

# **Classroom Interaction in Effective and Ineffective Schools: Preliminary Results from Phase III of the Louisiana School Effectiveness Study\***

---

**Samuel Stringfield**  
*Tulane University*

**Charles Teddlie**  
*University of New Orleans at Lakefront*

**Sandra Suarez**  
*Louisiana State Department of Education*

## **ABSTRACT**

*A major focus in Phase III of the Louisiana School Effectiveness Study is on the relationship between classroom interaction patterns and school effectiveness. This paper presents observations on similarities and differences between prior teacher and school effectiveness studies, the LSES-III methodology, and preliminary results from one of the eight pairs of schools involved in the year-long study. The data indicate that the use of low-inference classroom interaction observation systems can provide powerful information for differentiating effective from ineffective schools.*

## **INTRODUCTION**

Phase III of the Louisiana School Effectiveness Study (LSES-III) involves a year long attempt to integrate many of the methods of teacher effectiveness research into a longitudinal school effectiveness study. Most notably, low-and high-inference measures of classroom interaction, which had been shown in prior teacher effectiveness studies to be related to student achievement, were systematically employed in the classrooms of the schools in LSES-III. In so doing, LSES-III is nesting a study of classroom interaction within a school effectiveness study.

In this article, we note some similarities and discrepancies between the teacher and school effectiveness research movements, and provide a description of the methods and some preliminary data from LSES-III.

## **TEACHER AND SCHOOL EFFECTIVENESS RESEARCH**

In this paper, we will not review the findings of either literature per se. Brophy (1979) and Rosenshine (1983) offer excellent reviews of the teacher effectiveness literature, and Purkey and Smith (1983), Good and Brophy (1986)

---

\*This research was partially funded by a grant from the Southeastern Regional Council for Educational Improvement.

and Borger, Lo, Oh, and Walberg (1984) provide similar overviews of school effectiveness. Rather, we will discuss two shared characteristics of the field: 1) both have relied heavily on a process-product methodology, and 2) together they are central to the justification, if not the reality, of what is coming to be known as the school improvement movement.

*1. Both fields have built on a process-product methodology.*

The teacher effectiveness field took shape through a group of studies correlating classroom interaction patterns with measures of gain in student achievement (e.g., Brophy and Evertson, 1974; Stallings and Kaskowitz, 1974; Fisher et al., 1980) and has progressed through a series of quasi-experiments in which the alteration of classroom processes produced mean gains in student achievement test scores (e.g., Anderson, Evertson and Brophy, 1979; Good and Grouws, 1979; Stallings, 1980).

With three important differences, the school effectiveness literature is progressing through the same process-product (correlational), then active manipulation loop. The differences are significant:

- a. The *processes* in teacher effectiveness studies have tended to be the actual teacher and student *behaviors*, as measured by low inference observation systems. By contrast, in the school effectiveness studies, the processes have tended to be self-reported attitudes (Rutter et al., 1979 offered a significant exception).
- b. The central *products* of the exemplary teacher effectiveness studies were regressed mean gain scores on standardized, norm referenced achievement tests. In the two most often cited school effectiveness studies (Brookover et al., 1979; Rutter et al., 1979), the achievement product was calculated from passing rates on, respectively, criterion referenced basic skills and specific content area achievement tests. Percent of students passing criterion referenced tests is unlikely to provide as refined a measure of overall achievement as does regressed mean gain on a norm referenced test.
- c. The teacher effectiveness studies have generally been much more methodologically rigorous. The correlational and the quasi-experimental phases of the teacher effectiveness field have each produced at least five exemplary studies. All of these studies were conducted by persons from outside the immediate educational systems under investigation, used defensible sampling techniques, and described in detail the processes and products observed and analyzed. Two prior correlational school effectiveness studies (Brookover et al., 1979; Rutter et al., 1979) met most of those criteria. No moderate-to-large scale quasi-experimental school effectiveness study has achieved such methodological standards.

*2. While both the school and teacher effectiveness literatures are assumed to be central to the school improvement movement; that movement appears to have taken a course separate from either.*

Evidence of this can be found in a recent special issue of the *Elementary School Journal* devoted to "Policy Implications of Effective Schools Research" (Cohen, 1985). The first three articles referenced neither Brookover nor Rutter. What, one wonders, are the new roots of what is known as "school effectiveness?"

At a recent national convention, the present authors were invited to a meeting of people working in the school effectiveness area. Several of the

persons working in school improvement studies described the methods by which they were implementing changes in a particular area of school climate based on the research findings of ... (a specific, nationally regarded researcher). The researcher in question then clearly stated that his research could not be interpreted to advocate for changes in their stance based on this information. Similar experiences abound among teacher effectiveness researchers. Such observations lend potential credence to Rowan's (1984) disturbing thesis regarding "Shamanistic Rituals in Effective Schools," and generally blurred the meaning of "school effectiveness."

One of the ways in which the school effectiveness movement can demonstrate its validity is to build bridges between itself and other more developed areas of inquiry in educational and social science research.

A clear step in that direction would be conducting of a series of studies examining the interrelationships between school effectiveness "processes" (largely self-reported student, teacher and principal attitudes, school rules, and "culture") and teacher effectiveness processes (teacher and student classroom behaviors). LSES-III is one such study.

## METHOD

Twelve school systems had comprised the LSES-II population. One additional large system was added to the sampling pool for LSES-III. Nine pairs of schools were chosen using the following procedure:

1. Within individual school systems, third grade school means on the Total Reading section of the state Basic Skills Test (BST)<sup>1</sup> were computed. The BST is administered in late March of each year. Mean scores were developed for both the '82-'83 and '83-'84 school years.
2. Within each large school system, and among contiguous rural systems, regression models were developed in which mother's education, father's profession, and student body racial composition were independent variables predicting mean BST reading scores. A total of seven separate models were used.
3. A school was considered for inclusion in LSES-II if a) the school scored above (or below) achievement prediction both years, b) the school scored substantially above (below) prediction at least one year, and c) a matching opposite directional outlier of similar racial composition was identified within that system (or in a contiguous system in the rural models).
4. Among the potential pairs identified through steps 1-3c above, pairs were chosen within the following constraints:
  - a. Three must be rural, three urban, three urban-to-suburban,
  - b. Pairs must be included from northern, central, and southern Louisiana,
  - c. The schools must include pairs of predominantly minority, predominantly majority, and mixed student populations, and;
  - d. No system would contribute more than one pair to the sample. (One exception was made to allow the study of a pair of extended day programs.)

Nine pairs of outlier schools were chosen using criteria 1-4d. The third grade situation in one school proved, upon observation, anomalous within the school and the pair was dropped after the fall observations, leaving 8 matched pairs in the sample. In the present paper, preliminary data from one suburban pair is presented.

## INSTRUMENTS

Data gathering in each school included the use of eight instruments plus extensive, qualitative field notes. To ensure comparability of achievement gain

<sup>1</sup>See Appendix A for more information about the Basic Skills Test (BST).

data across school districts, and to prove norm referenced achievement data (in addition to the state Basic Skills Test data), the research version of the 3-R's Test Level 9 (Riverside, 1983)<sup>2</sup> was administered to all 3rd grade students, fall and spring. The 3-R's research version was chosen because the test was recently nationally normed, was not yet being used by any of the school systems under study, and was available in a form which took under one hour to administer.

A set of three closely paralleled questionnaires were used to obtain data from principals, teachers, and students. The questionnaires were built on those developed by Brookover et al. (1979). Several locally developed items and measures of Locus of Control and Self Concept were added during LSES-II (Teddlie et al., 1984). An audiovisual usage questionnaire was developed (Miller, 1985) and completed by teachers.

Three observation systems were used in classroom data gathering. For low-inference data gathering, observers used a modified version of the Classroom Snapshot (CS) from the Stallings Observation System (SOS). The SOS had been used in several teacher effectiveness studies (e.g., Stallings & Kaskowitz, 1974, Stallings, 1980) and, in modified form, in studies of schooling (e.g., Goodlad, 1984). In the CS subscale, data is gathered regarding classroom interaction patterns at several (for this study, eight) discrete moments across a 45 minute to one hour observation. Data is simultaneously coded across four dimensions: activity (e.g. reading aloud, practice drill), adult involvement (e.g. teacher, aide, other, or none), student involvement (none to whole class), and materials used (e.g. chalkboard, textbook). These variables can be aggregated into reliable predictors of student achievement. In particular, Stallings (1980) found that interactive teaching (which from the CS includes reading aloud, making assignments, instruction/explanation, discussion/review, and practice drill) comprise a powerful, alterable, predictor of student achievement. Time spent organizing and off- task (the sum of social interaction, uninvolved, discipline and classroom management), by contrast was a negative predictor of achievement. Substantial effort was made to gather six observations on each third grade teacher's class during the three-day visits in the fall and spring. Observation schedules were developed so classes were observed during all academic hours of the day.

Between low-inference CS codings, high-inference data were gathered using an observation form developed for that purpose. The form listed and subcategorized areas identified by Rosenshine (1983) as related to gain in student achievement. The format included such topics as daily review (with sub-headings), and presentation of new content and skills.

Site visit teams also interviewed principals, teachers, and, on an informal basis, support staff and students at each school. A high-inference School Observation Checklist was developed and completed by the school site team at the end of each three-day observation period.

## **PROCEDURES**

Each school was visited by a two-person team for three full school days in both the fall and the spring of the 1984-1985 school year. Principal and teacher questionnaires were administered during the three-day fall visits, student questionnaires during the three-day spring visits. At all schools, the 3-R's Test was administered to all third graders during the morning of the third day of the site visits, both fall and spring.

During each three-day visit, observers devised an observation schedule which included 12 classroom visits per observer, such that each observer visited every third grade class for at least one class period each day. Other classrooms were scheduled for observation as time permitted, such that more non-third grade classes were observed in schools with two third grades than schools with three or four. No school in the study contained over four third grade sections.

<sup>2</sup> See Appendix A for more information about the The 3 R's Test.

Observations were scheduled so that, at some point during the three days, each class was observed during every hour listed as an academic period. Hours which were not listed on the school schedule as academic (e.g., physical education, home room, recess, lunch, music) were not coded.

Louisiana elementary schools are under state mandate to provide a specific number of minutes of instruction in reading, language arts, and mathematics. Observers were instructed not to code behaviors during times between periods, but to begin coding one minute after any designated academic time had begun.

## RESULTS

Data analysis from LSES-III is in the beginning stages, and what is presented here are preliminary analyses of classroom observation and more qualitative impressions from fall and spring data gathering at one pair of outlier schools.

Data is presented beginning with descriptions of the school system and particular schools, including informal observations regarding staff attitudes, and proceeds to a more quantitative presentation of low-inference, teacher-level CS data.

The high- and low-outlier pair of schools are in a large, middle class, relatively affluent suburban school district. The majority of the students in both schools are white, though each has a substantial minority population. In both schools, the minority population is a mixture of Black, Hispanic, and Asian children. Both schools are located in middle-class, single-family dwelling dominated neighborhoods.

In addition to the statewide BST, the district annually administers the Comprehensive Test of Basic Skills (CTBS)<sup>3</sup> to all its students. The district's assistant director of testing vouched for the validity of the choice of schools, stating that the school, which was a positive outlier on the BST, was annually a positive outlier on the CTBS and that the other performed worse than predicted on the CTBS each year.

The district had a highly centralized, standardized elementary curriculum. The curriculum included 4 tracks: 1A (advanced work for gifted students), 1 (a curriculum for students scoring in the top 23% on the CTBS the previous year), 2 (the "regular" curriculum for students scoring between the 23rd and 77th percentiles on the CTBS), and 3 (a slower, often remedial track for students scoring in the bottom 23 percentiles). For each track, the district provided specific skills to be mastered, dates by which they were to be mastered, and workbooks to facilitate and monitor mastery. At first blush, the research team was hard pressed to imagine how a school could become either a positive or a negative outlier.

### THE SCHOOLS

**Millard Fillmore Elementary School (Pseudonym).** On entering the brightly colorful, modern, clean, carpeted Fillmore school, the first research team member, unaware whether he was at a high or low outlier school, met five cheerful teachers.

"You must be from the state department study," one stated.

"Yes."

---

<sup>3</sup> See Appendix A for more information about the Comprehensive Test of Basic Skills (CTBS).

"Well, we all just *love* Fillmore." All the teachers nodded enthusiastically. It was 10 minutes before school, and the group was having coffee in the comfortable teachers' lounge. A television was turned on in the corner.

In the near decade history of Fillmore, no teacher had asked for a transfer out. All turnover had resulted from family relocation or other forces beyond the control of the staff members. The school spanned kindergarten through sixth grade, and every teacher, specialist, support person, and janitor interviewed expressed pleasure at being there. They felt they worked at a very good school.

The entire staff at Fillmore appeared comfortable with itself. Their students, for the most part, were pleasant, well-dressed, and active. A parent group was actively involved in the school, and in practice ran the library. (All of the elementary schools in the district had a half-time librarian, half-time bookkeeper. At Fillmore, the person spent over 90% of her time bookkeeping.)

The principal was gracious, calm, proud of her school and of what she had made of it. She considered the school to be "heavy into Madeline Hunter." The printed daily schedule for third grade at Fillmore indicated that school began at 8:25 with a 15 minute homeroom, followed by the 65-minute first academic period. Recess lasted from 9:45-9:55 and was followed by the 65-minute second period and the first 25 minutes of 3rd period. Lunch and a second recess were followed by the completion of 3rd period, 4th, and 5th periods, both 65 minutes long.

The research team noted that in six days of being observed, no third grade class began promptly at 8:25. The students and teachers exhibited a tacit understanding that the 8:25 bell meant "begin heading toward your classroom." Not on the schedule was a 5 minute transition between each period, a late re-beginning after each recess, busses leaving Fillmore five minutes before school was "over" (meaning that the last 15 minutes were lost to instruction), and a constant stream of children to and from bathrooms, the office, the library, and, in some cases, just hanging out in the halls. The net effect of these not-on-the-schedule down times was a loss of at least an hour a day of available academic time for all students.

Of the district's four academic tracking choices, Fillmore had groups in 1, 2, and 3. This relatively affluent school simply did not concern itself with 1A, the most advanced track. As one teacher explained, "I think Piaget was right, you can't push kids to learn before they are ready."

**John Adams Elementary School (Pseudonym).** This campus was located in a somewhat less affluent, though solidly middle-class neighborhood. Although the school building was not as modern looking as Fillmore and was not carpeted, it was clean. The children playing on the playground before school appeared relaxed and happy.

The school experienced a change in principals midway through the 1984-1986 school year, with the "old" principal of several years taking a position in the State Department of Education. The new principal had been lead teacher at the school for several years and described herself as sharing the philosophy of the former leader. Like the principal of Fillmore, both Adams principals described their school as following the precepts of Madeline Hunter.

Unlike the principal at Fillmore, both Adams principals expressed detailed interest in their school's curriculum. Through a negotiated agreement with the faculty, Adams school used only curriculum tracks 1A and 2. If a child seemed headed for a low score on the BST or CTBS, he or she was assigned extra work to build his or her skills. If a child scored in the top 23%, the staff assumed he or she could do the advanced, enriched activities of track 1A.

During her tenure, the first Adams principal felt the need to dismiss two teachers. One transferred. The principal stated, "I was documenting a case" to fire her. The second was not recommended for tenure. The first Adams principal stated that, in general "I try to work with them. There are many things we can teach teachers."

The first Adams principal expressed a specific formula for building an effective school. First, build trust and goodwill with the faculty. "Together maybe we can build a better school." Second, build goodwill with parents, build common goals. Third, work with the children. "Make school important, yet fun." As an example of an activity from the previous year that incorporated all three steps, she cited their "Reading Jogs the Mind" program in which parents certified the number of minutes per week they read with their elementary school child. The school goal of one million minutes was monitored throughout the year and exceeded by year's end.

The academic focus of Adams was visibly present around the school. On the hall which included the third grade classrooms were eight bulletin boards. At both the fall and spring visits, all eight carried messages either conveying the importance and joy of reading, or exhibiting student achievements. On the wall across from the principal's office was a list of students on the current academic honor roll.

The school schedule at Adams included a single two-and-a-half hour block of reading/language arts time each morning.

At the bell marking the beginning of school, students lined up and walked quickly into their classes. Homerooms were brief and academics began on time. Observers' notes included such comments as:

"Prompt!"

"After recess, students were in seats, paper ready by the time the teacher returned!"

"Extremely orderly without feeling at all repressive."

"Good, clear review."

"High level of student response."

"The praise tends to be specific."

"A lot of student-teacher interaction."

The site visit team later learned that Adams was the positive outlier school, Fillmore the negative.

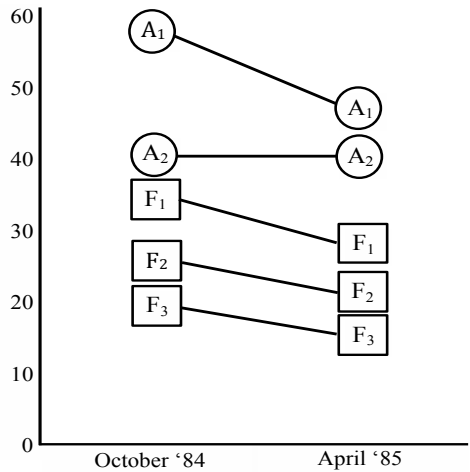
#### **LOW-INFERENCE CLASSROOM OBSERVATIONS**

Low-inference quantitative data gathered on the classroom snapshot of the Stallings Observation System cast additional light on differences between the two schools. Stallings (1980) had found that percent of time in interactive teaching was a positive predictor of achievement. As can be seen in Figure 1, no interactive teaching pattern by a Fillmore third grade teacher reached the lowest percentage of interactive teaching time achieved by an Adams teacher. Moreover, the grand mean percent of interactive teaching at Adams, 44.65%, nearly doubled the 24.18% grand mean at Fillmore. While spring achievement data was not yet available, one could hardly be surprised that for two consecutive

prior years Adams had shown substantially higher achievement than Fillmore, even though the schools were demographically comparable.

A third note should be made regarding the data in Figure 1, relating to the relative stability within teachers of interactive teaching rates. While a more rigorous coding procedure resulted in a fall to spring drop in the recorded instances of interactive teaching, no class in these schools changed its rank on interactive teaching. Whereas studies of the stability over time of classroom interaction measures are rare, this data supports the stability of the CS section of the SOS.

**Figure 1.** Interactive Teaching: Percent of Total Classroom Codings by School and Teacher



Other aggregated measures from the CS supported the effectiveness of the classroom interaction pattern at Adams school. The grand total percent of organizing and off-task observations (a negative predictor of achievement), at Adams was 29.9%, while it was 39.9% at Fillmore. Other data await additional analyses.

## DISCUSSION

Good and Brophy (1986) have argued that additional school effectiveness research is needed "to demonstrate that the behavior of individual teachers in one school differs from the behavior of teachers in other schools." In this preliminary analysis of one pair of schools from LSES-III, we have begun such analyses.

The schools had many similarities. Both were public and served predominantly middle-class children. Both principals involved the teachers in decision making and project implementation. Both had a highly stable staff, strong parental involvement, and a sense of community. Discipline was not a major problem at either school. Both schools had focused major staff development efforts on attending meetings and implementing strategies from Madeline Hunter seminars. The two schools appeared to receive equal district support. Both had high expectations for their students (although at Fillmore these tended to take the form of a belief that the students will go to college; whereas at Adams it was expressed as a conviction that all students can, and will, learn their third grade materials this year, starting now).

The two schools worked under the same ostensibly lock step, day-to-day regimented, rationalized, performance based curriculum. On the printed schedules of the two schools, the total number of minutes devoted to reading, language arts, and mathematics were identical.

In short, the schools were quite similar on many of the dimensions often cited as producing effective schools. Moreover, our impression was that the parents at both schools were pleased with the schools. Yet third graders at Adams had, for at least two consecutive years, substantially outperformed their peers at Fillmore on both criterion and norm referenced tests.



LSES-III data indicate that these differences can be attributed to four factors. First, the two principals at Adams provided a particular kind of leadership. Their vision of an effective school was concerned with the long term benefits of *here and now achievement*. They insisted on a clear and present academic focus for Adams.

Reflecting that stance, the teachers appeared to evaluate themselves based on how successfully all of their students were mastering their third grade basic skills and other school related activities, rather than on how likely it was that the majority of their students would attend college.

Third, at Adams, and at almost all positive outlier schools in LSES-III, there was a prominent display of the names of academic honor roll students in a heavily traveled hall near the principal's office. Academic excellence was the single most important goal of the school. Of central interest in LSES-III, the school's commitment to academics had been translated into in-class action. The rate of interactive instructing at Adams nearly doubled that at Fillmore. Similarly, time spent in organizing and off-task activities was a third lower at Adams.

If a rational, data based school improvement literature is to develop, it will require information from both the school-effectiveness and teacher-effectiveness literatures. Good and Brophy (1986) have argued for research which nests classroom interaction studies within larger school effectiveness studies. Such research can provide a bridge between the school effectiveness and more developed teacher effectiveness literatures.

LSES-III is one such study. We are just beginning the analysis of data from this phase, yet the first preliminary analyses presented here indicate that the method offers promise. If further analyses confirm our findings in the 16 school database, and if other studies replicate LSES-III findings, then connections will have been built between the "process" of the two fields, and substantial progress will have been made toward the development of a more unified model of effective schooling.

Given that practice cannot wait on theory development, practical issues should be addressed. To date, the quasi-experimental teacher effectiveness literature is much more developed than similar efforts in the school effectiveness field. The preliminary findings of LSES-III suggest that school "culture" and other school level variables are translated in effective schools into specific, measurable teacher behaviors. In several studies (e.g., Anderson, Evertson, and Brophy, 1979; Good and Grouws, 1979; Stallings, 1980) these teacher behaviors have proven alterable through extensive, specific, behaviorally based workshops series. Future school improvement studies might find added strength in in-depth efforts to change patterns of classroom interaction. ■

## REFERENCES

- Anderson, L., Evertson, C., & Brophy, J. (1979). An experimental study of effective teaching in first-grade reading groups. *Elementary School Journal*, 79, 198-223.
- Borger, J. B., Lo, C. Oh, S., & Walberg, H.J. (1984). Effective Schools: A Quantitative synthesis of constructs. *Journal of Classroom Interaction*, 20(2), 12-17.
- Brookover, W., Beady, C., Flood, P., Schweitzer, J., & Wisenbaker, J. (1979). *Schools social systems and student achievement: School can make a difference*. New York: Praeger.
- Brophy, J. (1979). Teacher behavior and its effects. *Journal of Educational Psychology*, 71, 6, 733-750.
- Brophy, J. & Evertson, C. (1974). *Process-product correlations in the Texas Teacher Effectiveness Study: Final Report*. Research Report No. 74-4. Austin, Texas: Research and Development Center for Teacher Education, University of Texas.
- Cohen, M. (Ed.), (1985). *Elementary School Journal*, 85, 3.

- Fisher, C., Berliner, D., Filby, N., Marliave, R., Cahen, L., & Dishaw, M. (1980). Teacher Behaviors. Academic Learning Time and Student Achievement: An overview. In C. Denham and A. Lieberman (Eds.), *Time to learn*. Washington, D.C.: National Institute of Education.
- Good, T. & Brophy, J. (1986). School Effects. In M. Whitrock (Ed.), *Third handbook of research on teaching*. New York: Macmillan.
- Good, T. & Grouws, D. (1979). The Missouri Mathematics Effectiveness Project: An experimental study in fourth grade classrooms. *Journal of Educational Psychology*, 71, 335-362.
- Goodlad, J. (1984). *A place called school*. New York: McGraw-Hill.
- Miller, D. (1985). *Education Media questionnaire*. Unpublished manuscript. Louisiana State University, School of Education, Baton Rouge, Louisiana.
- Purkey, S. & Smith, M. (1985). School reform: The district policy implications of the effective schools literature. *Elementary School Journal*, 85, 353-390.
- Purkey, S. & Smith, M. (1983). Effective schools: A review. *Elementary School Journal*, 83, 427-452. Riverside Publishing Company (1983). *The 3-R's Test*. Chicago: Riverside.
- Rosenshine, B. (1983). Teaching functions in instructional programs. *Elementary School Journal*, 83, 335-351.
- Rowan, B. (1984). Shamanistic rituals in effective schools. *Issues in Education*, 2, 76-87.
- Rutter, M. (1982). *Fifteen thousand hours: Secondary schools and their effects on children*. Harvard University Press.
- Stallings, J. (1980). Allocated academic learning time revisited, or beyond time on task. *Educational researcher*, 9(11), 11-16.
- Stallings, J. & Kaskowitz, D. (1974). *Follow through classroom observation evaluation (1972-1973)*. Menlo Park, CA: SRI International.
- Teddlie, C., Falkowski, C., Stringfield, S., Desselle S., & Garvue, R. (1984). *The Louisiana school effectiveness study: Phase Two: 1982-1984*. Baton Rouge, LA: Louisiana State Department of Education.

## **Appendix** *Description of Measures*

This Appendix was added to the this publication of the manuscript to provide readers with additional information about the key measures used in this study.

**Basic Skills Test (BST) (see page 6):** BST measures educational accomplishment and abilities at the third through ninth grade levels. The major areas covered by the tests include vocabulary, reading, language, work-study and arithmetic. Administration of the entire battery requires about five hours of testing time. The split-half reliability coefficients range from 0.70 to .80, possibly reflective of the brevity of these subtests. The composite scores for each skill area are, however, quite reliable. Norms for the entire battery are based upon a sample of over 74,000 students. Scores can be converted into grade equivalents and percentile ranks to interpret an individual student's scores. Tables for converting grade equivalents to percentiles are provided both by grade and by time of testing (i.e., beginning, middle, or end of year). A third set of norms is based upon school averages and permits comparisons between schools within a system.

Siegel, L. (1957). Review of Iowa Tests of Basic Skills. *Journal of Counseling Psychology*, 4(3), 252-253.

**Three R's Test (see page 7):** The Three R's Test developed by Thorndike and Hagen in 1982, is a series of standardized achievement tests in the areas of reading, language, and mathematics for grades K-12. Administration time is 85 minutes for grades K-2 and 98 minutes for grades-12. Separate standardized scores are available for Verbal Abilities and Quantitative Abilities. Percentile ranks, stanines for grade and age, and standard age scores are available. Standard scores have a mean of 100 and a standard deviation of 16, and they are calculated at 3-month intervals between ages 7 years 6 months and 18+ years. Split-half and Kuder-Richardson Formula 20 reliability estimates for subtests are in the .80s and .90s. Validity was built into the tests by using curriculum objectives taken from textbook and state curriculum guides to develop test items. The Three R's Test was normed on two national samples; a spring standardization sample containing 85,000 students and a fall sample of 32,500 students.

Kibby, M. (1986). Test Review: The 3-R's Test. *Journal of Reading*, 29(4), 316-320.

**Comprehensive Tests of Basic Skills (CTBS) (see page 8):** CTBS is a test battery of 10 overlapping levels measuring achievement in reading, spelling, mathematics, language, science, and social studies from kindergarten through grade 12. CTBS uses scale scores, percentiles, stanines, and grade equivalents.

Schell, L. (1984). Test Review: Comprehensive Tests of Basic Skills (CTBS, Form U, Levels A-J). *Journal of Reading*, 27(7), 586-589.