

BRIDGE AND TEST SCORES

A Research Report Presented to the

CARLINVILLE LIONS CLUB

January 23, 2007

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BACKGROUND: While I was in North Dakota on a Visiting Professor appointment during the Fall of 2001, Lion Bill Werner taught Bobbie Klaus the basics of how to play bridge. Bobbie set up short bridge lessons as part of her 5th grade class math instruction. The students liked the game so well, that they started asking if they could stay in from recess to keep playing.

The “No Child Left Behind” education act was passed by Congress in 2001. It required extensive reporting on test scores. So, Terry Levan was appointed “the data guy” for the Carlinville Community School District. He immediately recognized that the scope of the reporting required the creation of a database and the use of a computer.

Three years later, in 2004, I learned that Terry Levan had written a series of computer programs which allowed for the tracking of student test scores over their entire time in the Carlinville school system. He wrote these programs in his spare time without any financial support from the school district. I asked Terry if we could track the changes in student test scores of the kids who learned to play bridge in Bobbie Klaus’s 2001 5th grade class and compare them to the changes of the non-bridge playing kids. He said we could track each student by using student number and could easily compute their changes in test scores in an Excel spread sheet. And, he created the data base to do that.

It turns out that the standardized testing schedule in the Carlinville schools has the kids taking the Iowa Test of Basic Skill, the ITBS, in September of 5th grade, April of 6th grade and April of 7th grade. Thus, the entire 5th grade in 2001-02 had been tested before one class of the six classes that year started to learn how to play bridge. They were all tested 20 months later as 6th graders and again 32 months later as 7th graders.

The 5th grade class of 2002-03 did not have the opportunity to learn to play bridge because a new “Everyday Math” math program was started. Bobbie Klaus resumed using bridge as part of her math instruction with the 2003-04 5th grade class. This change allowed the tracking of the students of the same teacher over a three year period with the middle year students not learning how to play bridge. This arrangement removed the teacher as a variable in the results to be analyzed.

The happening of all these events in Carlinville created a “researcher’s serendipity.”

There was pre-testing of all the students in the 5th grade and post-testing at the 20th and 30th month intervals. There was a large control group that did not learn how to play bridge. There was an experimental group who did learn how to play bridge. There was a standardized testing program in which the same scoring scale was used for all three tests. In fact, the ITBS has five separate subject areas scored separately. This test structure and scoring scale allowed a comparison of the performance of five non-bridge groups of students to one test group of bridge playing students on all five subjects. And, there was a database that could track the scores over the three years to see how much gain the two groups would make.

Putting all of this together, Lion George Banziger, Terry Levan and I put together a grant application and sent it to the Board of Trustees of the Educational Foundation of the American Contract Bridge League. As a member of the Board of Trustees, I was able to present the application, but did not vote on it to avoid a conflict of interest. The grant was approved at the Fall 2004 North American Bridge Championships and the research began in 2005. It continued in 2006 and is scheduled to finish sometime in 2007. A follow-on grant application may be submitted sometime this year.

METHOD: The first step in building the data base was to link the student to the teacher by using student number. Six files were constructed using the teacher's name with the student numbers for each teacher. Students who moved or repeated 5th grade had to be deleted from the data base. Thus, the six classes which started with 18 to 20 students in the 5th grade ended up with 15 to 20 students who took all three tests over 32 months.

The starting average test scores in the five subjects of the ITBS of each of the six sections and the average score of all 101 students in the six sections of the 2001 5th grade class are shown in Table 1 below. The fact that the principal had assigned the students to the six sections to provide about equal ability in each section is reflected in the small spread of average scores. These results provided a solid starting point from which to measure the progress of all of the students and then compare the progress of the bridge playing students to the progress of the students who did not learn to play bridge.

When the students entered 6th grade, they were given individual class schedules. This mixing of the experimental and the control groups actually strengthened the validity of the study. Table 2 contains the average scores of the ITBS administered in April 2003 taken by these 6th graders using their original 5th section assignments. Table 3 shows the 20-month average test score gains by the original 5th grade sections.

The same procedures applied to the group when they were 7th graders. They also had individual class schedules and took the ITBS exams in April 2004. Table 4 contains the 32-month average ITBS scores. Table 6 contains the 32-month gains by original 5th grade sections.

RESULTS: Table 1 shows the starting point average test scores for each of the six sections of the 2001-02 5th grade class. Table 2 shows the average test scores 20 months later. Table 3 is produced by subtracting Table 1 scores from Table 2 scores and it shows the average 20 month gain in each subject area. Table 4 contains the average test scores 32 months later. Table 5 is produced by subtracting Table 1 scores from Table 4 scores and it shows the average 32 month gain in each subject area.

TABLE 1
Section Average Standard Test Scores
September 2001 ITBS (Before Bridge)

SECTION(#)	READING	LANGUAGE MATH	SCIENCE	SOCIAL STUDIES
BRIDGE (15)	217.07	206.47	211.07	214.47
NB-1 (18)	210.94	211.06	207.06	214.22
NB-2 (17)	215.94	211.53	209.59	223.12
NB-3 (15)	211.87	207.40	208.93	219.13
NB-4 (16)	220.75	221.75	216.63	230.50
NB-5 (20)	214.85	213.00	216.30	219.65
NB AVE (86)	214.83	212.95	211.81	222.70
CLASS AVE. (101)	215	212	212	221

TABLE 2
Section Average Standard Test Scores
April 2003 ITBS (20 Month Later)

SECTION (#)	READING	LANGUAGE MATH	SCIENCE	SOCIAL STUDIES
BRIDGE(15)	238.53	231.53	236.27	254.73
NB-1 (18)	230.67	236.44	227.94	245.11
NB-2 (17)	241.35	242.06	243.29	250.00
NB-3 (15)	234.26	224.33	229.00	246.80
NB-4 (16)	239.94	241.25	239.25	267.81
NB-5 (20)	239.30	240.40	234.65	248.00
NB AVE (86)	237.14	237.26	234.83	250.76
CLASS				

AVE. (101)	237	236	235	255	253
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TABLE 3
20 Month Average Gain by Section

SECTION(#)	READING	LANGUAGE	MATH	SCIENCE	SOCIAL STUDIES
BRIDGE (15)	21.46	25.06	25.20	40.26	42.40
NB-1 (18)	19.73	25.38	20.88	34.83	30.89
NB-2 (17)	25.41	30.53	33.70	34.41	26.88
NB-3 (15)	22.39	16.93	20.07	27.20	27.67
NB-4 (16)	19.19	19.50	22.62	37.06	34.56
NB-5 (20)	24.45	27.40	18.35	28.20	28.35
NB AVE (86)	22.32	24.30	23.00	32.29	29.63
AVE (101)	22	24	23	34	32

TABLE 4
Section Average Standard Test Scores
April 2004 (32 months later)

SECTION(#)	READING	LANGUAGE	MATH	SCIENCE	SOCIAL STUDIES
BRIDGE(15)	257.93	257.53	262.60	266.73	266.87
5 NB AVE (86)	248.70	258.61	253.30	260.21	245.89
NB-1 (18)	243.50	257.11	243.50	257.67	254.11
NB-2 (17)	252.11	263.35	261.65	262.47	261.53
NB-3 (15)	245.20	248.60	249.40	254.93	249.93
NB-4 (16)	252.81	262.56	259.06	269.69	269.63
NB-5 (20)	249.80	260.30	253.35	256.95	254.80
Average (101)	250	258	255	261	259

TABLE 5
32 Month Average Gain by Section

SECTION(#)	READING	LANGUAGE	MATH	SCIENCE	SOCIAL STUDIES
BRIDGE(15)	40.86	51.06	51.53	52.26	45.14
5 NB AVE (86)	33.87	45.04	41.48	37.52	36.77
DIFFERENCE	6.99	6.02	10.05	14.74	8.37
NB-1 (18)	32.56	46.05	36.44	43.39	39.89
NB-2(17)	36.17	51.82	52.06	38.47	38.14

NB-3(15)	33.33	41.20	40.47	35.60	30.80
NB-4(16)	32.06	40.81	42.43	38.94	39.13
NB-5(20)	34.95	47.30	37.05	31.65	35.15
Average(101)	35	46	43	40	38

DISCUSSION: The 20-month average test score gains show that the bridge playing students did slightly better than their classmates in Math; much better in Science, and very much better in Social Studies, which was the only subject area to be a statistically significant difference. See Table 6.

The 32-month average test score gains show that the bridge playing students were higher in all five subject areas. Language was the only one that was not statistically significant.

Since bridge is a quantitative game, better scores in Math and Science were expected. The higher gains in Reading, Language, and Social Science may be caused by the faster development of inferential reasoning skills. Further research is needed in this area.

Table 6
Summary of Statistical Analysis of Comparison of Fifth Grade Bridge-Playing and Non-Bridge-Playing Groups on the Iowa Tests of Basic Skills

	Bridge-Playing Class (1) Average Scores	Non-Bridge-Playing Class (5) Average Scores	One-tailed t-test of Significance¹	Probability of Difference (Level of Significance)
Math				
20-month	25.2	23.0	0.455	0.327
32-month	51.5	41.5	-1.805	0.043*
Science				
20-month	40.3	30.3	1.29	0.107
32-month	52.3	37.5	-1.999	0.030*
Reading				
20-month	21.5	27.2	0.195	0.424
32-month	40.9	33.9	-2.177	0.020*
Language				
20-month	25.1	26.2	0.227	0.411
32-month	51.1	45.1	0.947	0.178
Social Studies				
20-month	42.4	29.6	2.063	0.026*

¹ A one-tailed t-test of significance was used to test the null hypothesis that the bridge-playing group did not score significantly higher on the Iowa tests than the non-bridge-playing group.

32-month	45.1	36.8	-1.012	0.163
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**AN ANALYSIS OF STANDARDIZED TEST SCORE GAINS
FOR THREE 5TH GRADE CLASSES OF THE SAME TEACHER**

Christopher C. Shaw, Jr. Ph.D.

This report contains the class average gains on the Iowa Test of Basic Skills for three consecutive 5th grade classes taught by the same teacher at the Carlinville, Illinois Intermediate School for the years 2001-2003. The students were tested in September of 5th grade, May of 6th grade, and May of 7th grade. The gains in test scores are shown for both the 20-month interval and the 32-month interval between tests. The 2002 5th grade class did not receive bridge lessons as part of their math instruction in the classroom. The 2001 and the 2003 classes learned how to play bridge. The average ability of all three classes was approximately the same when they started 5th grade. Thus, the test score gains appear to reflect the impact that learning bridge has on the student's ability to learn in both 6th and 7th grades. Learning bridge helped student's develop their inferential reasoning skills. These skills were used in all five subject areas of the Iowa Test of Basic Skills.

20-MONTH AVERAGE TEST SCORE GAINS

YEAR	READING	MATH	SOCIAL STUDIES	LAN- GUAGE	SCIENCE	
2001-02	21.47	25.20	42.40	25.06	40.27	Bridge
2002-03	17.43	24.26	14.31	30.52	29.79	No Br.
2003-04	28.50	34.95	24.17	32.11	24.67	Bridge

32-MONTH AVERAGE TEST SCORE GAINS

2001-02	40.87	51.53	45.13	51.07	52.27	Bridge
2002-03	23.37	36.42	25.15	30.05	36.05	No Br.
2003-04	39.72	45.67	32.50	37.17	45.11	Bridge

The 2001 bridge students had higher test score gains than the 2002 students at the end of 20 months and 32 months in 4 of the 5 subjects. The average Language gain of the 2001 class was lower than the 2002 class and the 2003 class gain was slightly better than 2002.

The 2003 bridge students out gained the 2002 class with the exception of Science at the end of 20 months. Note that they exceeded the gain of the 2002 students by the end of 30 months.

The game of bridge helps to develop inferential skills in both the bidding and the playing of a contract. It is possible that these inferential reasoning skills developed by learning to play bridge are needed more in the 7th grade curriculum to perform well on standardized tests. Students who learn how to play bridge start developing inferential reasoning skills. These skills are very difficult to teach to elementary students. They appear to be used in all five subject areas in middle school.