption that the control and treatment groups are equivalent on both observed and unobserved characteristics. In this way, the control group serves as a model for what would have happened to members of the treatment group had they not been exposed to an intervention. Even when there is randomization, however, there is a chance that the groups are different in some way. To check this, Learning Point Associates compared the treatment and control groups on all characteristics for which there were data.

In this study, the treatment and control groups did not differ significantly on any of the characteristics for which we had data. Specifically, the treatment and control groups were not different in terms of the following characteristics:

- Years of classroom teaching experience

- Years of experience teaching The Stock Market Game

- Grade level taught

- Locale (urban, suburban, or rural)

- Region of the country

- Percentage of minority students in the school

- Percentage of students who qualify for free and reduced-price lunch in the school

The treatment and control groups among the younger students did differ significantly on their average scores on the pretests.[5]

Learning Point Associates also checked for differences on observable characteristics between treatment and control group for those who did (or did not) submit data. The only difference between treatment and control groups was on one characteristic: the number of classes in which a teacher planned to teach the game in the upcoming year. Of those teachers who reported that they might teach The Stock Market Game in six or more classes, those in the treatment group were more likely to submit data than those in the control group.

FINDINGS

The section presents the answers to the research questions in four sections. The first subsection addresses the impact of playing The Stock Market Game on student achievement. The second subsection discusses the major findings about game implementation from the perspective of the teachers and the students. Third is a section describing the effects that various amounts of implementation have on student learning. Finally, the last subsection discusses the effect that teaching The Stock Market Game has on teacher investment practices.

Impact on Student Achievement

This study measured the impact of playing The Stock Market Game on student achievement using an RCT study design. The RCT design supports statements of causality such that any significant changes observed in student achievement can be said to have been caused by playing (or not playing) The Stock Market Game. The results support statements of causality if the students who played the game scored higher *or lower* than the students who did not play the game.

Several statistical methods were used to fit various models to the achievement data.[6] This approach, known as a sensitivity analysis, ensures that the findings are consistent under a variety of statistical scenarios. Only one of these models is discussed here,[7] but the interested reader is invited to consult the full report for a complete discussion of findings.

Differences in achievement are presented in terms of the student test scores[8] and further quantified in terms of effect sizes and confidence intervals.[9] An effect size is a single estimate of a treatment effect. A confidence interval is a range of values, a range of estimates, for that treatment effect. An effect size (and the related confidence interval) provides a measure for the *magnitude* of a treatment effect. In a recent paper examining effect size change for a number of standardized tests, Hill, Bloom, Black, and Lipsey (2007), derive empirical average effect sizes for students in Grades K–12 over the course of a year. Hill et al. further provide average effect sizes from the results of more than 60 randomized controlled trials that are categorized according to student grade level and the specificity of the test. We use these empirical benchmarks from this recent report to interpret the magnitude, and meaning, of the effect size estimates for this program's impact.

These analyses revealed that students who played The Stock Market Game outperformed students who did not play. Details follow for the mathematics and investor knowledge tests.

Mathematics

Figure 1 illustrates the mathematics findings separately for students in Grades 4–6 and in Grades 7–10.

**Figure 1. Average Score on Mathematics Tests
for Treatment and Control Groups**
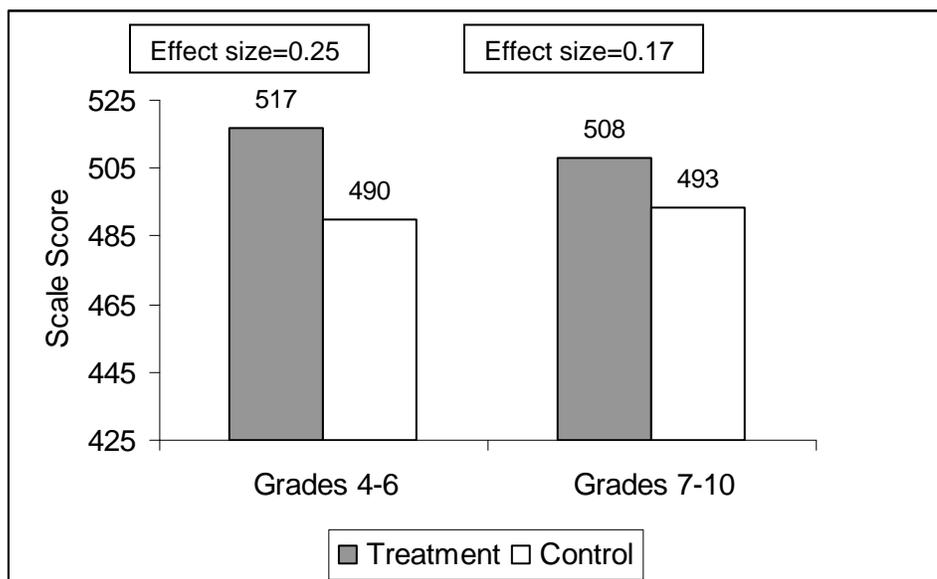
For the younger students, the treatment group scored approximately 27 points higher than the control group. This difference is equivalent to an effect size of 0.25, with a confidence interval ranging from 0.11 to 0.40. In the absence of an intervention, during the course of one full year, students in these grades might demonstrate an effect-size change in mathematics between 0.30 and 0.56 (Hill et al., 2007). Therefore, a difference of 0.25 standardized units after only a 15-week period could be considered substantial.[10]

Another interpretation of this effect size comes from a comparison with other randomized studies. Hill et al. report that for students in elementary schools who are tested with a standardized test that has a narrow focus,[11] the average effect size for the intervention is 0.23. Therefore, playing The Stock Market Game could be considered to have an effect similar to that of other targeted interventions.

For the older students, the treatment group scored approximately 15 points higher than the control group. This difference is equivalent to an effect size of 0.17. The confidence interval for this effect size ranges from 0.02 to 0.32. In the absence of an intervention, during the course of one full year, students in these grades might demonstrate an effect-size change in mathematics between 0.14 and 0.32. Therefore, after a 15-week intervention, a difference between groups equal to an effect size of 0.17 could be considered substantial. This effect size, however, is slightly lower than that from other interventions for high school students, which report an average effect size of 0.28 (Hill et al., 1997).

Investor Knowledge

Figure 2 illustrates the investor knowledge findings for elementary, middle, and high school students.

**Figure 2. Average Scores on Investor Knowledge Tests
for Treatment and Control Groups**
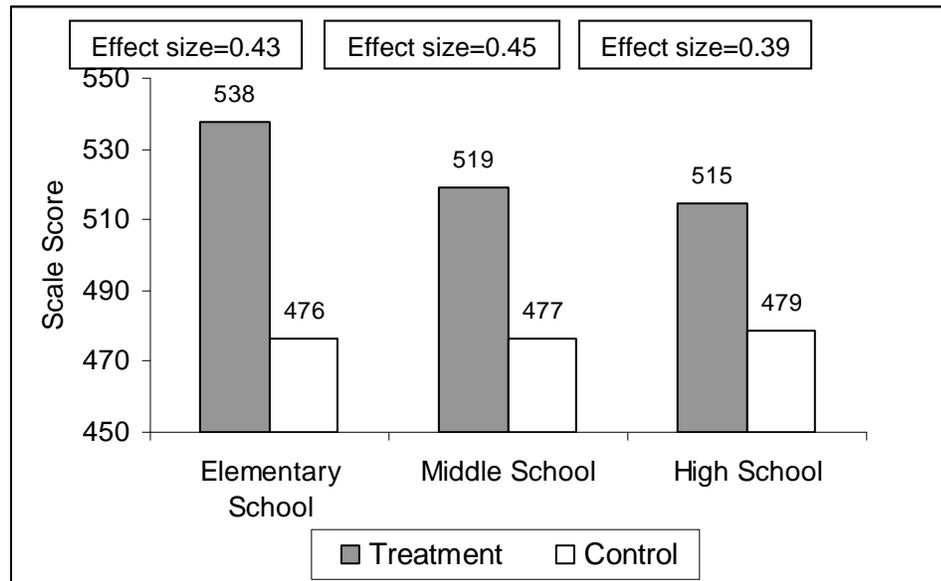
For elementary students, the treatment group scored approximately 62 points higher than the control group, corresponding to an effect size of 0.43, with a confidence interval ranging from 0.24 to 0.61.

After a full year of schooling without an intervention, elementary students in Grades 4 and 5 might demonstrate an effect size change in mathematics between 0.41 and 0.56 (Hill et al., 2007). Therefore, a difference of 0.43 standardized units after a 15-week period could be considered substantial. In comparison with other randomized studies using a specialized test, the average effect size for elementary school students is 0.44. Therefore, playing The Stock Market Game could be considered to have an effect similar to that of other targeted interventions.

For middle school students, the treatment group scored approximately 42 points higher than the control group; a difference equivalent to an effect size of 0.45. The confidence interval for this effect size ranges from 0.29 to 0.60. In the absence of an intervention, during the course of one full year, students in Grades 6 and 7 might demonstrate an effect size change anywhere between 0.22 and 0.41 (Hill et al., 2007). Therefore, a difference of 0.45 standardized units after a 15-week period could be considered substantial. This effect size is slightly lower, however, than that from other interventions for middle school students, which report an average effect size of 0.51 (Hill et al., 1997).

For high school students, the treatment group scored approximately 36 points higher than the control group. This difference is equivalent to an effect size of 0.39. The confidence interval for this effect size ranges from 0.16 to 0.62. In the absence of an intervention, during the course of one full year, students in Grades 9 and 10 might demonstrate an effect-size change in mathematics anywhere between 0.14 and 0.25 (Hill et al., 2007). Therefore, a difference of 0.39 standardized units after a 15-week period could be considered substantial. In other randomized studies, using a specialized test, the average effect size for high school students is 0.27.

Therefore, the effect of playing The Stock Market Game could be considered to have a stronger effect than other targeted interventions.

Overall, in both mathematics and investor knowledge, there is a significant difference between students who played The Stock Market Game and those who did not, with those who played substantially outperforming those who did not. Table 2 provides an overall summary of the student achievement findings for both mathematics and investor knowledge.

Table 2. Summary of Achievement Findings for Mathematics and Investor Knowledge

Mathematics	Grades 4–6		Grades 7–10
Effect size	0.25		0.17
Confidence interval	0.11 to 0.40		0.02 to 0.32
Magnitude of change	Substantial		Substantial
Comparison to other RCT intervention studies	Similar		Slightly weaker
Investor Knowledge	**Grades 4–5**	**Grades 6–8**	**Grades 9–10**
Effect size	0.43	0.45	0.39
Confidence interval	0.24 to 0.61	0.29 to 0.60	0.16 to 0.62
Magnitude of change	Substantial	Substantial	Substantial
Comparison to other RCT intervention studies	Similar	Slightly weaker	Stronger

Implementation

The teacher and student surveys provided information about the implementation of the program. The various methods reported by teachers for implementing The Stock Market Game are presented, followed by a description of student experiences playing the game. Lastly, there is a brief discussion of the interaction between teacher implementation and student experience.

Teacher Implementation of The Stock Market Game

Teacher implementation of The Stock Market Game was measured with three constructs: teachers' use of basic or advanced classroom teaching practices; the use and helpfulness of materials created by The Stock Market Game; and the use of practices to connect the program to resources outside the classroom. A summary of the findings for each construct—*practices, materials,* and *connections*—follows.

The majority of teachers indicated that they employed basic, familiar practices for teaching the program; fewer than half reported using more advanced teaching practices. Teachers were asked about a variety of approaches to engage students in the program. More than half the teachers surveyed (56 to 98 percent) reported using basic practices, such as introducing the foundational concepts of stock, company, and ticker; posting team rankings; and recognizing student achievement. Fewer than half the teachers (8 to 48 percent) reported using more advanced practices, such as posting student work, playing the game with the students, and

requiring students to participate in the InvestWrite program (a writing competition in which students compose essays about financial topics).

The majority of teachers reported that they used the basic program-created materials to teach The Stock Market Game; fewer than half reported using materials that go beyond basic use of the program. Teachers were asked about their use of materials created by The Stock Market Game, such as lessons, worksheets, projects, and assessments. More than half the teachers surveyed (54 to 88 percent) reported using basic materials, that is, those materials typically used to teach a course, such as lessons, publications, and worksheets. Fewer than half the teachers (20 to 43 percent) reported using materials that go beyond basic implementation of the program, such as financial projects, postgame follow-up on investments, and InvestWrite.

While not all teachers used the materials, the majority of those who did reported that the materials were moderately or very helpful. Teachers who used materials created by The Stock Market Game rated the helpfulness of those resources for teaching the program. Overall, these teachers reported the materials to be helpful, with more than half (60 percent to 90 percent) rating each of the materials as *moderately* or *very helpful*. Teachers generally rated core materials (e.g., lessons for teaching the idea of a stock, company, and ticker), other general lessons, and worksheets for implementation as the most helpful. For those materials that only some teachers used (such as InvestWrite, financial projects, and postgame follow-through), those who used them found them *moderately* or *very helpful* (60 to 83 percent).

The majority of teachers reported that in teaching the class, they connect the program to resources outside the classroom that are easy to access; fewer than half made use of less readily accessed resources. Teachers were asked about ways they connect the game to people and events outside the classroom. More than half the teachers surveyed (61 to 97 percent) reported making connections that are easy to arrange and integrate, such as connecting The Stock Market Game to current events, discussing careers in the financial sector, and notifying parents of use of the program in the classroom. Fewer than half the teachers, 8 to 45 percent, reported incorporating resources that are more difficult to arrange, such as hosting guest speakers, involving parents in the program, and coordinating field trips.

In summary, teachers appear to be using basic approaches to implement The Stock Market Game, but some are using more advanced approaches. Of those teachers using The Stock Market Game materials, most find them helpful. In addition, teachers connected the teachings of the game to events outside the classroom.

Table 3. Summary of Implementation Findings

Implementation Measure	Use of basic approaches	Use of advanced approaches
Teaching practices	56% to 98%	8% to 48%
Use of SMG materials	54% to 88%	20% to 43%
Connection to outside world	61% to 97%	8% to 45%

Student Experiences of The Stock Market Game

Surveys completed by students in the treatment group provided information about student experiences playing The Stock Market Game. Four constructs measured student *engagement* with the game, the *benefits of their interaction* with other students, the development of *financial life skills*, and the extent to which their learning about savings and investing applied *beyond the classroom*. A summary of major findings for each construct follows.

Most students reported that they enjoyed playing, and learned from, The Stock Market Game. Most students indicated that they enjoyed, and learned about, the aspects of finance addressed by the game, such as choosing which company to invest in and trading stocks on the computer. Nearly 90 percent of younger students, and 78 percent of older students, reported that they liked playing The Stock Market Game.

Most students reported that playing on a team during The Stock Market Game was a positive experience and improved their interaction with others. Most students indicated that they enjoyed playing on a team and that they learned about competition, communication, compromise, and conflict resolution while playing The Stock Market Game. In addition, the majority of students reported that if they played the game again, they would like to play on a team (70 to 71 percent).

A majority of students reported that The Stock Market Game influenced their development of financial life skills. A majority of students agreed that playing The Stock Market Game influenced them to think more about budgeting and financial planning. Most younger students (87 percent) and the majority of older students (67 percent) agreed with the statement "The Stock Market Game taught me to be more careful with how I spend my money."

Some students even reported applying learning from The Stock Market Game beyond the classroom. Some students reported thinking about investing outside class, talking to their friends about the game, watching financial television shows, or looking at stocks or companies in newspapers or on the Internet in their spare time. For example, 30 to 44 percent of students reported researching stocks or companies on the Internet or in newspapers when not in class. Almost 58 percent of younger students, and 39 percent of older students, reported that they talked to their parents about The Stock Market Game.

In summary, students reported that they are enjoying and learning from playing The Stock Market Game. They reported learning from their interactions with other team members as well as developing financial life skills. Some students are even thinking about financial planning and discussing the game with friends and family outside school time.

Relationship Between Teacher Implementation and Student Experience

Results from the teacher and student surveys were analyzed to determine whether there was a significant relationship between teacher implementation of The Stock Market Game and student

experience. The analysis of 187 treatment teachers and 2,716 student surveys from Grades 4–10 revealed the following findings:

Teaching The Stock Market Game with a greater breadth and depth of practices was found to be related to stronger engagement for younger students. Students in Grades 4–6 taught by teachers who used additional materials and more advanced teaching practices (such as posting student scores, assigning grades, and creating assessments and projects), reported higher levels of engagement from playing The Stock Market Game.

Teaching The Stock Market Game with a greater breadth and depth of practices was found to be related to stronger positive interactions among younger students. Students in Grades 4–6 taught by teachers who used additional materials and more advanced teaching practices reported higher levels of positive interactions with others and development of interpersonal skills.

Teaching The Stock Market Game with a greater breadth and depth of practices was found to be related to younger students applying their learning activities beyond the classroom. Students in Grades 4–6 taught by teachers who used additional materials and more advanced teaching practices reported higher levels of extending their learning beyond the classroom with activities such as talking about the stock market with their parents and friends, thinking about investing outside school, and accessing financial media (television, newspapers) at home.

Linking The Stock Market Game to outside resources was found to be related to older students applying their learning beyond the classroom. Students in Grades 7–10 taught by teachers who related the course to more outside resources (such as linking the game to current events, organizing related field trips, and involving parents and guest speakers), reported higher levels of extending their learning beyond the classroom with activities such as talking about the stock market with their parents and friends, thinking about investing outside school, and accessing financial media at home.

In summary, when teachers use more advanced teaching practices, younger students had greater engagement with the game, enjoyed and learned from their interactions with others, and thought about what they had learned while playing the game when they are not in school. In addition, when teachers use more advanced practices to link outside resources to The Stock Market Game, students report greater levels of thinking and talking about the game outside class.

Effect of Implementation and Student Experience on Student Learning

To further examine the variation in student learning in classrooms participating in The Stock Market Game, we analyzed survey data from students and teachers in relation to student test score data. We analyzed data along two lines. First, we examined the data to determine the extent to which teacher-reported implementation of The Stock Market Game correlated with greater student learning. For this analysis, we compared a measure of overall implementation, as well as measures of implementation subcomponents (i.e., *practices, materials,* and *connections)*, with changes in student learning.

Second, student perceptions of their engagement with the game, their interactions with others, and their application of learning beyond the classroom were compared with their test scores on the investor knowledge and mathematics assessments.

The analyses suggest some significant relationships between student learning and student experiences as well as between student learning and teacher implementation. The findings for the mathematics and investor knowledge tests follow.

Mathematics

We examined student learning in mathematics in relation to survey findings on teacher implementation and student experiences.

Teacher Implementation. There was no significant relationship between overall teacher implementation of the game and student mathematics learning for either students in the lower grades (4–6) or students in upper grades (7–10).

While no effect of overall implementation was discovered, there was a significant positive relationship between the construct addressing *classroom teaching practices* and student mathematics learning for students in the upper grades. More specifically, a 10-point change in teacher implementation of the game (a one-standard-deviation change) was predictive of a 7.6-point change in student learning. In concrete terms, the more advanced teaching practices that teachers engaged in, the better their students performed.

Student Experience. There was no significant relationship between student experiences of The Stock Market Game and their mathematics learning.

Investor Knowledge

We examined changes in students' investor knowledge in relation to survey findings on teacher implementation and student experiences.

Teacher Implementation. Overall teacher implementation of The Stock Market Game was significantly related to student investor knowledge learning for elementary and middle school students. The relationship was positive and significant for students at the middle school grades. For these students, a 10-point change in teacher implementation (a one-standard-deviation change) was predictive of a 10.3-point change in the student's score on the investor knowledge assessment. That is, the more teachers used the advanced implementation strategies, the better middle school students performed.

The relationship between implementation and learning was slightly more complex for the elementary students. For this group, those students who were less skilled at the beginning of the game (as measured by the pretest) seemed to benefit most from more advanced teacher implementation.

While there was not a significant effect of overall implementation on student learning at the high school level, the construct measuring *classroom teaching practices* showed a significant relationship with investor knowledge learning. In particular, a 10-point change in this area of implementation (a one standard deviation change) was predictive of a 23-point change in a student's score on the investor knowledge assessment. That is, the more teachers used advanced teaching practices, the better high school students performed on the investor knowledge tests.

Student Experience. For both middle school and high school students, the measure of *engagement* in playing The Stock Market Game was significantly related to their investment learning. Students who reported a greater *engagement* with the game tended to demonstrate significantly more learning than students who were less engaged with the game. This was not the case for students in elementary school.

For middle school students, a 10-point change in their reported *engagement* (a one-standard-deviation change) was predictive of an 11.8-point increase in their investor knowledge assessment score. For high school students, the effect was even greater, with a similar change in *engagement* (i.e., 10 points) corresponding to a 20.4-point increase in the investor knowledge score.

Student-reported experience about interactions with their team members also was significantly related to their investor knowledge learning, but for the construct measuring *benefit of interactions*, the relationship with student learning was negative. That is, students who reported more enjoyment and learning from interactions with their team members and classmates tended to have lower investor knowledge assessment scores.

The relationship between student experiences and learning was not significant for the elementary school students.

To summarize the effects on student learning, overall implementation, as measured by the teacher survey, does not seem to be related to mathematics learning. Teachers' use of more advanced teaching practices was, however, related to improvements in mathematics learning. Teacher implementation appears to make more of a difference for investor knowledge, especially for younger students. In middle school, greater implementation led to greater learning, and in elementary school, those students who were less skilled to begin with seemed to benefit the most from more advanced methods of game implementation. Older students were affected not by advanced implementation as a whole, but only by more advanced teaching practices.

Effect on Teacher Investment Practices

Data from the teacher surveys provide correlational findings on the effect of teaching The Stock Market Game on teacher investment practices. The results include responses from all teachers; that is, those completed by teachers who participated in the RCT and those completed through the nationwide invitation to respond to the survey.

Teachers were asked about their investment practices and their perceptions of the influence of The Stock Market Game on these practices. The items were organized according to three constructs: *engaging in financial planning*, *conducting financial research*, and *using investment*

products and services. If the teachers responded that they engaged in a given practice, they were asked to rate whether teaching the program had *no*, *minimal*, *moderate*, or *major* influence on them. Summaries of the findings for each construct follow.

Use of the classification system given here allows for a succinct discussion of survey findings. With regard to agreement in any one type of rating scale (e.g., strongly disagree, disagree, agree, strongly agree), the use of *few* refers to 0 to 24 percent, *some* refers to 25 to 49 percent, *majority* refers to 50 to 74 percent, and *most* refers to 75 to 100.[12]

Most teachers reported engaging in financial planning practices, and for some, The Stock Market Game had a moderate or major influence on their doing so. Teachers were asked about the actions they might take to control their finances and prepare for the future, including, for example, setting financial goals, reviewing household finances, analyzing their risk tolerance, and establishing a plan to increase savings. Most teachers (81 to 89 percent) reported engaging in each of these practices. Of those teachers who engaged in financial planning practices, 36 to 48 percent reported the program had a *moderate* or *major* influence on their doing so.

The majority of teachers reported conducting financial research, and for some, The Stock Market game had a moderate or major influence on whether they did so. Teachers were asked about actions they may take to expand their knowledge of financial planning and products, such as reading the business section of the newspaper (online or in print), subscribing to a financial magazine, and participating in a financial course. More than half the teachers surveyed (58 to 92 percent) reported engaging in those practices. Of those teachers who conducted financial research, 31 to 62 percent reported the program had a *moderate* or *major* influence on their doing so.

The majority of teachers reported using investment products and services, and for some, The Stock Market game had a moderate or major influence on their use. Teachers reported on their use of specific products or services for financial planning, such as opening an investment account, investing in the stock market, joining a local credit union, and participating in a pension program. A majority of teachers (55 to 75 percent) reported using these products or services. Of those teachers who used these products and services, 28 to 39 percent reported the program had a moderate or major influence on their doing so.

Table 3 summarizes these findings.

Table 3. Summary of Teacher Investment Practices and the Influence of Teaching The Stock Market Game

Practice	Teachers Engage in Practice	The Stock Market Game Was a Moderate or Major Influence
Financial planning	81% to 89%	36% to 48%
Financial research	58% to 92%	31% to 62%
Use of investment products and services	55% to 75%	28% to 39%

SUMMARY

The study of The Stock Market Game included two components: a randomized controlled trial (RCT) involving nearly 600 classrooms of teachers and students and a nationwide survey of approximately 4,800 teachers who have taught The Stock Market Game. Data-collection instruments were developed and psychometrically evaluated in the early part of 2008 and the full study was conducted in the fall of 2008. Participation rates were high, with approximately 90 percent of confirmed teachers having students submit test data. The teacher survey response rate was approximately 39 percent.

The RCT provided data to answer questions about the impact of playing The Stock Market Game on student achievement, and a survey of the students provided information on student experiences in playing the game.

On the nationwide survey of The Stock Market Game, teachers provided information on their investment practices and information on how they implemented the game.

Overall, results from the RCT showed that students who played The Stock Market Game significantly outperformed students who did not play the game on both mathematics and investor knowledge tests.

Student experience playing the game is positive and beneficial. Students report that they enjoy playing the game and are learning about communication and conflict resolution from their interactions with other students. In addition, some students are thinking about investing when they are not in class and are discussing the game with friends and family. Last, students of all ages appear to be building a mental framework for saving and investing in the future.

The results from the nationwide survey of teachers indicated that most teachers are using basic teaching practices to implement The Stock Market Game, suggesting that teachers can readily use the game with familiar and comfortable teaching practices. A smaller number, but still a substantial portion, are using somewhat more advanced teaching methods such as inviting industry experts into the classroom as guest speakers, and these more advanced methods are correlated with greater learning for older students.

Teachers report using, and finding helpful, the lessons and worksheets and other basic materials developed by the Foundation for Investor Education at SIFMA, and some are even using the more complex materials such as the standards maps that show the alignment of The Stock Market Game curriculum to state standards.

The survey also indicated that many teachers of The Stock Market Game engage in financial planning, conduct financial research, and use investment products and services. Of those teachers who report engaging in these activities, most report that teaching The Stock Market Game has had an influence on their doing so.

NOTES

[1] Hierarchical linear modeling is a statistical approach that is common in analyzing educational data because it accounts for the nested structure of the data. That is, students are nested within classrooms. classrooms are nested with schools, and so forth.

[2] For students in Grades 4–6, the tests assessed: number properties and operations; measurement; geometry; and data analysis and probability. For students in Grades 7–10, the tests assessed these four content areas in addition to algebra.

[3] The investor knowledge tests assessed: economic concepts; investment strategies; investor research; and calculations.

[4] The exact reason for electing not to participate was not obtained from all teachers. However, some common reasons for dropping out of the study were a change in the teacher's class scheduling or a misunderstanding of the requirements of the study (e.g., teachers thought the students could play the game as long as the teacher did not engage in any instruction about the game).

[5] Tests of differences in pretest were significant for the math test administered to students in Grades 4–6 and for the investor knowledge test administered to students in Grades 4–5. Pretests did not significantly differ for any of the other groups tested.

[6] The three approaches to modeling the data were (1) multiple imputation, (2) complete case, and (3) instrumental variables. The first two approaches are intent-to-treat models because they classify students and classrooms according to the original assignment of experimental condition (i.e., treatment or control). The third set of models is treatment-on-treated models because they account for the fact that some classrooms did not comply with their assignment. In other words, these last set of models classifies classrooms based on their report of playing The Stock Market Game, not actual assignment. That is, students were asked at the time of the post test if they had played The Stock Market Game in that class. If 70 percent of students tested reported playing the game, the classroom was classified as playing, regardless of whether they had been assigned to play or not. In most cases the percentage of non-complying classrooms was very small and did not significantly affect the impact estimates. For details please refer to the full report submitted to the FINRA Foundation.

[7] Presented here are the treatment-on-treated models. These models include two covariates: the experimental condition (treatment or control) and the pretest.

[8] These test scores are the Rasch-derived scale scores transformed to have a mean of 500 and a standard deviation of 100.

[9] Confidence intervals can be understood as the range of values for which we might find the true population average, or the difference between two population averages, if the experiment were conducted again under similar conditions. Effect size estimates are *point* estimates and confidence intervals are *ranges* of estimates.

[10] It is important to note that the Hill et al. report based growth on nationally normed standardized tests. The explanation of the effect size finding for the mathematics tests used in this study does not imply growth on a standardized test.

[11] Hill et al. report effect sizes according to three types of tests for elementary students: standardized test (broad); standardized test (narrow) and specialized topic/test. We consider the math test to fall into the category of standardized test (narrow). We consider the Investor Knowledge test to be a specialized topic/test.

[12] The same classification system for discussing findings is used throughout the implementation section of this report.

REFERENCE

Hill, C. J., Bloom, H. S., Black, A. R., & Lipsey, M. W. (2007). *Empirical benchmarks for interpreting effect sizes in research* (MDRC Working Papers on Research Methodology). New York: MDRC. Retrieved July 24, 2009, from http://www.mdrc.org/publications/459/full.pdf