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## ABSTRACT

The Cognitive Enrichment Network Educational Program (COGNET) establishes a framework through which teaching staff, parents, and others work together to help at-risk children succeed in school and become effective, independent life-long learners. The model can be used for at-risk and underachieving students aged 4 through 12 in regular and special education. The COGNET program is based in Feuerstein's theory of mediated learning experience and builds on the belief that children learn how to learn in a social context involving mediated learning experiences. COGNET aims to: (1) provide insight into 10 building blocks of thinking and 8 tools of independent learning; (2) create an atmosphere in which all children are expected to learn and are respected; (3) engender a love for active learning; and (4) develop a network to enable parents, educators, health providers, and social workers to give one another mutual support. Since 1988 numerous studies have provided evidence concerning the positive impact of COGNET on academic achievement and parent involvement. Twelve figures and three tables present achievement data. (Contains 13 references.) (SLD)

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## UNIVERSITY/SCHOOL PARTNERSHIPS IN RESEARCH AND SERVICE:

## THE COGNITIVE ENRICHMENT NETWORK

## NATIONAL FOLLOW THROUGH EDUCATIONAL MODEL

## (COGNET)

part of a Symposium on

An Instructional Model for High Risk Populations

and the Partnerships That Characterize It

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# **UNIVERSITY/SCHOOL PARTNERSHIPS IN RESEARCH AND SERVICE:**

## **THE COGNITIVE ENRICHMENT NETWORK**

### **NATIONAL FOLLOW THROUGH EDUCATIONAL MODEL**

#### **(COGNET)**

##### **History and Current Focus**

The Cognitive Enrichment Network Educational Program (COGNET) establishes a framework through which teaching staff, parents, and others work together to help at-risk children succeed in school and become effective, independent life-long learners. It is a comprehensive educational model that addresses four components of effective school programs for high risk populations: a cohesive, theoretically based classroom approach, parent involvement, health and social services linkages, and university/school partnerships.

The model can be used by teachers, teaching assistants, parents and others working with at-risk and/or underachieving children ages four through 12 in regular and special education programs. A pilot version of the program was successfully implemented in four Head Start centers in 1984-86. In 1988, COGNET became one of 15 National Follow Through educational models funded by the U.S. Department of Education.\* Currently, the program is being implemented in six urban elementary schools (five of which are Chapter I School Wide Projects) in Chattanooga and Knoxville, TN; Detroit, MI; and Omaha, NE; rural elementary schools in Jefferson County, TN; and on the Flathead Indian Reservation in Ronan, MT; and by the Detroit Public Schools Department of Specialized Student Services in regular and special education and the Centre for the Advancement of Cognitive Education in Kortrijk which serves special education needs in the Flemish speaking part of Belgium.

##### **Theoretical Orientation**

The COGNET program is based upon Feuerstein's theory of mediated learning experience (Feuerstein, 1980). It is also influenced by the works of Vygotsky (1978) and Piaget (1976) as well as the

research of Heath (1983), Weir (1989) and others. As a result, COGNET builds upon several specific beliefs.

Children learn how to learn in a social context involving mediated learning experiences. School is a place to practice knowledge and skills needed in the real world. School success is dependent on children's opportunities to actively explore new ideas and, with the help of a mediator, to connect them to their own stories of how the world works. The classroom should be a laboratory for learning where the thinking process is valued as much as the final product. Feuerstein's theory of mediated learning experience provides a foundation for preventing as well as overcoming such impediments.

The COGNET mission is to (a) provide insight into 10 Building Blocks of Thinking and 8 Tools of Independent Learning and how they affect human competence, (b) create an atmosphere where we expect all children to learn, respect all children for what they think and say, and value the process of learning much or more than the product, (c) engender a love for active learning, (d) develop a network that enables parents, educators, health providers and social workers to give one another mutual support as they seek to empower the child, and (e) share our model with others who wish to help students learn how to learn. A major part contributing factor in COGNET implementation is the way in which we draw upon principles of organizational learning as described by Senge (1990), Fuman (1993) and others.

### Purposes and Needs

Due to society's need for each citizen to be able to learn independently, adapt to an ever-changing world, and act as a responsible member of society, education's main task is to find ways to prevent learning problems and disabilities, cultural alienation, and poverty from becoming impediments to independent learning. As a result, the needs of the whole child and family must be addressed rather than merely the needs of the child as a student in the classroom.

The purpose of COGNET is to help children become effective, independent, life-long learners. We address this purpose with the following contextually-linked goals:

- \* develop children's understanding of cognitive processing concepts and their ability to construct their own learning strategies based upon these concepts.
- \* expand and refine children's understanding of how to become effective, independent, life-long learners.
- \* increase children's academic achievement (knowledge and skills).
- \* enhance teacher interaction behaviors that reflect a mediated learning approach to teaching and facilitate student learning to learn.
- \* enhance parent/school partnerships in meeting the learning needs of children.

### COGNET School and Family Approaches

COGNET focuses on both school and home environments. In both settings, adults help children understand fundamental methods for exploring and connecting new ideas including 10 Building Blocks of Thinking and 8 Tools of Independent Learning as children engage in personally relevant activities. These Building Blocks and Tools and their definitions are as follows:

| TOOLS OF INDEPENDENT LEARNING: DEFINITIONS |  |
|--|--|
| 1.   | INNER MEANING: the quality of significance felt inside yourself that provides intrinsic motivation for learning and remembering  |
| 2.   | SELF REGULATION: controlling your approach to learning by using metacognition to determine such factors as readiness and speed   |
| 3.   | FEELING OF COMPETENCE: knowing you have the ability to do a particular thing; the lack of which often results in lazy and other avoidance behaviors; the presence of which results in feeling confident and motivated to learn |
| 4.   | GOAL OF DIRECTED BEHAVIOR: taking initiative in setting, seeking, and reaching objectives on a consistent basis  |
| 5.   | SELF DEVELOPMENT: being aware of your uniqueness as an individual and working towards becoming all you can be  |
| 6.   | SHARING BEHAVIOR: communicating thoughts to yourself and others in a manner that makes the implicit explicit   |
| 7.   | FEELING OF CHALLENGE: being aware of the effects emotions have on novel, complex and consequently difficult tasks; knowing how to deal with challenge  |
| 8.   | AWARENESS OF SELF CHANGE: knowing that you change throughout life and learning to expect, nurture, and benefit from changes  |

#### BUILDING BLOCKS OF THINKING: DEFINITIONS

1. **APPROACH TO TASK:** the manner in which a person goes about beginning, being involved with, and completing an event; including gathering information, thinking about the situation, and expressing thoughts or actions related to the event
2. **PRECISION & ACCURACY:** degree of awareness of the need to be exact and correct in understanding and using words and ideas
3. **SPACE & TIME CONCEPTS:** degree of understanding of basic ideas about how things relate in size, shape, and distance to one another (space) and ability to understand measurement of the period between two or more events or the period during which something happens and/or changes that occur due to these periods (time)
4. **THOUGHT INTEGRATION:** degree of ability to pull together and use at the same time multiple sources of information which are a part of a given event
5. **SELECTIVE ATTENTION:** degree of ability to choose relevant pieces of information when considering thoughts or events
6. **MAKING COMPARISONS:** degree of awareness of the need to examine the relationship between events and ideas especially in determining what is the same and what is different
7. **CONNECTING EVENTS:** degree of awareness of need to associate one activity with another and use this association in a meaningful manner
8. **WORKING MEMORY:** level of capacity for enlarging the thinking space to enter bits of information or mental acts, retrieve information stored in the brain, and make connections among the information gathered
9. **GETTING THE MAIN IDEA:** degree of awareness of the need for finding a fundamental element that related pieces of information have in common
10. **PROBLEM IDENTIFICATION:** degree of ability to automatically experience and define within a given situation what is causing a feeling of imbalance

In the COGNET school program, the Building Blocks of Thinking and Tools of Independent Learning are integrated into school curricular activities. Each day, teachers select several activities which provide an opportunity to focus students' attention on how specific Building Blocks or Tools can help one learn more effectively in the given situation as well as in other, personally relevant, school home, work and social situations. Although COGNET can be integrated into any school activity, we encourage schools to

utilize our Critical Attributes of a Laboratory for Learning in selecting activities which are project-based, cooperative, integrative, and challenging. These attributes are as follows:

**Critical Attributes for Classroom Activities  
In a Laboratory for Learning**

1. These activities require students to integrate ideas and share the results of careful thinking. They do not rely merely on recall of specific, unconnected facts.
2. These activities encourage students to participate actively even when others are responding by evaluating others' responses and helping others' to solve problems. They do not allow students to sit passively and wait on others to have their turns or take over (co-opt) others' learning.
3. These activities allow students to make choices about what they will do on some parts of many activities. They do not require all students to do exactly the same tasks in every case.
4. These activities include some tasks for which there is no one best response. They do not require students to "read the teacher's mind."
5. These activities help students connect isolated skills to their needs in real life activities. They do not present drill and practice tasks without showing how they are used with other skills in real life activities.
6. These activities focus students' attention on process as much or more than product—on improving one's approach. They do not focus students' attention exclusively on producing right answers.
7. These activities assist teachers in observing how each student processes information as they perform. They do not result in documenting only the product of each student's thinking.
8. These activities focus students' attention on the need for Self Regulation. They do not always regulate behavior for the students.
9. These activities provide enough challenge for students so that they can build a Feeling of Competence. They are not boring nor too difficult.
10. These activities transcend the actual skills involved by providing insight that goes beyond the immediate needs of the task. They are not limited to focus only on the present situation.

The COGNET school program also incorporates the same laboratory for learning approach to the use of technology in the classroom. Curriculum related, real life oriented software is carefully selected based on COGNET criteria. In addition, teachers are encouraged to implement cooperative learning structures and social skill monitoring based on Kagan's model (1992) to assure that all children are challenged and that all become active participants in computer and other activities.

In the COGNET family program, parents focus children's attention on the need for Building Blocks and Tools while engaged in activities outside of school such as shopping, planning a party, and doing one's job. Parents reinforce the need in all situations for Building Blocks of Thinking and Tools of Independent Learning that teachers have taught their children in school. However, COGNET parent involvement goes much further to include parent participation on school advisory committees, in classroom volunteer programs, in parenting classes, in self improvement activities and opportunities, in school and parent fund raising projects and in community involvement activities.

### **Impact Studies Overview**

Since 1988, numerous studies have provided evidence concerning the potential impact of COGNET on children, teachers and parents. Children who participated in the program for two or more years made substantial and significant gains over a comparison group on measures of academic performance, cognitive functioning, and intrinsic motivation. In a longitudinal study (Greenberg, 1991), at-risk children moved from an average achievement test score at the 36th percentile before COGNET to the 64th percentile after COGNET in mathematics and the 56th percentile in reading. Parents reported important changes in their children's attitude and understanding of personal responsibility in learning. A study of classroom teacher/student interactions (Greenberg, Woodside, & Brasil, 1994) revealed that COGNET teachers asked more challenging, process oriented questions than comparison teachers and provided greater opportunity for learning to occur. Another study revealed teacher increased preference for reading approaches that are more challenging and personally relevant to students (Gettys, 1990). Parent interview data (Greenberg, 1991) indicated that COGNET parent workshops helped parents better understand their role in children's learning as well as develop specific approaches to helping their children learn.

Preliminary results of several recent studies support the earlier findings. These studies investigated the effects of COGNET on children's academic performance and on parents actively involved with their



children's schools in implementing the model. The final section of this paper presents a summary of these preliminary data and conclusions based upon the findings.

### **COGNET Impact on Children's Academic Performance**

The data included in the following figures and tables display the preliminary results of studies conducted on five COGNET Follow Through Project demonstration schools. Four of the COGNET schools and both of the comparison schools are Chapter I School Wide Project Schools with 90% or more children coming from families with low income. Two of the COGNET schools are located in the inner city of Knoxville, Tennessee as is their comparison school. Two of the other COGNET schools are located in the inner city of Chattanooga, Tennessee as is their comparison school. The fifth school is located on the Flathead Indian Reservation in western Montana and comparisons are made between the gains of that school's Chapter I students and the Montana statewide Chapter I gains. Graphs of data from four types of analyses are included.

#### Value Added Assessment Gain Scores

Gain scores for 1991-93 based on the Sanders Model of Value Added Assessment (McLean, Sanders, & Stroup, 1991) are presented in figures 1-5 and include representations of gain scores from 2 school districts in the State of Tennessee. Bars A and B represent two COGNET demonstration schools, bar C represents an environmentally similar comparison school, and bar D represents the school district as a whole for schools A-C. Bars E and F represent two other COGNET demonstration schools, bar G represents an environmentally similar comparison school, and bar H represents the school district as a whole for schools E-H. A score of 100 equals the national average of improvement while a score of 120 reflects a gain of 20% more than the

national average. The achievement test from which the scores were derived is the Tennessee Comprehensive Assessment Program (T-CAP) which is based on the CTBS. The gains were determined for cohorts of students from one grade to the next and are presented separately for five basic skill areas.

Figures 1-5 display gain scores for 1991-92-93 in Language, Reading, Mathematics, Social Studies and Science achievement. On tests of Language, Reading, and Social Studies achievement the average gains for children in three COGNET schools were greater than their comparison schools. The average gains for two COGNET schools were greater than all schools combined within their districts which included schools serving drastically fewer high risk children. Tests of Science achievement revealed similar gains for COGNET and comparison groups. On tests of Mathematics achievement, the average gain of children in all four COGNET schools was greater than their comparison schools and for three COGNET schools the average gain was greater than all schools combined in their districts.

#### Percent of Children Scoring Below Average on the T-CAP

Data on children in the 1st grade in 1991 in two COGNET schools and their comparison school were contrasted with data on the same children in 4th grade in 1994 to determine COGNET impact on the percent of children scoring below average in achievement based on the T-CAP tests. Results clearly indicate the positive impact of the COGNET program on children most at-risk for failure. Figure 6 displays the percent of students scoring below average in language achievement in 1991 and 1994. Scores of the first COGNET school presented in the figure decreased from 68% of all children scoring below average in 1st grade to 35% in 4th grade and the second from 55% of children scoring below average in 1st grade to 35% in 4th grade.

The comparison school scores, however, showed no decrease in the percent of children scoring below average with slightly more than half of their children scoring below average as 1st graders and also as 4th graders. Figure 7 displays the percent of students scoring below average in reading achievement in 1991 and 1994. The first COGNET school scores presented in the figure decreased from 75% of children scoring below average in 1st grade to 50% in 4th grade. The second COGNET school scores decreased from 50% of children scoring below average in 1st grade to 35% in 4th grade. The comparison school scores revealed that more children scored below average in fourth grade than they did in first, with the percent scoring below average increasing from 50% to 60%. Figure 8 displays the percent of students below average in math achievement as first and fourth graders. The two COGNET schools decreased from close to half of their children scoring below average to less than one third. The percent of comparison school children scoring below average, however, remained about the same from 1st grade to 4th grade at 45%.

#### Chapter I Student NCE Gains

The reading and math scores of students qualifying for Chapter I in a COGNET school were compared to the Chapter I student scores across their state. The Normal Curve Equivalency (NCE) gain scores of 2nd through 5th graders were included for 1993-94. Figure 9 displays positive gains for the COGNET school in both reading and math while negative gains are displayed statewide. Reading NCE gain scores were 14.4 for the COGNET school and -.4 for the state. Math NCE gain scores were 2.5 for the COGNET school while the state displayed a negative gain of -2.8.

### NCE Gain Scores and Effect Size by Level of Implementation

In order to determine whether teachers' full implementation of the COGNET educational model would impact children's achievement more than partial implementation or no implementation, we compared NCE gain scores for children in three groups: (1) those in classes with teachers implementing the model at a high level in COGNET schools, (2) those in classes with teachers implementing the model at a low level in COGNET schools, and (3) those in classes with teachers in a comparison school. Teachers in COGNET schools were divided into groups based on in school expert evaluation of the frequency with which they taught Building Blocks of Thinking and Tools of Independent Learning to children, the level of insight their children displayed in understanding and applying these cognitive processes, and the degree to which their classroom activities met the criteria for a laboratory for learning. The 1993 NCE scores for students in 2nd through 5th grade in each group were subtracted from the 1994 NCE scores to determine the gains. The effect sizes were determined by subtracting the gains of low implementation or comparison groups from the gains of the high implementer groups and dividing by the standard deviation of both groups.

Results of analyses conducted on scores for children in the three schools consistently supported the positive impact on academic gains of high implementation of the COGNET model. Figure 10 and Table 1 display the mean NCE gains for high and low implementation groups in COGNET school #2 and its comparison school. The high implementation group had much greater gains in reading and mathematics than did either the low implementation group or the comparison. In language, however, the low implementation group had larger gains than the high implementation group. Table 1 also shows that effect sizes of medium to large educational importance for the high implementer groups as compared to the low implementer and comparison groups in all three test areas except language where the differences between high and low groups were not considered educationally important based on effect size results. The comparison school gains were negative in all three achievement areas. Similar results were found for high and low implementation groups for COGNET school #3 and its comparison school. Results are displayed in Figure 11 and Table 2. Figure

12 and Table 3 display the results for COGNET school #6 and its comparison school. The high implementation group displayed medium and educationally important effect size in a comparison of language scores for children in high implementer groups over children in low implementer groups and in reading scores for children in high implementer groups over children in comparison school groups. In other test areas for COGNET school #6, the effect sizes between high implementation vs. low and high implementation vs. comparison groups were not considered educationally important.

### Conclusions

The preliminary results described in this paper clearly support the positive impact of the COGNET program on children's academic performance and parent involvement. The impact on children, although more pronounced in some schools than others, is consistent across all schools where data were available to conduct a given type of analysis. Further, both sets of results are consistent with earlier studies of COGNET. Clearly, the components of the COGNET model demonstrated as critically important in meeting the needs of high risk children based on the results of the comparisons of levels of implementation of the model. Nevertheless, knowing that a comprehensive program like COGNET can make such a positive impact on children's academic achievement is a far cry from assuring that schools can readily implement a comprehensive, theory-based educational model.

Due to our six year's experience as a partner with schools implementing COGNET, we know that successful implementation requires a long term commitment and ongoing support. Our schools agree that all four components of the model are essential. The educational approach is needed in order to provide a means for helping children learn how to learn in all kinds of situations. Parent involvement is also a critical component due to the powerful role parents play in helping children understand school and gain the most benefits from it. In addition, health and social service linkages are necessary to assure that the needs of the

whole child have the potential of being met. But the university/school partnership component may well provide the missing piece that when omitted leads to so many wasted efforts in school improvement.

Fullan (1993) builds a solid case for the critical importance of school partnerships or alliances with outside agencies that sponsor change. At the heart of Fullan's argument is the belief that schools must become learning organizations that address the needs of the whole child and the complex systems that effect learning. Fullan states, "The basic discovery arising from systems thinking is that alliances are the bread and butter of learning organizations in dynamically and complex societies. [ ] ...problems are too difficult to be solved by anyone [working in isolation]." (p. 93)

Throughout his text, Fullan focuses on essential aspects of individual and group learning of schools working for transformation and continuously sites the advantages of university/school partnerships in reaching this goal. Our six years of experience as a partner with schools attests to this need. In brief, those of us involved in developing the COGNET model are continuously gathering information from our consistent interactions with those in real world schools and their ups and downs in the process of transformation. Indeed, the formal knowledge upon which COGNET is based has been heavily influenced by the practical knowledge we have gained through these partnerships. In turn, those in our partner schools tell us that they benefit from the formal knowledge sharing of our university sponsor staff and the perspective we bring about practical knowledge due to our work in numerous schools.

We recently held the third annual COGNET Leadership Conference, a two and one-half day event where 60 participants representing eight schools in five states collaborated with sponsor staff and consultants to design the ideal COGNET school. Teachers, principals, district level administrators, parents, a grandparent, social workers, a school nurse, teaching assistants, a librarian and a music teacher interacted with four university professors, graduate students and other university professional and support staff. Together, we met the definition of collaboration or "shared creations" (Schrage, 1990) as we designed the

ideal COGNET school. Instructional models for high risk populations may well depend upon such collaboration.

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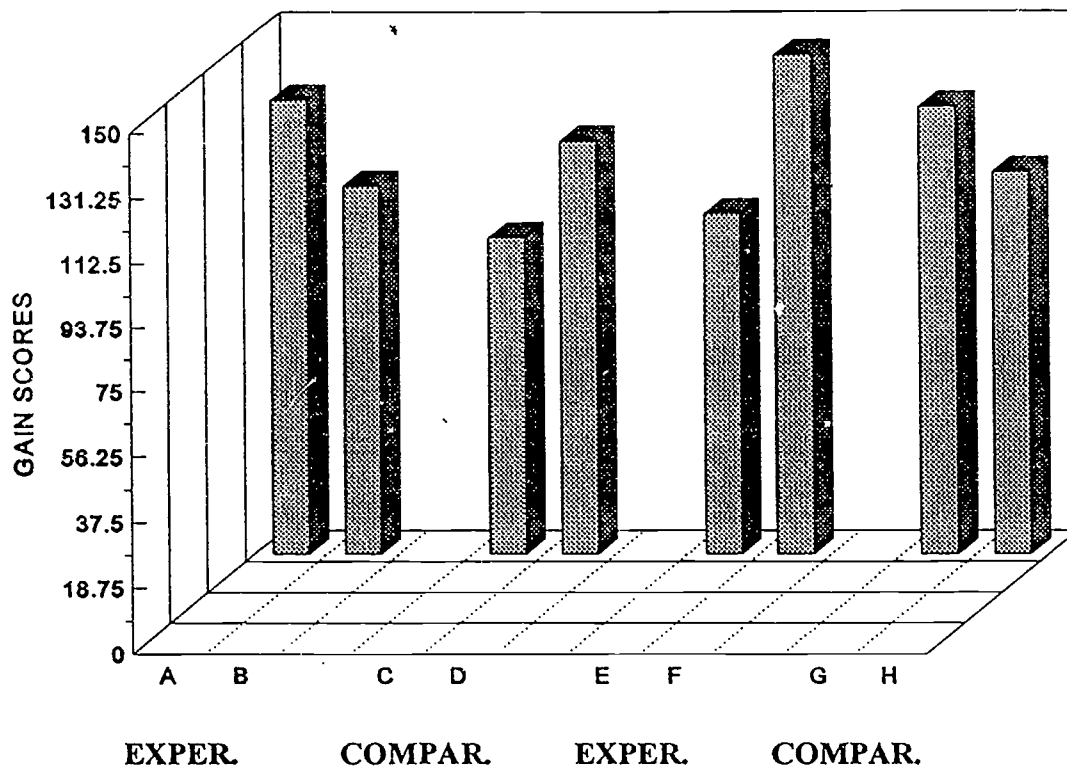
Follow Through Program Grant #S014C10013 and/or Grant # 030913.

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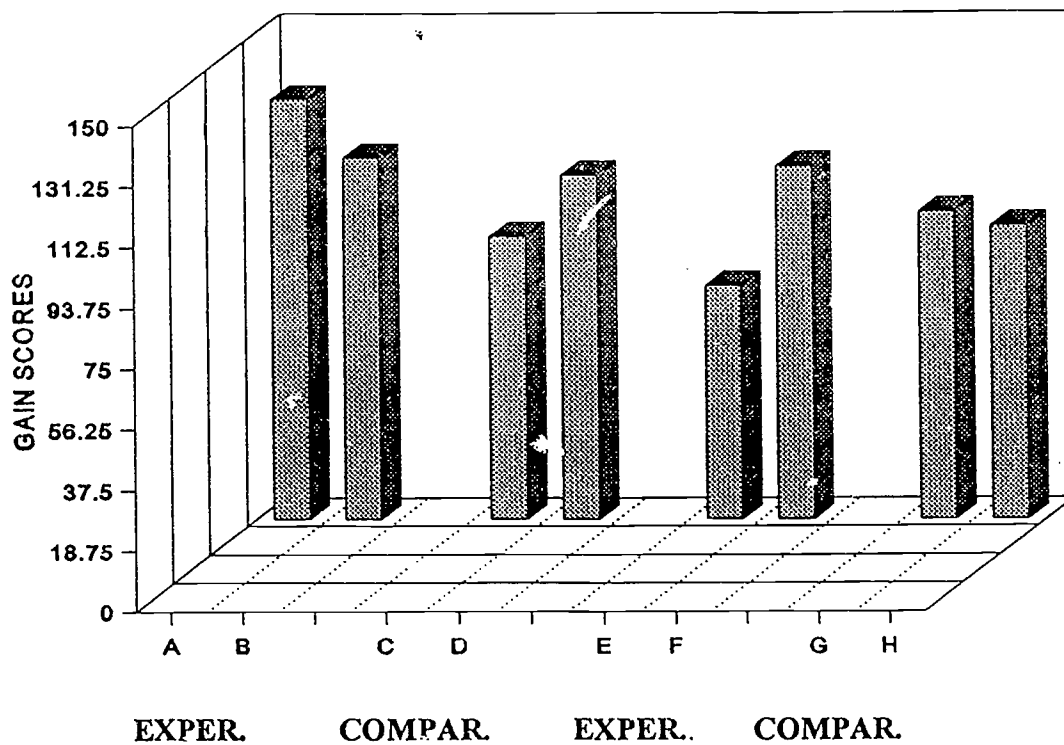


**FIGURE 1. TENNESSEE VALUE ADDED  
ASSESSMENT LANGUAGE ACHIEVEMENT GAINS.**



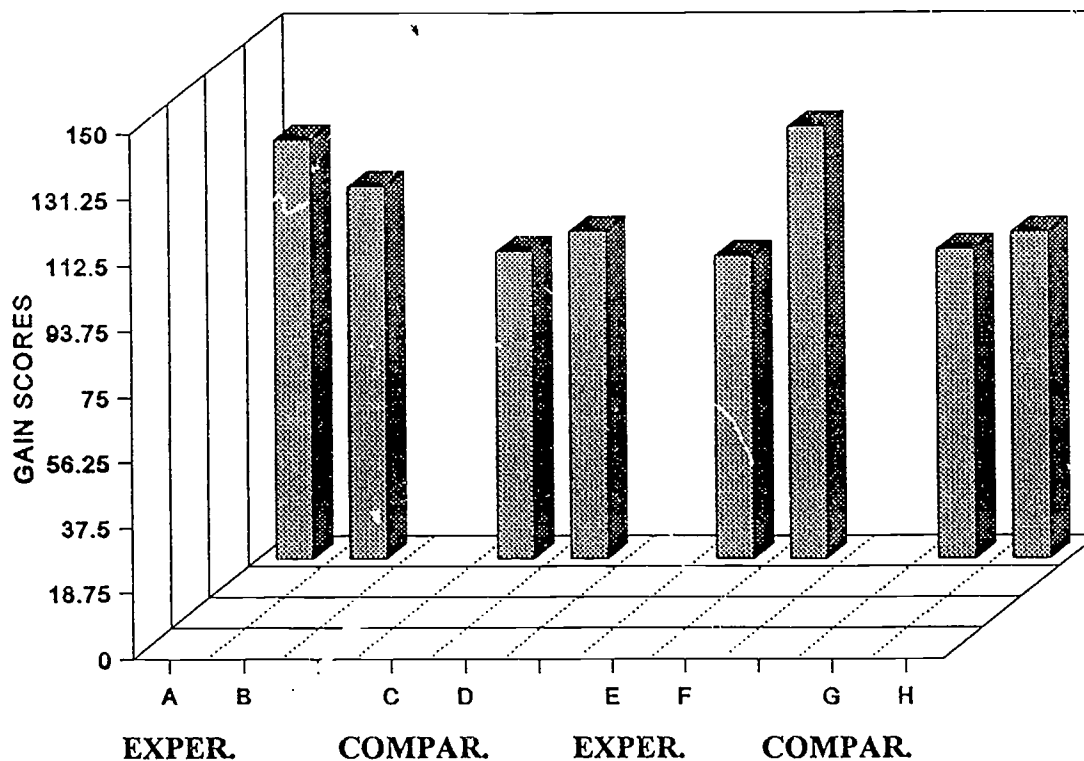
1991-92-93

**FIGURE 2. TENNESSEE VALUE ADDED  
ASSESSMENT READING ACHIEVEMENT GAINS.**



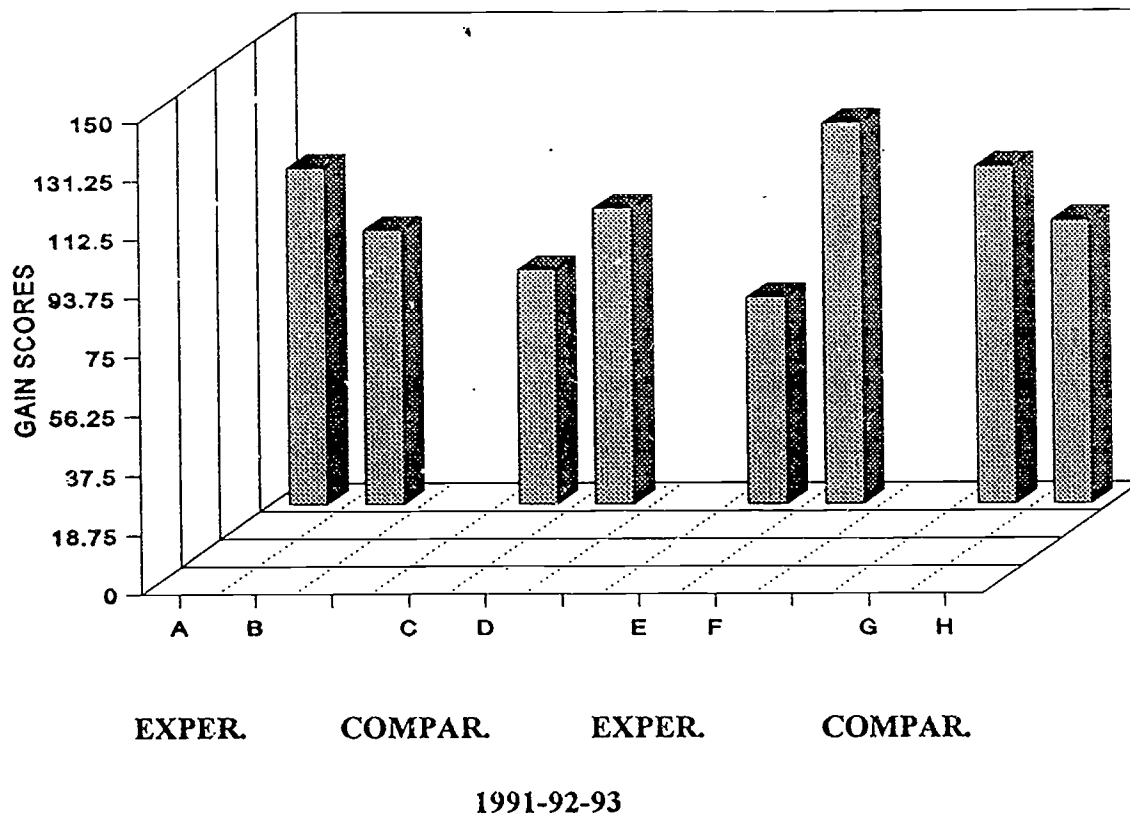
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**FIGURE 3. TENNESSE VALUE ADDED  
ASSESSMENT MATH ACHIEVEMENT GAINS.**

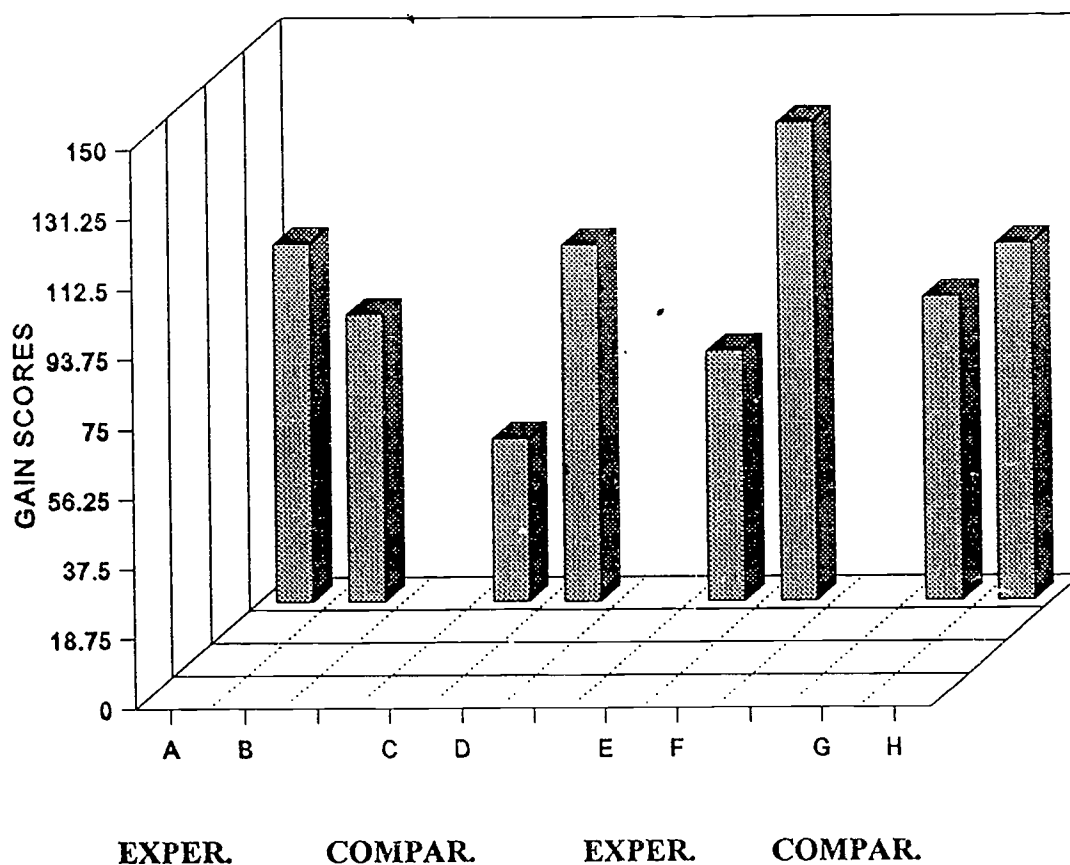


1991-92-93

**FIGURE 4. TENNESSEE VALUE ADDED  
ASSESSMENT SOC. STUD. ACHIEVEMENT GAINS.**



**FIGURE 5. TENNESSEE VALUE ADDED  
ASSESSMENT SCIENCE ACHIEVEMENT GAINS**



1991-92-93

FIGURE 6. PERCENTAGE OF STUDENTS BELOW AVERAGE IN LANGUAGE ACHIEVEMENT.

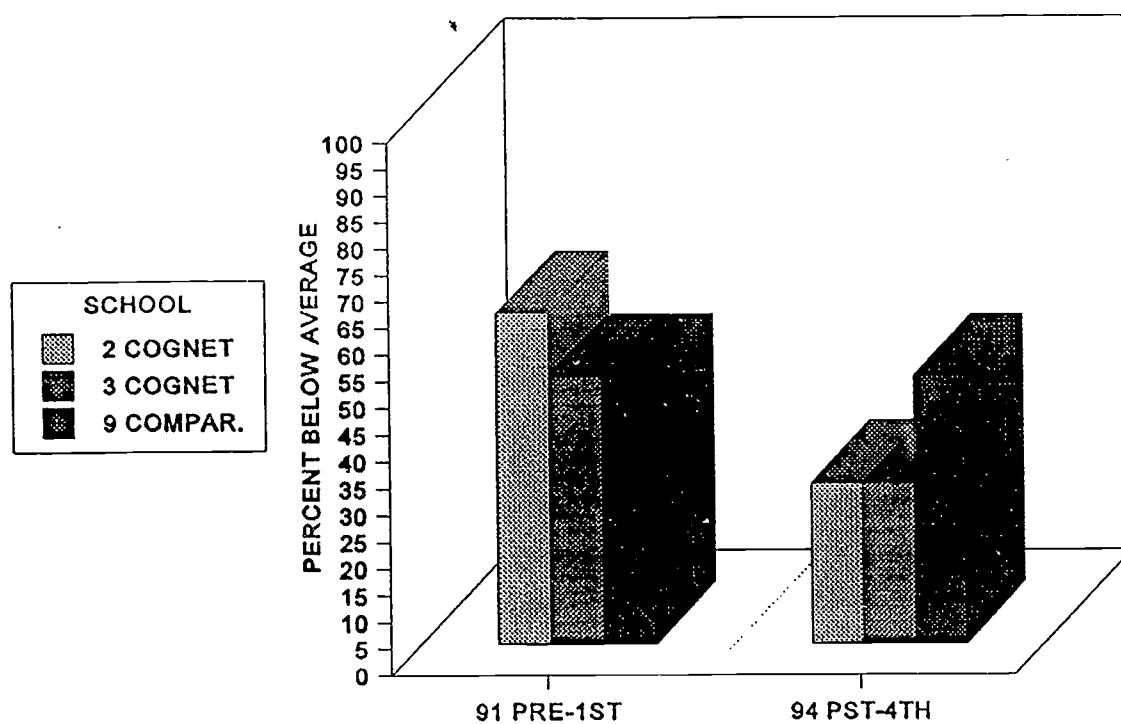


FIGURE 7. PERCENTAGE OF STUDENTS BELOW  
AVERAGE IN READING ACHIEVEMENT.

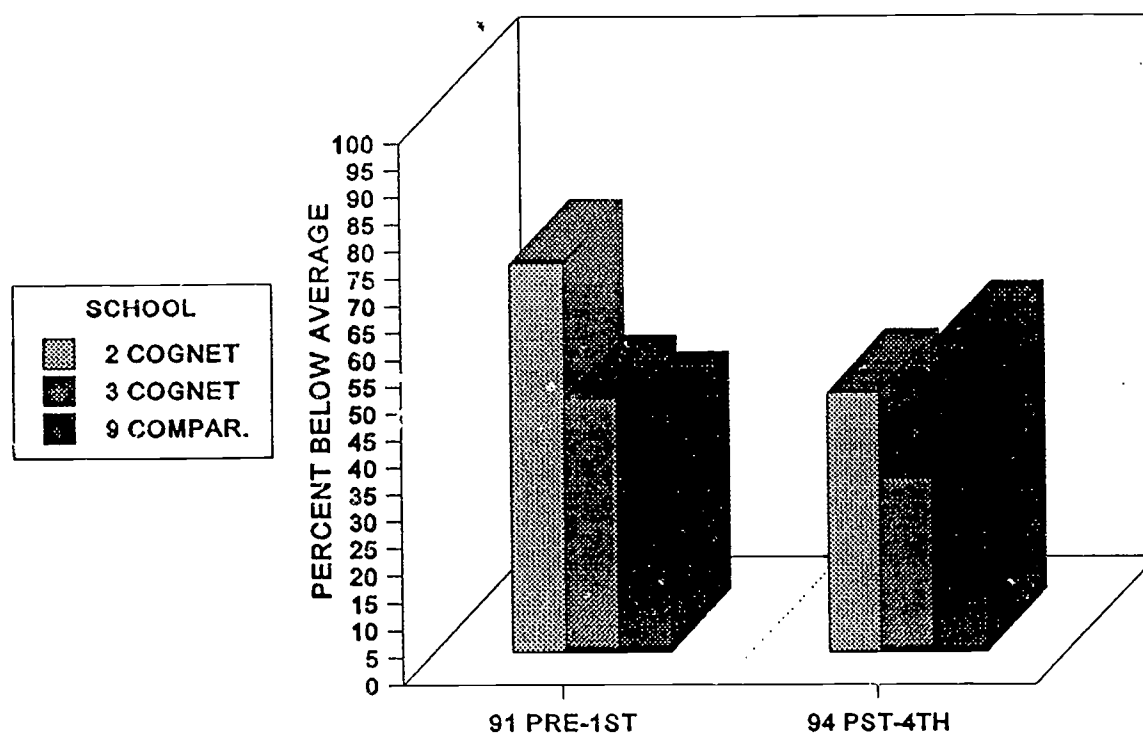


FIGURE 8. PERCENTAGE OF STUDENTS BELOW AVERAGE IN MATH ACHIEVEMENT.

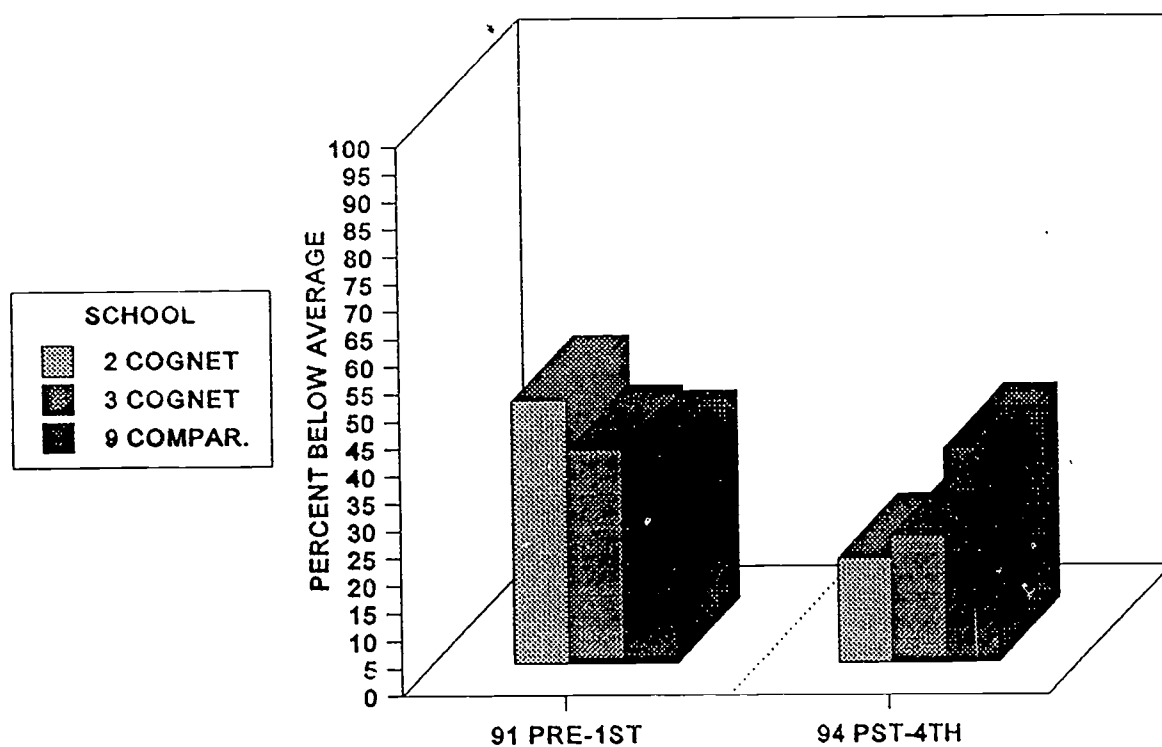
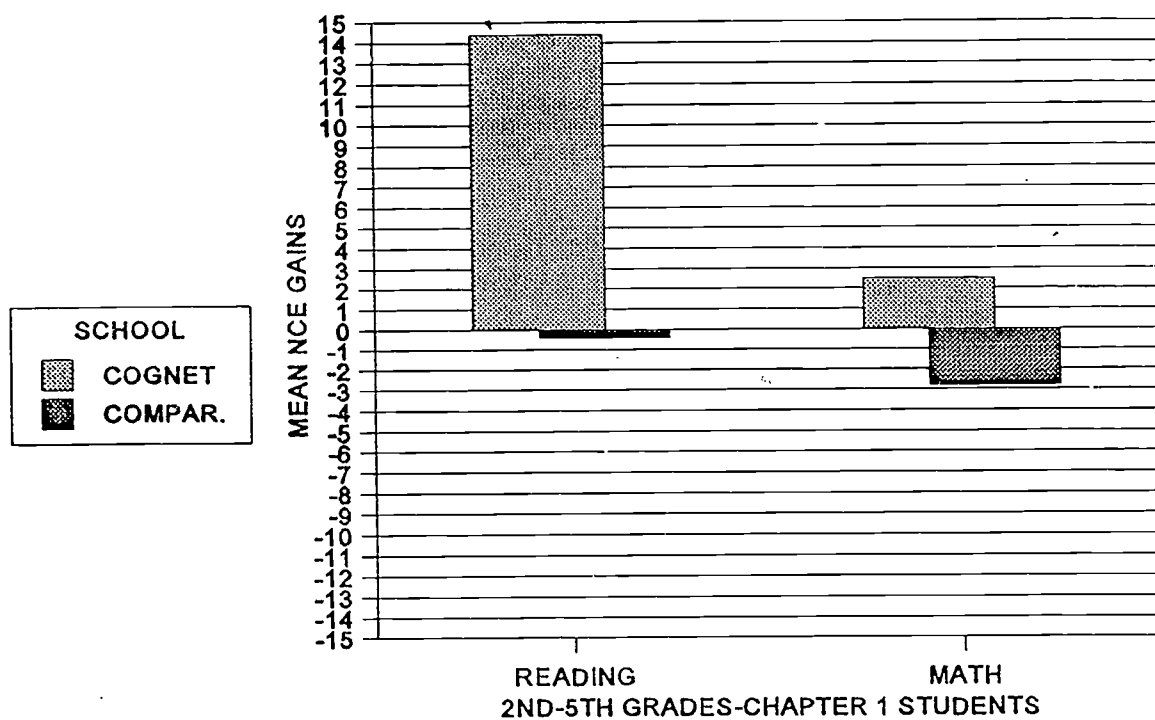
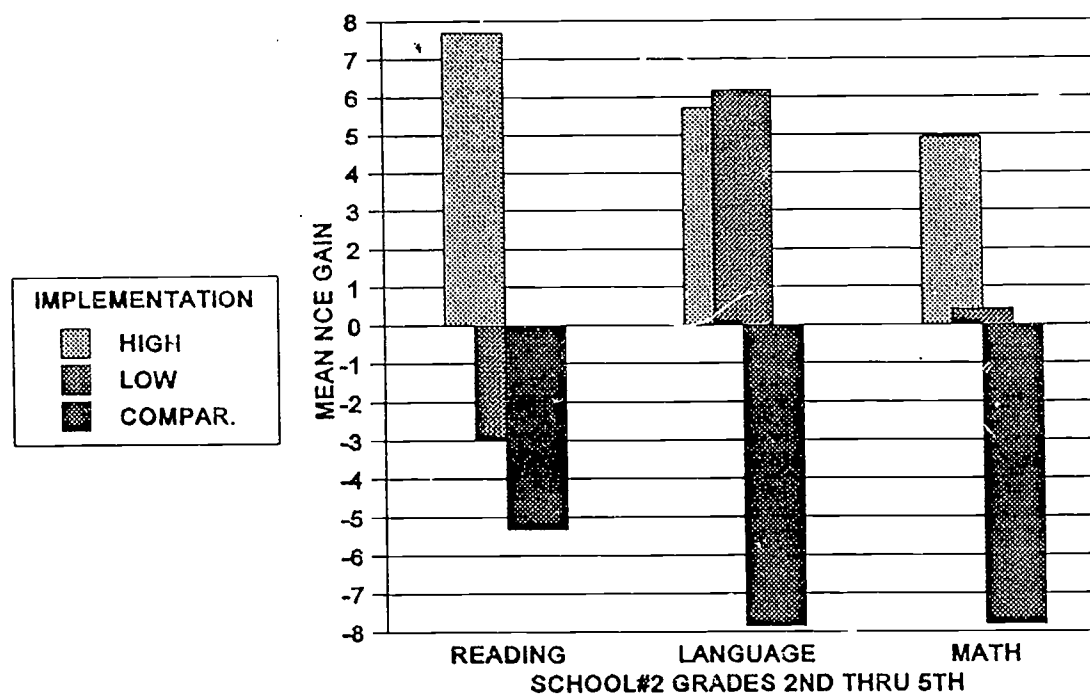




FIGURE 9. NCE GAIN SCORES FOR COGNET  
AND COMPARISON STUDENTS STATEWIDE, 93-94



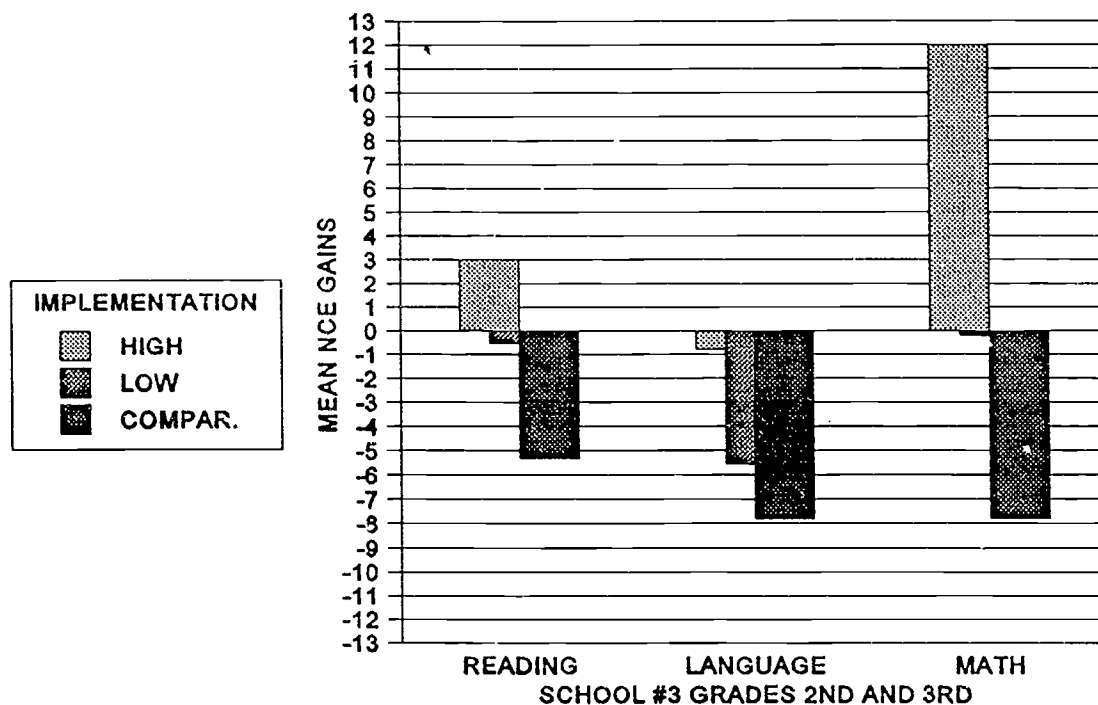
**FIGURE 10. MEAN NCE GAINS FOR COGNET SCHOOLS AND COMPARISON STUDENTS, 93-94.**



**Table 1. School #2 repeated measures mean NCE gains/effect sizes**

|                             | Reading     | Language    | Math        |
|-----------------------------|-------------|-------------|-------------|
| low<br>n=                   | -7.13<br>39 | 5.84<br>37  | -4.03<br>36 |
| high<br>n=                  | 6.74<br>61  | 5.60<br>62  | 4.88<br>60  |
| control<br>n=               | -1.35<br>51 | -7.27<br>49 | -5.16<br>50 |
| effect size<br>high/low     | .9          | 0           | .6          |
| effect size<br>high/control | .5          | .8          | .6          |

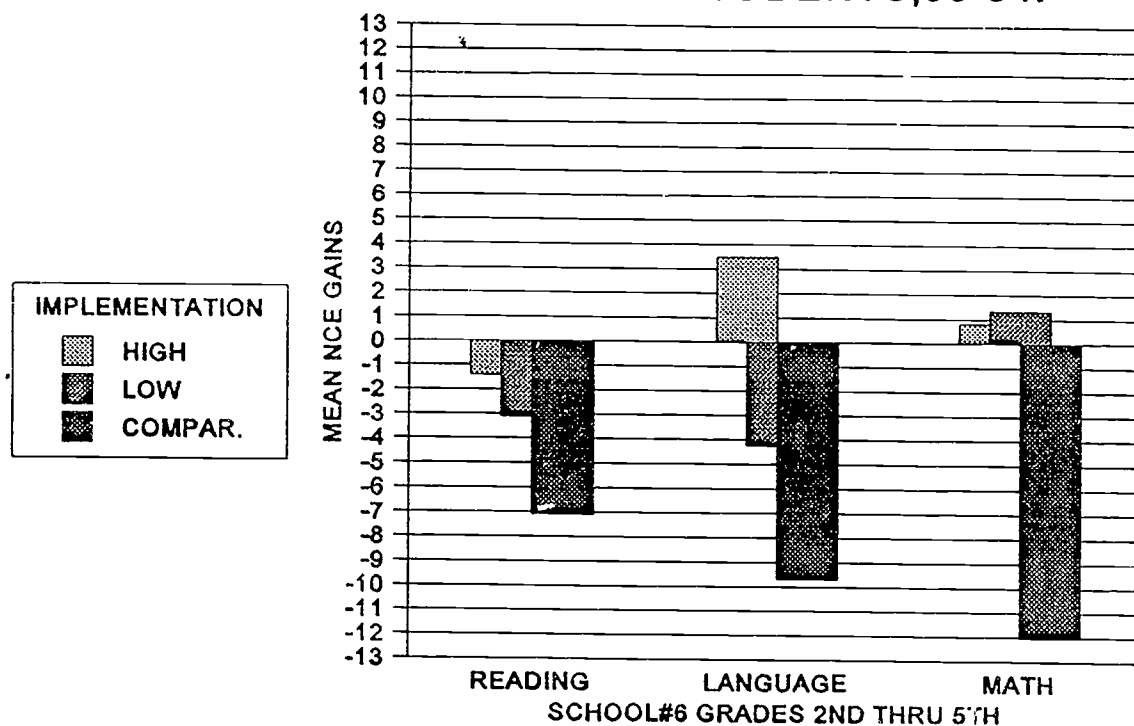
**FIGURE 11. MEAN NCE GAINS FOR COGNET  
SCHOOL#3 AND COMPAR. STUDENTS,93-94.**



**Table 2. School #3 repeated measures mean NCE gains/effect sizes.**

|                             | Reading     | Language    | Math        |
|-----------------------------|-------------|-------------|-------------|
| low<br>n=                   | 2.7<br>20   | -3.05<br>20 | 2.68<br>22  |
| high<br>n=                  | 5.68<br>22  | 1.95<br>20  | 12.64<br>22 |
| control<br>n=               | -1.35<br>51 | -7.27<br>49 | -5.16<br>50 |
| effect size<br>high/low     | .2          | .4          | .6          |
| effect size<br>high/control | .4          | .6          | .99         |

**FIGURE 12. MEAN NCE GAINS FOR COGNET SCHOOL#6 AND COMPAR. STUDENTS,93-94.**



**Table 3. School #6 repeated measures mean NCE gains/effect sizes.**

|                             | Reading    | Language     | Math         |
|-----------------------------|------------|--------------|--------------|
| low<br>n=                   | -.71<br>31 | -4.52<br>31  | 2.53<br>32   |
| high<br>n=                  | -1.0<br>43 | 5.33<br>42   | .41<br>44    |
| control<br>n=               | -7.6<br>85 | -11.29<br>85 | -15.69<br>85 |
| effect size<br>high/low     | -.02       | .7           | -.1          |
| effect size<br>high/control | .4         | 1.1          | 1.1          |