

THE EFFECTS OF COOPERATIVE LEARNING
ON THE READING COMPREHENSION OF
SEVENTH GRADE STUDENTS

THESIS

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Abstract

This study examined the effects of cooperative learning instruction on forty seventh-grade students from a public middle school in Western New York. The students were divided into two groups: Group A and Group B. The students in Group A received the cooperative learning treatment, while students in Group B received no treatment, but worked in a traditional classroom environment.

Each student spent approximately nine weeks in either a class using cooperative learning strategies or one that did not. Each classroom is heterogeneously grouped. The cooperative learning strategies employed were a combination of techniques developed by Slavin, Kagan, and Johnson and Johnson. Cooperative learning activities were incorporated three to four class periods per week. The cooperative learning groups were selected by the teacher. The groups consisted of the recommended combinations as directed by cooperative learning researchers, Johnson and Johnson. Each group remained the same throughout the nine week period. The non-treatment classroom was treated equally in regard to all assignments and materials covered.

Materials included two short stories, and two teacher-prepared reading comprehension tests. An independent t test for independent means at the .05 level of significance was used to determine the effects of cooperative learning. The results revealed that cooperative learning significantly increased students' reading comprehension. The findings, consistent with previous research, support the claim that cooperative learning facilitates comprehension of text.

Table of Contents

Chapter	Page
I Statement of the Problem	1
Purpose.	1
Need for the Study	1
Question	2
Definition of Terms.	2
Limitations of the Study	3
Summary.	4
II Review of the Lierature.. . . .	5
Purpose.	5
Concept of Cooperative Learning.	5
Results and Benefits	8
Cooperative Learning and Reading	9
Social Interaction.	11
III Design of the Study	13
Purpose	13
The Hypothesis.	13
Methodology.	13
Analysis of the Data.	16
Summary	16

Table of Contents (Con't)

Chapter	Page
IV Analysis of Data	17
Purpose	17
Analysis of the Findings	17
Findings	18
Interpretation of the Data	21
Summary	22
V Conclusions and Implications	23
Purpose	23
Conclusions	23
Implications for Research	24
Implications for Classroom Practice	25
Summary	26
References	28
Appendices	
A. Reading Comprehension Tests	31
B. Test Scores for Phase I	36
C. Test Scores for Phase II	38

List of Tables

Table	Page
1. Mean Reading Test Scores	18
2. Two-tailed <u>t</u> test of Significant Difference on the Mean Comprehension Test Scores in Phase I . . .	19
3. Mean Reading Comprehension Test Scores (Phase II)	20
4. Two-tailed <u>t</u> test of Significant Difference on the Mean Comprehension Test Scores in Phase II . . .	21

Chapter I

Statement of the Problem

Purpose

The purpose of this study was to investigate the effects of cooperative learning on the reading comprehension of seventh grade students with varying levels of ability.

Need for the Study

Creating an optimal learning environment in the classroom is among one of the most important obligations of an educator. "No issue in education sets off more intense feelings than whether, and to what extent, students should be grouped into different classes," a recent article of The Harvard Education Letter notes. Some argue that the practice unfairly harms large groups of students, particularly minorities, who are "tracked for failure" by being placed in less accelerated, traditional groups. Others respond that traditional classroom grouping is the only way to insure that students receive the challenges and/or support they need to reach their academic potential (Slavin, 1987).

Society, including today's students, continues to change, while the traditional roles of educators and students remains the same (Johnson & Johnson, 1990). Are the classrooms of today environmentally suitable to fulfill the needs of our 1990s students? Researchers continue to search for that "optimal learning environment." Several researchers have been studying the effects of cooperative learning as quite possibly being the solution to the "optimal learning environment" dilemma. A comparison of a heterogeneously grouped "cooperative" classroom and a heterogeneously grouped "traditional" classroom will help educators determine which setting creates an "optimal learning environment."

Question

The present study was designed to answer the following question:

Does cooperative learning significantly affect the reading comprehension of seventh grade students of varying levels of ability?

Definition of Terms

Reading Comprehension The ability to understand, recall, and paraphrase what has been read. Literal

comprehension is the ability to gain specific meaning of any written material, regardless of the interpretation of the whole. Inferential comprehension is the ability of the reader to derive meaning that is not specifically stated in the reading; to understand what is only implied.

Cooperative Learning Instruction Students working together in the classroom toward the goal of success with the belief that they are in a "sink or swim" situation together (Johnson & Johnson, 1987).

Heterogeneous Grouping/Varying Levels of Ability Students of low, average, and high ability levels placed in the same learning environment.

Homegeneous Grouping Students of "like" ability are placed in the same learning environment.

Traditional Instruction Students work independently and/or competitively in a teacher-centered learning environment.

Limitations of the Study

The findings of this study are limited in their application based upon the following conditions:

1. The study covered only a two-week teaching period.
2. Only one teacher took part in the study.
3. Only two stories were used in the study.
4. The findings of this study are only applicable to seventh grade students from a similar school environment and exposed to the same conditions of the study.
5. The same dependent measures were used in the study, with both being teacher-prepared.

Summary

The present study was designed to further investigate the effects of cooperative learning on the reading comprehension of seventh grade students. Research supports the use of cooperative learning to improve reading comprehension. The cooperative learning groups used in this study were intended to increase student motivation and promote an understanding of the literature encountered. More research is needed to empirically validate this learning strategy.

Chapter II

Review of Literature

Purpose

The purpose of this study was to investigate the effects of cooperative learning on the reading comprehension of seventh grade students with varying levels of ability.

The Concept of Cooperative Learning

It is not uncommon for educators to prefer having "like" students in a class, working independently to complete an assigned task. Many teachers want all accelerated students in one class. Others prefer placing readers in low, medium, and high performance groups. Low achievers and at-risk students are often assigned to certain teachers in specific classes. The list of strategies to deal with varying levels of ability is endless, but the purpose is the same. It is felt that traditionally grouping students facilitates the success of educators, as well as the success of students.

"Education is... and exchange between people who are different from each other" (Bradley, 1990 p. 5). Based on Bradley's premise, should educators be contemplating a change in the way we typically organize and instruct our classrooms? There has been a large amount of research done in attempt to find the best possible environment for learning to occur.

The term "cooperation" can be defined as the interaction of individuals working together towards a common goal (Johnson & Johnson, 1987). The success or failure of the group's effort depends on all members reaching that designated goal. Research indicates that students learn more, become more self-confident, and often display a mutual growth in attitudes towards one another through the application of heterogeneous cooperative learning groups (Johnson & Johnson, 1987).

Learning as a group is the basis of the concept of cooperative learning. The group's success is based on each individual's learning which helps insure every member of the group is learning (Slavin, 1986). Working together, students help one another to learn by encouragement and reinforcement of success. Slavin (1986) states that in order for cooperative learning to be a successful component, groups must be rewarded for

their positive group interaction and group success must depend on individual learning. Slavin (1987) also mentioned in one of his studies that cooperative learning is only effective if used in conjunction with students heterogeneously grouped for instruction.

Cooperative learning groups should be designed to include different ability level students in each group. This will motivate higher ability students to help encourage lower ability students to be successful. Cooperative learning enables students of all ability levels to improve (Slavin, 1986). (It is essential to be sure that cooperative learning is a learning method designed to improve learning and also to assist and maintain positive relationships among classmates.) It is intended to be used in the daily instructional curriculum and not as an extra-curricular activity (Webb, 1982).

The key to cooperative interaction is for students to believe that they are in a "sink or swim" situation together. They must feel responsible for both their learning and the learning of other group members. Students must perceive that if any group member is to achieve his or her goal, everyone in the group must achieve the goal (Hiebert, 1989).

Results and Benefits

Hundreds of studies, dating back as far as the early 1920s, have examined the effects of various forms of between-class ability grouping and with-in class ability grouping. The results indicate that assigning students to classes according to ability does not enhance, but yet may hinder student achievement (Slavin, 1987).

Many problems are inherent in traditionally grouping students for instruction. Johnson and Johnson (1990) report that once students have been classified, "history reveals almost insurmountable difficulties in reassigning them" (pg. 52). Second, "there is no consistent evidence that ability grouping increases student achievement at any level" (pg. 52). Third, we may not have precise enough measures to group students. Assigning students to groups is often based more on social class and ethnic membership than ability. As a result, there is a potential for misclassification. Fourth, "there is disturbing evidence that teachers tend to underestimate the ability of students assigned to low-ability groups" (pg. 54). Fifth, evidence indicates that students in low-ability groups tend to spend less time working on academic tasks than do

students in other groups. These realities seem to indicate that placing students in traditional groups for instruction requires a great deal of caution (Johnson & Johnson, 1990).

Forty-five studies lasting from two to fifty weeks have compared student achievement in cooperative learning groups to that in traditional learning groups. Forty of these studies have found significantly higher achievement for the cooperative classes, and none favored traditional classes (Slavin, 1986).

One study, in a low-functioning high school English class in New Jersey, found that after three weeks the cooperative class scored sixty percent higher than the traditional class on a grammar test. Another study, in a suburban high school social studies class in New York, found that after ten weeks the cooperative class scored eighty percent higher than the traditional class on a practice regents examination (Slavin, 1986).

Cooperative Learning and Reading

Kulik and Kulik (1987) investigated the effects of traditional grouping instruction on reading achievement. Many school children's reading experiences occur most exclusively within the text of traditional grouping. Traditional grouping provides

fewer opportunities for learning. Setting up groups in the classroom sets a tone for social processes that can have social and instructional effects. Processes can encompass a variety of behaviors. The most obvious are the actual interactions between teachers and students within each reading group. The amount of time students spend in teacher-directed reading groups is highly related to reading achievement.

Research done by Borko (1987) investigated how students are organized and instructed for reading. Her research is in agreement with that of the research done by Kulik and Kulik (1987). She agreed that the amount of time spent in traditional reading instruction and the actual interactions between teachers and students strongly influence the effects of reading instruction.

Sorenson and Hallinan (1986) attempted to improve upon the previous research done on the effects of traditional classroom instruction. In their opinion, previous studies have based their findings on traditional instruction and reading with too many limitations in place. Much of the previous research tends to be based on small samples from a few classes. In addition to using better data, their study uses a

conceptual framework. The focus of their study was on academic growth, in reading, measured at the beginning and end of the school year. Information on traditional classroom instruction was obtained from the teachers six times over the school year. The teachers provided information on data collection, basis of how classes were taught, and the percentage of instructional time students spent working independently, or in cooperative learning groups. The main finding in this research is that traditional classroom instruction provides fewer opportunities for learning than cooperative learning classrooms.

Social Interaction

Cooperation is the key for group success. Working in cooperative groups will help the students to better adapt to the world outside after schooling.

Swartzbaugh (1988) speculated that teachers can truthfully state their classes are preparing students to function and work in the modern world since teamwork goes hand-in-hand with the learning of transferable social skills.

Students often feel uncomfortable in relationships with authority figures during adolescence. Byrne (1988) reports that they may have these negative

feelings as a result of having to deal with self-esteem and their own identity crisis. Cooperative learning allows the students to work together towards a common goal of success, in the classroom environment, without the stress of dealing exclusively with the authority figure, the classroom teacher (Johnson & Johnson, 1987).

Slavin, (1986) suggests that peers can often interact better with one another than with a teacher. They can also explain things better to one another than the teacher can. Cooperative learning groups provide modeling opportunities that help students work together to demonstrate abilities for the benefit of others. Johnson and Johnson (1987) add that cooperative learning is advantageous in the long run for students, since it provides a foundation for a supportive environment. It forces students to make, support, and defend ideas that they have come up within the group.

Chapter III

Design of the Study

The purpose of this study was to investigate the effects of cooperative learning on the reading comprehension of seventh grade students with varying levels of ability.

Hypothesis

The following null hypothesis was investigated in both phases of this study:

There is no statistically significant difference between the mean test scores in reading comprehension of seventh grade students who received cooperative learning instruction and those seventh grade students who did not receive cooperative learning instruction.

Methodology

Subjects

The subjects involved in this study were forty seventh grade students, heterogeneously grouped for instruction. Students were selected from two English

classes at a public middle school in Western New York. The students were divided into two groups: Group A and Group B. Each student in Group A has received cooperative learning instruction, while students in Group B received instruction in a traditional classroom. Both classes were taught by the researcher.

Instruments

Materials for this study included two short stories and two teacher-prepared reading comprehension tests. The short stories used in this study were Raold Dahl's "The Landlady" and Ernest Hemingway's "A Day's Wait."

The tests for both stories were designed to include ten short-answer comprehension questions. Literal and inferential questions were both included on the tests given.

Procedure

This study required eight class periods, over a two week period. Four class period were needed for Phase I of the study, to present "The Landlady" by Raold Dahl; and four class period were needed for Phase II of the study, to present "A Day's Wait" by Ernest

Hemingway. The treatments for each story required one 40 minute class period to present the lesson and read the story, and one class period to administer the test.

Prior to the study, each student spent approximately nine weeks in either a classroom using cooperative learning groups and strategies or a traditional classroom. The cooperative learning strategies employed were a combination of techniques developed by Kagan, Slavin, and Johnson and Johnson. Roles were assigned to each cooperative learning group member. Social skills were modeled and taught to the groups. Positive interdependence was developed to include support of their peers, mutual concern, and respect for one another. Each member of the group shared common goals and strived to achieve them together. A "sink or swim" attitude was instilled in each group and group members alike. Cooperative learning activities were incorporated three to four class periods, forty minutes each, per week in the treatment class. The cooperative learning groups were selected by the teacher. The groups consisted of the recommended combinations as directed by the guidelines directed by cooperative learning gurus, Johnson and

Johnson. Each group remained the same throughout the nine week period.

Analysis of Data

In both phases of the study, a t test of independent means at the .05 level of significance was used to determine the usefulness of cooperative learning on the reading comprehension of seventh grade students.

Summary

This study was designed to investigate the effects of cooperative learning on the reading comprehension of two groups of seventh grade English students. In both phases of the study, the reading comprehension scores of the cooperative learning group were compared with the scores of the traditional group to determine whether a statistically significant difference between the two groups existed. A t test of independent means at the .05 level of significance was used.

Chapter IV

Analysis of the Data

Purpose

The purpose of this study was to investigate the effects of cooperative learning on the reading comprehension of seventh grade students with varying levels of ability.

Analysis of the Findings

The following null hypotheses were investigated in this study:

1. There is no statistically significant difference between the mean test scores in reading comprehension of seventh grade students who received cooperative learning instruction (Group A) and those who did not receive cooperative learning instruction (Group B) during Phase I of the study.

2. There is no statistically significant difference between the mean test scores in reading comprehension of seventh grade students who received cooperative learning instruction (Group A) and those

who did not receive cooperative learning instruction (Group B) during Phase II of the study.

Findings

Table 1 summarizes the statistical findings of the analysis.

Table 1

Meaning Reading Comprehension Test Scores (Phase I)

Group	n	\bar{x}	md.	s.d.
A	20	9.5	10	0.5916
B	20	6.95	7	1.8397

Note: Maximum Score = 10

As indicated by the results of the reading comprehension test following Phase I of the study, the mean raw comprehension score for Group A (the cooperative learning group) was 9.5, with a standard deviation of 0.5916. The mean comprehension score for Group B (the traditional learning group) was 6.95, with a standard deviation of 1.8397. Both fell within the normal distribution range.

A t test of independent means at the .05 level of significance was used to determine whether the difference between the mean comprehension test score of Group A and the mean comprehension test score of Group B was statistically significant. These data are presented in Table 2.

Table 2

Two-tailed t test of Significant Difference on the Mean Comprehension Test Scores in Phase I

Group	\bar{x}	s.d.	t	p
A	9.5	0.5916	2.63	0.5
B	6.95	1.8397		

Note: degrees of freedom = 38 (n1-1) + (n2-2) = n1+n2-2

The calculated t value was 2.63. For a two-tailed test set at the .05 level of significance, the critical value for 38 degrees of freedom is 2.02. The calculated t value was greater than the critical t value, the null hypothesis was rejected. Therefore, there was a statistically significant difference between the test scores of Group A and Group B in Phase I of this study.

As indicated by the results of the reading comprehension test following Phase II of the study, the mean raw comprehension score for Group A (the cooperative learning group) was 9.25, with a standard deviation of 0.83. The mean comprehension score for Group B (the traditional learning group) was 6.75, with a standard deviation of 1.48. Both fell within the normal distribution level. These data are presented in Table 3.

A t test of independent means at the .05 level of significance was used to determine whether the difference between the mean comprehension test score of Group A and the mean comprehension test score of Group B was statistically significant. These data are presented in Table 4.

Table 3

Mean Reading Comprehension Test Scores (Phase II)

Group	n	\bar{x}	md.	s.d.
A	20	9.25	9	0.83
B	20	6.75	7	1.48

Note: Maximum Score = 10

Table 4

Two-tailed t test of Significant Difference on the Mean Comprehension Test Scores in Phase II

Group	\bar{x}	s.d.	t	p
A	9.25	0.83	2.56	0.5
B	6.75	1.48		

Note: degrees of freedom = 38 (n1-1) + (n2-2) = n1+n2-2

Interpretation of the Data

The present study was designed to determine whether or not cooperative learning significantly affects the reading comprehension of seventh grade students of varying levels of ability. An analysis of the data from Phase I of this study indicated that there was a statistically significant difference between the mean test scores of the cooperative learning treatment group (Group A) and the non-cooperative learning treatment group (Group B), in favor of the cooperative learning group. Furthermore, an analysis of the data from Phase II of the study revealed similar findings. There was a statistically

significant difference between the mean test scores of the cooperative learning group (Group A) and the non-cooperative learning group (Group B), in favor of the cooperative learning group. In both phases of the study, the null hypothesis was rejected. The evidence suggested, then, that cooperative learning significantly affected the reading comprehension of seventh grade students of varying levels of ability.

Summary

An analysis of the data from both phases of this study indicated that there was a statistically significant difference between the mean test scores of the cooperative learning groups and the non-cooperative learning groups, favoring the cooperative learning groups. The difference between the means, in both phases of this study, was not due to chance or error.

Chapter V

Conclusions and Implications

Purpose

The purpose of the present study was to investigate the effects of cooperative learning on the reading comprehension of seventh grade students with varying levels of ability.

Conclusions

Analysis of the data from both phases of this study indicated a statistically significant difference between the mean test scores of the cooperative learning groups and the non-cooperative learning groups, favoring the cooperative learning groups. These findings, consistent with previous research support the claims that cooperative learning instruction facilitates the reading comprehension of students with varying levels of ability.

In addition, informal observations indicated that most of the students preferred receiving instruction in a cooperative learning environment. In both phases of the study, students who received cooperative learning

instruction did not complain about completing the assigned tasks. On the other hand, in both phases of the study, students who did not receive cooperative learning instruction labored over the assigned tasks, complaining that the selections were "too long" and "stupid." These findings were consistent with previous findings, as well (Reuman, 1989; Winne, 1982). Attitude surveys from these studies revealed that the majority of the students involved found cooperative learning facilitative.

Implications For Research

Further investigations into the effectiveness of cooperative learning to facilitate comprehension are suggested. Though the results to date indicate the positive effects of cooperative learning with secondary students of various ability levels, little is known about the effects of cooperative learning of primary and elementary students or college students. This matter should receive further attention.

This study leaves much room for further review and analysis. A more conclusive study evaluating the effect of cooperative learning would include a larger sample and involve a variety of schools. In addition,

though research provides reasonable evidence to the effectiveness of cooperative learning, other instructional techniques designed to increase comprehension have been developed, as well. Future researchers could compare the effects of cooperative learning with that of other recommended and proven effective instructional techniques.

Implications for Classroom Practice

Research supports the use of cooperative learning to increase a variety of things, one being reading comprehension of today's learner. Cooperative learning has a positive effect on many different aspects of the classroom as suggested by Bradley (1990). Cooperative learning increases students' self esteem, level of motivation, classroom interdependence, academic achievement and social skills.

Several gurus of cooperative learning have developed what they call "cooperative learning" with the same basic understanding and the same goals in mind. Educators attempting to use cooperative learning in their classrooms should experiment with different methods to discover which positively fits their individual needs and the needs of their students.

Cooperative learning goes beyond simply putting students in groups to work together. Teachers should be trained to effectively implement the techniques involved with a successful cooperative learning classroom.

Based on informal observation, cooperative learning motivates students to go beyond what is just "acceptable." Students are more task-oriented, due to the fact that what they produce really counts and others are counting on them to produce. Positive interdependence is developed and students develop a camaraderie with classmates that very well could mean more than anything else in their academic careers.

The results of this study indicated a statistically significant difference between the cooperative learning group and the non-cooperative learning group. This, and prior research, should encourage educators to investigate cooperative learning.

Summary

The purpose of this study was to determine the effects of cooperative learning on the reading comprehension of seventh grade students. Students in

this study received the treatment with cooperative learning and the treatment without cooperative learning. Analysis of the data revealed a statistically significant difference between the two treatments, favoring the treatment with cooperative learning. These results are consistent with previous research.

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Appendix A
Reading Comprehension Tests

Name:

Quiz for "The Landlady" by Raold Dahl

Test pages 133-240

Write the letter of the best answer to each question.

1. ___ Even before the rings the bell of the "Bed and Breakfast" house, we are aware of all the following about Billy Weaver except
 - a. his age
 - b. his destination
 - c. his plans
 - d. his unsuspecting nature

2. ___ Billy wants to be "brisk" because it is an obvious sign of
 - a. success
 - b. youth
 - c. keeping warm
 - d. looking older than seventeen

3. ___ The boardinghouse tempts him because it seems all of the following except
 - a. livelier than a pub
 - b. exceedingly comfortable
 - c. cozy and hospitable
 - d. entirely respectable

4. ___ How does Billy feel when he again looks at the Bed and Breakfast sign?
 - a. unbelieving
 - b. hypnotized
 - c. pleased
 - d. indifferent

5. ___ After ringing the bell, Billy is promptly invited inside. Although he assumes the landlady is merely "prompt," actually she must have
 - a. run downstairs to answer
 - b. been looking out at him
 - c. been forewarned by someone at the train station
 - d. recognized him

6. ___ The landlady informs Billy that she only accepts lodgers who are
 - a. "well-mannered"
 - b. "intelligent"
 - c. "exactly right"
 - d. "well-dressed"

7. ___ Billy finds it impossible to be suspicious because the landlady seems all of the following except
 - a. amusing absent-minded
 - b. warm and motherly
 - c. unconcerned about money
 - d. bright and sharp

8. ___ Billy feels certain he has seen the names Christopher Mulholland and Gregory W. Temple prior to seeing them in the guest register. Has he?
- a. Probably not: his mind is playing tricks.
 - b. definitely not: those people never existed.
 - c. Definitely yes: they were famous athletes.
 - d. Undoubtedly: and in sensational newspaper headlines.
9. ___ When the landlady informs him that Mulholland and Temple are still present "on the fourth floor," how does Billy react?
- a. He is pleased.
 - b. He is baffled.
 - c. He laughs at her joke.
 - d. He expresses a desire to meet them.
10. ___ Obviously, the landlady has a hobby. What is it?
- a. Raising pets
 - b. Keeping a guest book
 - c. Drinking tea
 - d. Stuffing skins of animals

Name:

Quiz for "A Day's Wait" by Ernest Hemingway

Write the letter of the best answer to each question.

1. ___ Which of the following statements about the sick boy is true?
 - a. He does not talk much.
 - b. Ge feels very sick.
 - c. He vomits several times.
 - d. He has a fever.

 2. ___ The story does not contain many details. Which of the following details does the story give you?
 - a. The boy's name
 - b. The boy's age
 - c. The school he attends
 - d. His father's profession

 3. ___ The father calls a doctor. When?
 - a. Right after discovering the boy is sick
 - b. In the afternoon
 - c. During the night
 - d. The next day

 4. ___ The boy has all of the following symptoms of illness except
 - a. A white face
 - b. Fever
 - c. During the night
 - d. An upset stomach

 5. ___ The doctor finds nothing to be alarmed about, but he warns against
 - a. too much activity
 - b. high fever
 - c. solid food
 - d. too little sleep

 6. ___ The boy refuses to let anyone come into his room because he
 - a. wants to be alone
 - b. has been crying
 - c. believes his illness is catching
 - d. is trying to sleep

 7. ___ While the boy is ill, where is his mother?
 - a. In a hospital
 - b. Sick in her room
-

- c. Visiting relatives who live far away
 - d. The story does not tell us
8. ___The story states, "We flushed a covey of quail..."
Who are the "we"?
- a. A large hunting group
 - b. The boy's father and mother
 - c. The father and a dog
 - d. The father and some other sons
9. ___Why did the boy think he was going to die?
- a. He felt so terrible.
 - b. He misunderstood the doctor's sober warning.
 - c. He thought he had fatal fever.
 - d. He was merely feeling cowardly.
10. ___The boy's misunderstanding stemmed from his confusing
- a. Centigrade and Fahrenheit
 - b. French and English
 - c. "very sick" and "fatally ill"
 - d. "d'influenza" and "pneumonia"

Appendix B
Test Scores for Phase I

Group A		Group B	
Student	Raw Score	Student	Raw Score
1.	9	1.	9
2.	9	2.	8
3.	10	3.	6
4.	10	4.	5
5.	9	5.	9
6.	8	6.	10
7.	9	7.	7
8.	9	8.	7
9.	10	9.	6
10.	10	10.	7
11.	9	11.	9
12.	10	12.	8
13.	9	13.	5
14.	10	14.	4
15.	10	15.	4
16.	10	16.	5
17.	10	17.	6
18.	10	18.	10
19.	10	19.	8
20.	9	20.	6

Appendix C
Test Scores for Phase II

Group A		Group B	
Student	Raw Score	Student	Raw Score
1.	8	1.	7
2.	9	2.	7
3.	9	3.	8
4.	10	4.	10
5.	10	5.	6
6.	10	6.	5
7.	8	7.	7
8.	9	8.	8
9.	9	9.	7
10.	9	10.	9
11.	7	11.	5
12.	10	12.	10
13.	10	13.	9
14.	10	14.	4
15.	10	15.	5
16.	9	16.	6
17.	10	17.	7
18.	9	18.	7
19.	9	19.	6
20.	10	20.	6

Test Results

Phase I

Group A

 $x = 9.5$ $s = 0.5916$

Group B

 $x = 6.95$ $s = 1.8397$

Phase II

Group A

 $x = 9.25$ $s = 0.83$

Group B

 $x = 6.75$ $s = 1.48$