MONEY SAVVY KIDS™
Basic Personal Finance Curriculum

Evaluative Report
Suburban Chicago

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Money Savvy Generation®

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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 the suburbs of Chicago.

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 academic year 2004-2005, 22 elementary school teachers, representing 22 classrooms received Money Savvy Kids™ materials and curriculum training. Training was provided either in person, via telephone or via 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 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.

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Conclusions

Overall, the aggregate data indicate that the Money Savvy Kids™ program is effective in positively affecting students' attitudes and knowledge about spending, saving and investing money. The paired samples data indicates statistically significant improvements on eight out of ten items. While the effect sizes were small, the pre-test scores on Items 1, 2, 4, 8 & 9 were already leaning the correct way. The small increases implied an even greater majority choosing the correct response, and it is very unlikely this occurred by chance.

None of the significant changes, for the entire sample, indicated inappropriate understandings (for the entire group as a whole). The non-significant changes on Items 3 and 5 do not indicate a problem, however. Item 3 refers to having things when I want them – a position opposed to saving. Students disagreed with this on average on the pre-test and even more so on the post-test, but not with statistical significance. Item 5, which states: "The thing I enjoy most about earning money is getting to spend it later on." As noted in previous studies, this statement is somewhat confusing: it implies saving with "later on" but refers explicitly to spending.

When the data were analyzed by school, some statistically significant differences occurred between some schools. This was useful in identifying schools where the mean change scores on some items went the wrong way from pre to post. This may identify teachers who either misunderstood a concept and communicated this misconception effectively or teachers who understood a concept and did not succeed in communicating it to enough of their students.

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 the suburbs of Chicago. These results are consistent with those found in previous studies in Chicago; in Cleveland, Ohio, and in Washington State. These studies suggest the generalizability of the statement: the Money Savvy Kids™ curriculum is effective across 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: a smiley face for agree (with a value of 3), a straight mouth face for don't know or unsure (with a value of 2) and a frown face for 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 were to include the participating student's name. This would allow 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 Lillefiors correction) and the Shapiro-Wilk test. If the data do differ significantly from the normal distribution, one uses the Wilcoxon Signed Ranks test.

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(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 and 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- would 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 issue, 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 $1/10^{th}$ 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, analyses of variance (both parametric and non-parametric) and post-hoc tests were used to identify schools which had statistically significant changes in mean scores in the wrong direction.

Results

Entire Sample: Mean Item Changes

301 students could be identified by name and completed the pre- and post-tests. The average scores and standard deviations for each item are given in Table 1. Post-test items marked with an asterisk indicate a statistically significant improvement in average student response from pre to post.

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

	Pre	**SD**	**Post**	**SD**
Item 1	2.72	0.484	2.89***	0.324
Item 2	1.39	0.678	1.27*	0.612
Item 3	1.33	0.7586	1.26	0.571
Item 4	2.70	0.542	2.82**	0.486
Item 5	2.41	0.745	2.38	0.738
Item 6	2.34	0.831	1.96***	0.899
Item 7	2.08	0.658	1.78***	0.821
Item 8	2.69	0.555	2.85***	0.355
Item 9	2.75	0.531	2.86***	0.408
Item 10	2.12	0.868	1.77***	0.870

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

Item	Z value	Exact 2-tailed significance	Effect size
1. I know a lot about how to handle my money.	-5.389	.000	0.33
2. I believe that people act selfishly when they save money.	-2.576	.010	-0.16
4. I believe it is important to save money for the things that I want to buy in the future.	-2.744	.006	0.17
6. It is best to put the money you save in your room at home.	-6.257	.000	-0.39
7. When I invest in stocks, I will always make money.	-5.156	.000	-0.32
8. Business people help others by providing them with goods and services.	-4.550	.000	0.27
9. It is important for families to keep money in real banks.	-3.872	.000	0.23
10. I believe saving money helps me but not help anyone else.	-5.593	.000	-0.35

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 8 out of 10 items on the assessment.

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The average response of the students to item 1 changed from 2.72, leaning towards agreeing, to 2.89, which leans even more towards strongly agreeing. More students, on average believe that they know how to handle their money. The two-tailed exact significance implies that this improvement in average score could only have occurred by chance, less than 1 in1000 times. The .33 effect size indicates that this improvement is one third of an average standard deviation in size. Cohen considers this a "small effect."

The average response of the students to item 2 changed from 1.39, on the uncertain side of disagreeing, to 1.27, 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, less than 1 in100 times. The -.16 effect size indicates that this improvement is roughly 20% 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 2.70, leaning towards agreeing, to 2.80, 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 6 times in 1000. The .17 effect size indicates that this improvement is 17% of an average standard deviation in size. Cohen considers this a "small effect."

The average response of the students to item 6 changed from 2.34, uncertain, but leaning towards agreeing, to 1.96, which is very close to uncertain. This indicates an improvement in student understanding, because even though the average post-test score is uncertain, this average decreased from the pre-test because more students disagreed 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 -.39 effect size indicates that this decrease in score is roughly 39% of an average standard deviation in size. Cohen considers this a "small effect."

The average response of the students to item 7 changed from 2.08, very close to uncertain, to 1.78, 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 1out of 1000 times. The -.32 effect size indicates that this improvement is roughly 32% of an average standard deviation in size. Cohen considers this a "small effect."

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The average response of the students to item 8 changed from 2.69, leaning towards agreeing, to 2.85, which leans more towards agreeing. This indicates an improvement in student understanding because it is appropriate for students to believe that business people help others by providing goods and services. The two-tailed exact significance implies that this change in average score could only have occurred by chance, 1 out of 1000 times. The .27 effect size indicates that this improvement is a little over a quarter of an average standard deviation in size. Cohen considers this a "small effect."

The average response of the students to item 9 changed from 2.75, leaning towards agreeing, to 2.86, which leans more towards agreeing. This indicates an improvement in student understanding because it is appropriate for students to believe that their families should save their money in banks. The two-tailed exact significance implies that this change in average score could only have occurred by chance, 1 out of 1000 times. The .23 effect size indicates that this improvement is roughly one quarter of an average standard deviation in size. Cohen considers this a "small effect."

The average response of the students to item 10 changed from 2.12, very close to uncertain, but from the agreeing side, to 1.77, which leans towards disagreeing. This indicates an improvement in student understanding because more students should disagree that saving money helps only the saver. The two-tailed exact significance implies that this change in average score could only have occurred by chance, 17 out of 1000 times. The -.35 effect size indicates that this improvement is roughly 35% of an average standard deviation in size. Cohen considers this a "small effect."

Analyses by Schools/Classrooms

These data all differed from the normal distribution - the Kolmogorov-Smirnov (with Lillefiors correction) and the Shapiro-Wilk tests of normality indicated that there was less than one chance in a thousand that these data could have come from a normally distributed population. Because of this, traditional ANOVA analyses (see Table 4) were supplemented with non-parametric Kruskal-Wallis tests (see Table 5). Significant differences are indicated with asterisks and yellow shading (for electronic version).

Change Scores. Means and standard deviations for each of the item change scores (post-score minus pre-score) are listed in Table 3. Note that items 2, 3, 6, 7, and 10 are items that students should disagree with, therefore, negative change scores indicate a good thing – less students agreeing after than before.

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Table 3. Descriptive statistics for change scores

	N	Mean	Std. Deviation
ch1	289	.1730	.51824
ch2	289	-.1107	.72757
ch3	289	-.0536	.68063
ch4	289	.1107	.63590
ch5	289	-.0208	.85366
ch6	289	-.3824	.95924
ch7	289	-.3010	.95527
ch8	289	.1696	.57943
ch9	289	.1038	.47466
ch10	289	-.3391	.98384
Valid N (listwise)	289		

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Table 4. Analyses of variance for each change score by school groupings.

		Sum of Squares	df	Mean Square	F	Sig.
ch1	Between Groups	6.664	16	.417	1.660	.054
	Within Groups	71.003	283	.251		
	Total	77.667	299			
ch2	Between Groups	11.086	16	.693	1.311	.189
	Within Groups	149.048	282	.529		
	Total	160.134	298			
ch3	Between Groups	9.609	16	.601	1.259	.223
	Within Groups	135.426	284	.477		
	Total	145.035	300			
ch4	Between Groups	8.100	16	.506	1.164	.297
	Within Groups	123.559	284	.435		
	Total	131.659	300			
ch5	Between Groups	19.687	16	1.230	1.780	.033*
	Within Groups	195.599	283	.691		
	Total	215.287	299			
ch6	Between Groups	51.447	16	3.215	4.020	.000**
	Within Groups	226.362	283	.800		
	Total	277.809	299			
ch7	Between Groups	56.056	16	3.504	4.528	.000**
	Within Groups	216.671	280	.774		
	Total	272.727	296			
ch8	Between Groups	8.639	16	.540	1.587	.072
	Within Groups	95.629	281	.340		
	Total	104.268	297			
ch9	Between Groups	3.460	16	.216	.948	.515
	Within Groups	63.873	280	.228		
	Total	67.333	296			
ch10	Between Groups	33.953	16	2.122	2.367	.003**
	Within Groups	251.017	280	.896		
	Total	284.970	296			

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Table 5. Kruskal-Wallis test results.

	ch1	ch2	ch3	ch4	ch5
Chi-Square	25.537	19.174	21.246	20.378	29.099
df	16	16	16	16	16
Asymp. Sig.	.061	.260	.169	.204	.023*

	ch6	ch7	ch8	ch9	ch10
Chi-Square	48.048	58.684	25.223	18.573	34.669
df	16	16	16	16	16
Asymp. Sig.	.000**	.000**	.066	.291	.004*

The significant differences indicated by each of these tests for Items 5, 6, 7 and 10 tell us that at least 2 of the 17 groups had mean scores significantly different from one another on each of these items. These tests do not tell us which 2 (or more) groups had such differences. To determine which groups are significantly different, one typically uses post-hoc tests. Post-hoc tests typically require normal data and homogeneity of variance. Items violating homogeneity of variance will be tested with a post-hoc test appropriate for this situation – the Tamhane post-hoc test, rather than the Scheffe test. The purpose of these tests is to identify schools which fared significantly more poorly than the others.

Table 6 indicates which change scores violated the assumption of homogeneity of variance, which determines whether it is appropriate to use Scheffe or Tamhane post-hoc tests. Items 5 and 6 were thus analyzed using the Scheffe post-hoc test and Items 7 and 10 were analyzed with the Tamhane post-hoc test.

Table 6. Test of homogeneity of variances.

	Levene Statistic	df1	df2	Sig.
ch5	1.539	16	283	.086
ch6	1.317	16	283	.185
ch7	1.724	16	280	.042*
ch10	2.048	16	280	.011*

The Scheffe post-hoc tests on Item 5 indicated no significant difference, but since Item 5 has been determined to be problematic, it is not instructive to identify high and low scoring schools, anyway.

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The post-hoc tests on Item 6 (that it is best to put the money you save in your room at home), did indicate significant differences between Groups 6 (FRCDS 2nd graders) and 12 (Maplebrook), and 10 (Ellsworth) and 12 (Maplebrook). The problematic school is Maplebrook. Their mean score on this item was a positive .5455 (SD = .96250). This implies that more children at Maplebrook agreed with this innappropriate statement after instruction.
The Tamhane post-hoc tests for Item 7 (investing in stocks always leads to profit) indicate significant differences between a number of groups with appropriate response means and groups 8 (Elmwood), 12 (Maplebrook), and 17 (FRCDS 3rd graders) which all have incorrect, positive mean change scores (.2857, .5217, and .7273, respectively).

The Tamhane post-hoc tests for Item 10 (when I save money it helps me but not others) indicate no significant differences between groups, however, groups 3 (Cherokee), 7 (Ellsworth), and 8 (Elmwood), had incorrect positive mean change scores (.1875, .2500, and .1429).

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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.	
2.	I believe that people act selfishly when they save money.	
3.	I believe it is important to have the things I want when I want them.	
4.	I believe it is important to save money for the things that I want to buy in the future.	
5.	The thing I enjoy most about earning money is getting to spend it right away.	
6.	It is best to put the money you save in your room at home.	
7.	When I invest in stocks, I will always make money.	
8.	I believe business people help others by providing them with goods and services to buy.	
9.	It is important for families to keep money in real banks.	
10.	I believe saving money helps me but not help anyone else.	

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