



**Evaluative Report  
Memphis  
Sponsored by the Tennessee Department of Securities**

January 2007

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## Introduction

The purposes of this study are to: 1) measure the effectiveness of a program called Money Savvy Kids™ on the attitudes and knowledge of young children in public schools in Memphis, Tennessee.

Money Savvy Kids™ is curriculum developed by Money Savvy Generation of Lake Bluff, Illinois. The curriculum includes eight lessons:

- The History of Money
- Where Does Money Come From?
- Kids Can Earn Money Too!
- Saving Money and Bank Field Trip
- Spending Money
- Donating Money
- Investing Money
- Family Money Press Conference

An important part of Money Savvy Kids™ curriculum is the Money Savvy Pig™. This is a four-slot piggy bank. It provides teachers and parents with a fun and interesting way to introduce children to saving, spending, investing, and donating. Each child participating in the program receives a Money Savvy Pig™. During the fall of 2006, 10 elementary school teachers in 3 schools, received Money Savvy Kids™ materials and curriculum training. Training was provided via the participants' use of self-study materials. They were asked to implement the program in their classrooms and to use a pre-and post test with the students.

To investigate the effectiveness of this program, Dr. Mark Schug of the Center for Economics Education at the University of Wisconsin – Milwaukee, developed survey (see Appendix A) measuring student beliefs about savings habits, handling money, the role of business, etc. This survey has been used in each subsequent evaluation study since the first such study at the end of the 2003-2004 school year. This study was featured in the academic journal *The Social Studies* in Spring 2005 (Schug & Hagedorn, 2005). This survey was given to the Memphis students before receiving their Money Savvy Pigs and after they had completed their training. This report presents the analysis and interpretation of the results of those surveys.

## Conclusions

Overall, the aggregate data indicate that the Money Savvy Kids™ program was effective in positively affecting students' attitudes and knowledge about spending, saving and investing money. The paired samples data indicates statistically significant improvements on five out of ten items. One of the effect sizes was large on an important item (#6 indicating more disagreement with keeping money at home) and two were medium (#7 more disagreement with the false statement that you always make money buying stocks and #10 more disagreement that donating money only helps the recipients, not the giver). The smallness of the significant changes on the means of items 2 and 4 is not a concern because many of the children had an appropriate understanding on the pre-test.

The small, but non-significant change in the wrong direction on Item 3 (importance of having things when I want them), is of small concern, because on average, the majority of students disagreed with this statement.

The unmatched data analyses also support the general assertion that the program was effective. When all the data available were compared pre to post, seven out of ten item means improved with statistical significance. This includes the same five as the matched data (#'s 2, 4, 6, 7 and 10) additionally, items 8 and 9, although with small effect sizes. The problematic Item 3, again increased but this time with statistical significance. Fortunately it was a small effect size. When all the data for the two schools with pre's and post's were analyzed, this change "in the wrong direction" lost statistical significance. Items 4, 6, 7, 8 and 10 did change in the correct direction in this 2 school analysis, with statistical significance.

In this evaluator's professional opinion, these data indicate that the Money Savvy Kids™ curriculum worked effectively for the students who participated in this study from Memphis, Tennessee. Making matched and two types of unmatched comparisons is not an attempt to find something that is not there, but to address any concerns about using slightly less than half of the available data. None of the results obtained these three ways contradict each other – when one's alpha is set at 0.05, a result that is 0.06 is rejected, while one of 0.049 is accepted. When the difference between means is close, subtle changes between groups can push these results to or from significance.

Student responses to Item 5 ("The thing I enjoy about earning money is getting to spend it later on") were also interesting. The pre to post means never changed with statistical significance, but in the matched and 2 school samples the mean decreased, while for the total sample it increased. Again, the closeness of means explain such changes, but even so, these variations are not of great concern as the item itself is a bit confusing: waiting till later can be perceived as a positive, but spending at all can be perceived as a negative.

Overall, these results are consistent with those found in previous studies in both urban and suburban Chicago, in Cleveland, Ohio, in Washington State, and in North Dakota. What each of these studies suggests is that the Money Savvy Kids™ curriculum is effective with a wide variety of English reading students.

### **Methodology**

The Money Savvy Kids™ Assessment is a 10 item, Likert scale instrument. A three-point response format was used: "agree" (with a value of 3), "unsure" (with a value of 2) and "disagree" (with a value of 1). Dr. Schug had a literacy expert check the questions for roughly a second grade reading level.

The completed pre and post-tests include the participating students' names. This allows for matching individual pre and post-tests. Once matched and recorded, either a paired-samples t-test or the non-parametric Wilcoxon Signed Ranks test would be performed on the data to determine if student responses changed from pre to post in a statistically significant manner. The

paired samples t-test is appropriately used if the data did not differ significantly from a normal distribution. Normality is determined using the Kolmogorov-Smirnov test of normality (with Lilliefors correction) and the Shapiro-Wilk test. If the data do differ significantly from the normal distribution, one uses the non-parametric Wilcoxon Signed Ranks test.

Because collected pre and post-surveys include a significant number that cannot be matched (probably due to students missing class on a particular day), an independent samples analysis of all the pre-tests compared to all the post-tests, will be done as well. If the data are normal, an independent samples t-test will be used. If not, a Mann-Whitney U test will be used.

(Test and survey data can often deviate from the normal distribution due to floor effects on pre-tests and ceiling effects on post-tests. Another factor which can cause deviations from normality are outliers – test scores that are very low or very high. There are two general approaches to dealing with non-normality: data cleaning and transforming or using non-parametric statistics. Data cleaning includes removing outliers. Data transformations involve mathematical transformations of data, such as taking the logarithms of the data, and if this generates a normal distribution, doing statistical tests on the transformed scores. This evaluator prefers to accept the data as they are and use the appropriate non-parametric tests as needed.)

Any statistically significant changes from pre to post, using whatever method, will be identified and interpreted. A statistically significant difference in means from pre to post indicates the likelihood that such a difference in mean in the population would occur by chance. For instance, an increase of mean score on item 3 of .31 (on a scale of 1 to 5) occurs by chance only once in a thousand, as indicated by a p value equal to .001. While this information implies statistical significance (likelihood of occurring by chance), it says nothing about “how big” or “how important” a change of .31 is. To begin to understand these issues, one calculates effect sizes. The effect size is essentially the ratio of the change to the standard deviation of the change scores. If the standard deviation of the change scores for Item 3 were around .3, the effect size would be about 1, indicating the change was roughly one whole standard deviation. In the literature, such an effect size is considered “large” (Kirk, 1995). If the standard deviation of the change scores was around 3 (indicate great variability in student responses to Item 3), the effect size would only be .10 – representing a change of about 1/10<sup>th</sup> of a standard deviation. This effect size is considered “small,” even though the likelihood that such a change occurred by chance is very unlikely.

Finally, any changes in the wrong direction for any item on average for an individual classroom are to be identified, assessed for statistical significance (using Wilcoxon), and then compared statistically to all the other classes via one way analysis of variance with post-hoc tests (if data are normal) or via the Kruskal-Wallis test (if the data are not normal).

## **Results**

### **Matched Tests: Mean Item Changes**

Seventy-seven students could be identified by name and completed both the pre and post-tests. The average scores and standard deviations for each item are given in Table 1. The data for

every single item differed from normal with a statistical significance less than 1 in 1000 as determined by both the Kolmogorov-Smirnov and Shapiro-Wilks tests. Because of this, the Wilcoxon Signed Ranks test was used to determine if there were any statistically significant changes from pre to post.

**Table 1.** Item response averages and standard deviations for paired samples data.

	<b>Pre</b>	<b>SD</b>	<b>Post</b>	<b>SD</b>	<b>Desired change/achieved</b>
Item 1	2.86	.420	2.91	.369	Increase, yes
Item 2	1.39	.728	1.15	.422	Decrease, yes
Item 3	1.78	.868	1.88	.827	Decrease, no
Item 4	2.68	.616	2.84	.515	Increase, yes
Item 5	2.60	.693	2.59	.653	Decrease, yes
Item 6	2.68	.637	1.47	.754	Decrease, yes
Item 7	2.28	.772	1.70	.796	Decrease, yes
Item 8	2.84	.431	2.94	.229	Increase, yes
Item 9	2.81	.460	2.87	.469	Increase, yes
Item 10	1.78	.821	1.27	.641	Decrease, yes

**Table 2.** Significantly changed item response averages and effect size of changes.

Item	Z value	Exact 2-tailed significance	Effect size	Described Effect Size
2. I believe that people act selfishly when they save money.	-2.547	.010	-0.403	Small
4. I believe it is important to save money for the things that I want to buy in the future.	-2.015	.046	.282	Small
6. It is best to put the money you save in your room at home.	-6.811	.000	-1.734	Large
7. When I invest in stocks, I will always make money.	-4.501	.000	-.740	Medium
10. When I donate money it helps others but doesn't help me.	-3.626	.000	-.692	Medium

### **What Tables 1 and 2 tell us about student responses to individual items.**

In general these two tables show that there were statistically significant improvements in student understanding on half of the 10 items on the assessment. These are described subsequently in detail. The changes from pre to post on four of the items that did not change with statistical significance did indeed change in the appropriate manner. Item 3 ("It is important to have the

things I want when I want”) changed slightly in the wrong direction, but was still overall, in the unsure to disagreeing range.

The average response of the students to item 2 changed from 1.39, leaning towards disagreeing, to 1.15, which is more strongly disagreeing. This indicates an improvement in student understanding, because it is appropriate for students to disagree with the notion that saving money is selfish. The two-tailed exact significance implies that this improvement in average score could only have occurred by chance only 10 in 1000 times. The  $-.403$  effect size indicates that this improvement is roughly 40% an average standard deviation in size. Cohen considers this a “small effect.” The minus sign indicates that the average score decreased from pre to post (which is appropriate for this item).

The average response of the students to item 4 changed from 2.68, leaning towards agreeing, to 2.84, which leans even more towards strongly agreeing. This is an improvement of student understanding because it is appropriate for students to believe that saving money for future purchases is important. The two-tailed exact significance implies that this improvement in average score could only have occurred by chance, less than 46 times in 1000. The  $.282$  effect size indicates that this improvement is 28% of an average standard deviation in size. Cohen considers this a “small effect.”

The average response of the students to item 6 changed from 2.68, leaning towards agreeing, to 1.47, which leans towards disagreeing. This indicates an improvement in student understanding, because it is appropriate for students to disagree with the idea that saving money in your room is the best method of saving. The exact two-tailed significance implies that this change in average score could only have occurred by chance less than 1 out of 1000 times. The  $-1.734$  effect size indicates that this decrease in score is roughly one and three quarters of an average standard deviation in size. Cohen considers this a “large effect.”

The average response of the students to item 7 changed from 2.28, on the agreeing side of uncertain, to 1.70, which leans more towards disagreeing. This indicates an improvement in student learning because it is more appropriate for students to disagree with the idea that investing in the stock market always pays off. The two-tailed exact significance implies that this change in average score could only have occurred by chance less than 1 out of 1000 times. The  $-.740$  effect size indicates that this improvement is roughly three-quarters of an average standard deviation in size. Cohen considers this a “medium effect.”

The average response of the students to item 10 changed from 1.78, on the disagreeing side of uncertain, to 1.27, which leans towards disagreeing. This indicates an improvement in student understanding because more students should disagree that donating money only helps the recipient. The two-tailed exact significance implies that this change in average score could only have occurred by chance less than 1 out of 1000 times. The  $-.692$  effect size indicates that this improvement is roughly 70% of an average standard deviation in size. Cohen considers this a “medium effect.”

These interpretations, as well as the statistically non-significant changes are presented in terms of percentages of students picking each possible choice before and after being taught in Table 3.

**Table 3.** Percentages of chosen responses to selected items on pre and post-measures.

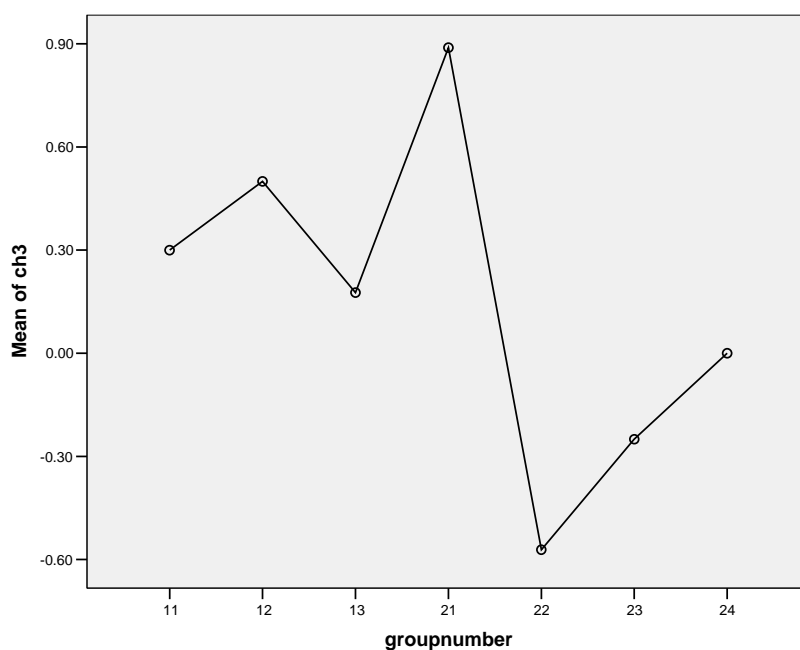
Item	Response	% students pre-test	% students post-test	Comments
1	1 disagree 2 unsure 3 agree	4.7 7.0 88.3	2.4 4.7 92.9	Fairly large percentages believing they know how to handle money before and after participation. 3.7 % fewer unsure after. 4.6 % more students agreeing that they can handle money after participation.
2	1 disagree 2 unsure 3 agree	75.7 13.3 11.0	85.9 9.4 4.7	10.2 % more students disagreeing that saving is greedy. 3.9 % fewer unsure. 6.3 % fewer students agreeing that saving is greedy after participation.
3	1 disagree 2 unsure 3 agree	57.6 21.5 20.9	42.4 30.6 27.1	15.2 % more students disagreeing with immediate gratification. 5.1 % fewer unsure. 5.6 % fewer agreeing with immediate gratification.
4	1 disagree 2 unsure 3 agree	5.8 19.2 75.0	5.9 2.4 91.8	16.8 % more students, who were unsure, agreeing that saving is important.
5	1 disagree 2 unsure 3 agree	16.2 21.4 62.4	9.4 22.4 68.3	6.8 % fewer students disagreeing, 1.0 % more unsure, and 5.9 % more agreeing with the statement that what they enjoy most about earning money is getting to spend it later on.
6	1 disagree 2 unsure 3 agree	10.6 11.7 73.9	68.2 16.5 15.3	57.6 % more students disagreeing that you should keep money in bedroom. 4.8 % more unsure. 58.6 % fewer agreeing with this after participation.
7	1 disagree 2 unsure 3 agree	21.4 21.4 41.6	50.6 25.9 23.5	29.2 % more disagreeing that you always make money on stocks. 4.5% more unsure. 18.1 % fewer agreeing with this.
8	1 disagree 2 unsure 3 agree	43.9 30.1 26.0	4.7 1.2 94.1	39.2 % fewer disagreeing that business people help others with goods & services. 28.9 % fewer unsure. 68.1 % more students agree with this after participation.
9	1 disagree 2 unsure 3 agree	7.0 15.1 77.9	4.7 2.4 92.9	3.7 % less disagree that it is important for families to keep money in real banks. 12.7 % fewer unsure and 15 % more agreeing.
10	1 disagree 2 unsure 3 agree	43.9 30.1 26.0	81.2 8.2 10.6	37.3 % more disagreeing that saving only helps the saving individual. 21.9 % fewer unsure. 15.4 % fewer agreeing.

## Analyses by Schools/Classrooms

Only item 3 (“It is important to have the things I want when I want them”) had a mean change from pre to post in the wrong direction. In other words, on average, the change from pre to post should have shown more students disagreeing with this item after participation. Instead, the average score after participation was 1.88 (SD = .827), on the disagreeing side of unsure. This indicated a slight increase (from 1.78 (SD = .868)). This increase was not statistically significant for the 77 matched pre and post-tests, but did suggest looking at the mean change scores (post item 3 mean minus pre item 3 mean) by classroom to see if any particular classroom stood out “going the wrong way.” These means are presented in Table and are plotted in Figure 1.

**Table 4.** Descriptives for Item 3 change scores by classroom

Group	N	Mean	Std. Deviation
11	10	0.300	1.34
12	8	0.500	1.07
13	17	0.177	1.01
21	9	0.889	1.17
22	14	-0.571	0.85
23	8	-0.250	1.16
24	11	0.000	0.77
Total	77	0.104	1.10



**Figure 1.** Plot of mean change scores by classroom.

Class 21 (School: Doubletree, Teacher: Bradfield) had the highest mean change from pre to post of 0.88. The 9 students who took both the pre and post-test in this class had a 1.89 (SD = .928) average on the pre-test (on the disagreeing side of unsure) and a 2.78 (SD = .667) average on the post-test (mostly agreeing). The Wilcoxon Signed Ranks test result for this change was not



significant ( $Z = -1.947$ ,  $p = 0.094$  (2 tailed, exact)). In other words, we need not reject the hypothesis that such a change occurred merely by chance.

The Kruskal-Wallis test did not suggest that the mean change scores on Item 3 varied from one another with statistical significance. In other words, the differences between each of the class means on Item 3 likely occurred by chance.

**Table 5.** Kruskal-Wallis results

	Ch3
Chi-Square	10.524
Df	6
Asymp. Sig.	.104

### Comparing Unmatched Pre and Post-tests: Mean Item Changes

One hundred and seventy-three students at three schools completed pre-tests. Eighty-five at two schools completed post-tests. Table 6 shows the mean item scores for the entire group of pre-tested students (labeled with a “1” on the variable “prepost”) compared to the mean item scores for the entire group of post-tested students. Table 7 shows which of these items changed with statistical significance from pre to post and what the effect sizes were for these changes.

**Table 6.** Item response averages and standard deviations for all unmatched samples.

	prepost	N	Mean	Std. Deviation	Desired change/achieved
item1	1	171	2.84	.482	Increase, yes
	2	85	2.91	.366	
item2	1	173	1.35	.671	Decrease, yes
	2	85	1.18	.493	
item3	1	172	1.63	.809	Decrease, no
	2	85	1.85	.824	
item4	1	172	2.69	.576	Increase, yes
	2	85	2.86	.492	
item5	1	173	2.46	.759	Decrease, no
	2	85	2.58	.658	
item6	1	173	2.66	.669	Decrease, yes
	2	85	1.46	.747	
item7	1	173	2.16	.750	Decrease, yes
	2	85	1.73	.822	
item8	1	173	2.72	.566	Increase, yes
	2	85	2.95	.219	
item9	1	172	2.71	.590	Increase, yes
	2	85	2.88	.448	
item10	1	173	1.82	.819	Decrease, yes
	2	85	1.29	.651	

**Table 7.** Significantly changed item response averages and effect size of changes for all tests.

Item	U value	Exact 2-tail significance	Effect size	Described Effect Size
2. I believe that people act selfishly when they save money.	6564.000	.048	-0.275	Small
3. It is important to have the things I want when I want them.	6241.000	.036	0.270	Small
4. I believe it is important to save money for the things that I want to buy in the future.	6157.000	.002	0.309	Small
6. It is best to put the money you save in your room at home.	2338.000	.000	-1.725	Large
7. When I invest in stocks, I will always make money.	5210.500	.000	-0.555	Medium
8. Business people help others by providing them with goods and services.	6088.000	.000	0.479	Small
9. It is important for families to keep money in real banks.	6251.000	.004	0.311	Small
10. When I donate money it helps others but doesn't help me.	4690.500	.000	-0.690	Medium

One hundred and seven students at two schools completed pre-tests, and eighty-five of them completed post-tests. Table 8 shows the mean item scores for this group of pre-tested students (labeled with a "1" on the variable "prepost") compared to the mean item scores for the group of post-tested students. Table 9 shows which of these items changed with statistical significance from pre to post and what the effect sizes were for these changes.

**Table 8.** Item response averages and standard deviations for unmatched samples from 2 schools.

group	N	Mean	Std. Deviation	Desired change/achieved
item1	1	105	2.85	Increase, yes
	2	85	2.91	
item2	1	107	1.36	Decrease, yes
	2	85	1.18	
item3	1	106	1.77	Decrease, no
	2	85	1.85	
item4	1	107	2.73	Increase, yes
	2	85	2.86	
item5	1	107	2.62	Decrease, yes
	2	85	2.58	
item6	1	107	2.66	Decrease, yes
	2	85	1.46	
item7	1	107	2.24	Decrease, yes
	2	85	1.73	
item8	1	107	2.79	Increase, yes
	2	85	2.95	
item9	1	107	2.81	Increase, yes
	2	85	2.88	
item10	1	107	1.77	Decrease, yes
	2	85	1.29	

**Table 9.** Significantly changed item response averages and effect size of changes for all tests from 2 schools with pre's and post's.

<b>Item</b>	<b>U value</b>	<b>Exact 2-tailed significance</b>	<b>Effect size</b>	<b>Described Effect Size</b>
4. I believe it is important to save money for the things that I want to buy in the future.	3981.000	.017	0.245	Small
6. It is best to put the money you save in your room at home.	1445.500	.000	-1.699	Large
7. When I invest in stocks, I will always make money.	3057.000	.000	-0.632	Medium
8. Business people help others by providing them with goods and services.	4033.000	.014	0.406	Small
10. When I donate money it helps others but doesn't help me.	3067.500	.000	-0.641	Medium

### **References**

- Kirk, R. E. (1995). *Experimental design: Procedures for the behavioral sciences* (Third ed.). Pacific Grove: Brooks/Cole Publishing Company.
- Schug, M. C., & Hagedorn, E. A. (2005). The Money Savvy Pig™ goes to the big city: Testing the effectiveness of an economics curriculum for young children. *The Social Studies*, 96(2).

### Appendix A: Money Savvy Kids™ Assessment

**Directions: Teachers,** please read each of the following 10 sentences together in class. Explain the following directions to the children: If you *agree* with the statement, use your pencil to circle the *face with the smile*. If you *don't know* or are *unsure* about the statement, circle the *face with the straight mouth*. If you *disagree* with the statement, circle the *face the frown*. Please circle only one face for each question.

- |     |  |       |        |          |
|-----|--|-------|--------|----------|
| 1.  | I believe I know a lot about how to handle my money.                                     | Agree | Unsure | Disagree |
| 2.  | I believe that people act selfishly when they save money.                                | Agree | Unsure | Disagree |
| 3.  | I believe it is important to have the things I want when I want them.                    | Agree | Unsure | Disagree |
| 4.  | I believe it is important to save money for the things that I want to buy in the future. | Agree | Unsure | Disagree |
| 5.  | The thing I enjoy most about earning money is getting to spend it right away.            | Agree | Unsure | Disagree |
| 6.  | It is best to put the money you save in your room at home.                               | Agree | Unsure | Disagree |
| 7.  | When I invest in stocks, I will always make money.                                       | Agree | Unsure | Disagree |
| 8.  | I believe business people help others by providing them with goods and services to buy.  | Agree | Unsure | Disagree |
| 9.  | It is important for families to keep money in real banks.                                | Agree | Unsure | Disagree |
| 10. | When I donate money it helps others but it doesn't help me.                              | Agree | Unsure | Disagree |