

1997

An experimental study using wait time in reading

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AN EXPERIMENTAL STUDY
USING WAIT TIME
IN READING

A RESEARCH PROJECT

Submitted to the Department of Elementary Education
University of Dayton, in Partial Fulfillment
of the Requirement for the Degree
Master of Science in Education

by

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March 1997

Approved by:

A solid black rectangular box used to redact the signature of the advisor.

Dr. Thomas Lasley, Advisor

ACKNOWLEDGEMENTS

The completion of a research paper is an effort involving several people.

I wish to particularly thank Dr. Thomas Lasley for his advice and counsel and for his support during the discussion and revision processes. The support of my principal, Mike Cullinan, and my teacher assistant, Leigh Schierloh is very appreciated.

Special thanks are due my husband, Brion, and my mother, Carol, for their encouragement and support and for taking care of my baby, Houston, so I had the time to complete this study.

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CHAPTER I

INTRODUCTION TO THE PROBLEM

Purpose of the Study

Imagine a third grade classroom where all the students are actively engaged in a reading lesson. The teacher, in an effort to save time, has several students read a page and then checks for comprehension by asking, in a rapid fire manner, several questions at the literal level. The students, in a response to the teacher's questions, give quick, short answers. This continues until the lesson is finished and the students move on to another task. Research suggests that this classroom typifies American educational practice (Rowe, 1972).

Now imagine another third grade classroom where the students are actively involved in a reading lesson. The students in this classroom are told that they will be given "wait time" to consider their answers after questions have been asked. They are told in advance that the questions may be difficult so they are to think about their answers before raising their hands. Research suggests that these students will achieve at a higher level. As a result of this added "wait time," the pupil responses will be more in-depth and at a higher level of cognitive thinking (Pond and Newman, 1988).

These situations are examples of two common questioning techniques used in classrooms. The first illustration describes questioning at the literal level where students are asked textually explicit questions. These types of questions only allow for quick answers without giving students time to formulate a more complex cognitive reply. As a result of questioning at the literal level, the number of student responses as well as the length of the responses decreases

(Stahl, 1994). The second illustration describes questioning at a more intellectually complex level, where textually implicit questions are asked. This type of questioning increases the length of student responses, increases the number of student-generated questions, increases the number of correct responses, and decreases failure to respond to questions (Pothier and Sawada, 1990).

One particular difference between these two approaches is the use of "wait time." "Wait time" allows the students time to think before formulating an answer; it also allows them time to think about their answer in order for them or other students to elaborate on the answers. The use of "wait time" is a valuable tool when questioning students. As teachers increase "wait time," students feel more in control of their learning. They may also feel that the teacher is more interested in their ideas, not just in testing their ability to remember facts (Pothier and Sawada, 1990). Tobin's review of studies on "wait time" in a number of subjects and grade levels suggests that utilizing "wait time" fosters higher cognitive level thinking. Obviously a "wait time" of one second or less is insufficient for critical thinking or problem solving and can inhibit or discourage discussion (Tobin, 1987, as sighted in Atwood and Wilen, 1991). The writer's past experiences in the classroom indicate that most teachers ask questions at the literal level without giving students adequate time to think. Because of this surface interaction, the students are not producing the quality answers most teachers are seeking.

Statement of the Problem

The purpose of this study is to evaluate if the use of "wait time" increases the number of responses and the complexity of the responses given to teacher questions by third graders during a reading lesson.

Hypothesis

There will be no significant difference in the number of quality answers given between the two randomized groups when one group is exposed to the use of "wait time." Determining a quality response is subjective. In this study, a "quality response" was one where the answer demonstrated that the student understood the material well enough to connect ideas and relate consequences. (See page 15 for examples of questions and responses.)

Assumptions

In order to carry out this study, the writer is making the following assumptions. The first assumption is that the groups are truly randomized. The students were placed in different groups, but no table of random numbers was used to make the placements. The placements were the result of a non-purposeful group selection process. Secondly, the researcher assumed that the teacher actually waited the required amount of time for the students exposed to "wait time." The teacher received no systematic training to ensure that a 3-5 second "wait time" was used. (As stated earlier, research suggests that teachers have become accustomed to asking questions in rapid fire order without giving students adequate time to think and formulate an answer.) Furthermore, it is assumed that the students will use the "wait time" appropriately; that is, that they will learn to take advantage of the "wait time" and really think about the answer instead of blurting out the first thing that comes to mind or not answering at all. Lastly, the writer assumes that the use of "wait time" could make a significant difference in the ability of students to respond with answers that demonstrate that they had given more thought to the questions rather

than just coming up with answers that were off target just because they felt under pressure to answer the teacher's questions.

Limitations

The writer found several limitations affecting the results of this project. One is that the sample size of each group may be insufficient. The groups were small. A better circumstance would be for the groups to have no fewer than 30 students. Another limitation may be that the teacher may not wait the three to five seconds required by "wait time." And a third limitation is that a student in the control group may not use his/her "wait time" effectively and therefore give shorter answers than would be anticipated.

Definition of Terms

"Wait time" 1 is the interval between teacher question and student response (Rowe, 1986).

"Wait time" 2 is the interval between student response and subsequent teacher question (Swift, 1985).

Textually Explicit Questions are closed-ended questions that have discrete answers.

Textually Implicit Questions are open-ended questions that a variety of possible answers.

CHAPTER II

LITERATURE REVIEW

Types of "Wait time"

There are several categories of "wait time" or periods of silence. The categories are named either according to the place they occur or by the primary function they perform during conversations and discussions. It is important to remember that the basic concept behind "wait time" is "think time." Some of the categories are:

1. "Wait time I" or Post-Teacher Questioning (Stahl, 1994). The typical teacher pauses, on the average, between .7 and 1.4 seconds after her/his questions before continuing to talk or permitting a student to respond. When teachers perceive a student as being slow or unable to answer, this period of time is frequently less than .7 seconds. "Wait time I" or post-teacher questioning" occurs when a period of 3 to 5 seconds of uninterrupted silence follows a teacher's question; students are given sufficient uninterrupted time to first consider and then respond to the question. To be most effective, this period of silence should follow a clear, well-structured question with the cues students need to prepare adequate answers. Extended periods of silence following imprecise questions tend to increase confusion, heighten frustration, and lead to no response at all.
2. Wait time II or Post-Student's Response (Stahl, 1994). The 3 to 5 seconds of uninterrupted silence occurs after a student has completed a response and while other students are considering volunteering their reactions, comments, or answers. This period allows other students with the time to think about what has been said and to decide

whether they want to say something of their own. If students are to be encouraged to interact with each other during discussions in class, they need to have time to consider other students' responses.

3. Teacher Pause-Time (Stahl, 1994). Teacher pause-time, which should occur at a variety of places during a class period, is a 3 to 5 second period of uninterrupted silence that teachers deliberately take to consider what just took place, what the present situation is, and what their next statements or behaviors could and should be. An example of when the 3 seconds or longer of reflective thought would be beneficial for the teacher – and eventually all students – occurs after a student has asked a question that requires more than an immediate, short recall answer. Other examples occur when students ask or seek further clarifications, clearer explanations, or better examples than those already provided.
4. Impact Pause-Time (Stahl, 1994). Impact pause-time occurs when the most dramatic way to focus attention at a given time is to provide a period of uninterrupted silence. Impact pause-time may continue for less than 3 seconds or for longer periods (up to several minutes), depending upon the time needed for targeted cognitive or affective thought. One example of a desired result is the creation of a particular mood or affective environment, such as when sudden silence may generate a feeling or mood of anticipation, expectation, drama, suspense, or uncertainty. Another example occurs when providing time for students to consider and internally respond to a rhetorical question before continuing with additional information or activity.

Benefits of "Wait time"

The benefits of "wait time" include: (1) the length of the students' responses increases between 300 percent and 700 percent (Honea, 1989); (2) the answers are supported by logical arguments and reasoning (Leder, 1987); (3) the number of questions asked by students increases (Atwood and Stevens, 1976); (4) the number of students voluntarily participating in discussion increases (U.S. Department of Education, 1987); and (5) the failure of students to respond decreases.

Effects of "Wait time" on Students and Teachers

According to Casteel and Stahl, 1973; Rowe 1972; Stahl 1990; Tobin 1987; when students are given three to five seconds of undisturbed "wait time," there are certain positive outcomes: (1) the length and correctness of their responses increase; (2) the number of their "I don't know" and "no answer" responses decreases; (3) the number of volunteered, appropriate answers by larger numbers of students greatly increases; and (4) the scores of students on academic achievement tests tend to increase.

Also, when teachers wait patiently in silence for three or more seconds at appropriate places, positive changes in their own teacher behaviors also occur: (1) their questioning strategies tend to be more varied and flexible; (2) they decrease the quantity and increase the quality and variety of their questions; and (3) they ask additional questions that require more complex information processing and higher-level thinking on the part of their students.

CHAPTER III

PROCEDURE

Purpose

The purpose of the study was to determine whether the use of "wait time" increased the length of student responses, increased the number of student-generated questions, increased the number of correct responses, and decreased the failure to respond to questions.

Subjects

The subjects were two classes of twenty-five third grade students of mixed abilities. In the class where "wait time" was tested, there were 13 girls and 12 boys. In the control class where there is no conscious use of "wait time," there were 13 boys and 12 girls.

Setting

School. The writer's building contains 475 students in grades kindergarten through eighth. Classrooms are primarily self-contained with ability grouping within each grade level for math and reading.

Community. The school system is an inner-city, Catholic school found in Central Ohio.

Data Collection

Construction of the process. The writer used a tape recorder as well as a teacher's aide in the classroom to assess the students' responses or non-responses according to a number

categories such as: the number of students actively participating (raising hands, full attention to the lesson); the number of students responding to the questions correctly; the number of students failing to respond to questions in any way or by saying "I don't know;" and the number of student discussions about their responses to the questions. Because it is difficult for the teacher to accurately assess the appropriate use of "wait time" by assessing the quality of the answers and any resulting student questions while consciously either using "wait time" or not using "wait time," record keeping by teacher's aide as well as a review of tape recorded questions and responses helped with the evaluation of the "wait time" technique. It is important to determine the length of time the teacher either waits or does not wait for the answers to the questions.

Administration of the Technique. The writer discussed the topic of "wait time" with all of the children. Then, the students were divided into two randomized groups, where one group was exposed to "wait time," and one group was taught the traditional way. After the completion of a two-day lesson, the students were administered a written posttest (See Appendix A) to measure the differences between the groups.

Design

The writer used a "randomized control-group posttest only" design in which the experimental group was exposed to a treatment of "X" (wait time) and the control group was not. After the exposure, the two groups were tested for the first time. The scores were compared to determine the effect of "X" on the quality of the students' participation.

Treatment

The writer's independent variable for this experimental study was "wait time" and no "wait time." The subjects were divided into two random groups of 25 students each. One group was exposed to "wait time" while the other one was not exposed to "wait time."

CHAPTER IV

Data Analysis

Purpose

The purpose of the study is to determine whether the use of “wait time” increases the length of student responses, increases the number of student-generated questions, increases the number of correct responses and decreases the failure to respond to questions.

Outcomes Assessed

The technique of “wait time” was used to assess the students’ responses or non-responses according to a number categories such as: number of students actively participating (raising hands, full attention to the lesson); the number of students responding to the questions correctly; the number of students failing to respond to questions in any way or by saying “I don’t know”; and the number of student discussions about their responses to the questions.

Also assessed was the teacher’s ability to adjust and actually wait 3 to 5 seconds after each question is asked of the students in the group where “wait time” is used.

Presentation of Results

The writer used a relatively simple research design. One group received a treatment (the treatment group) with “wait time,” and the other group received no treatment (the control group).

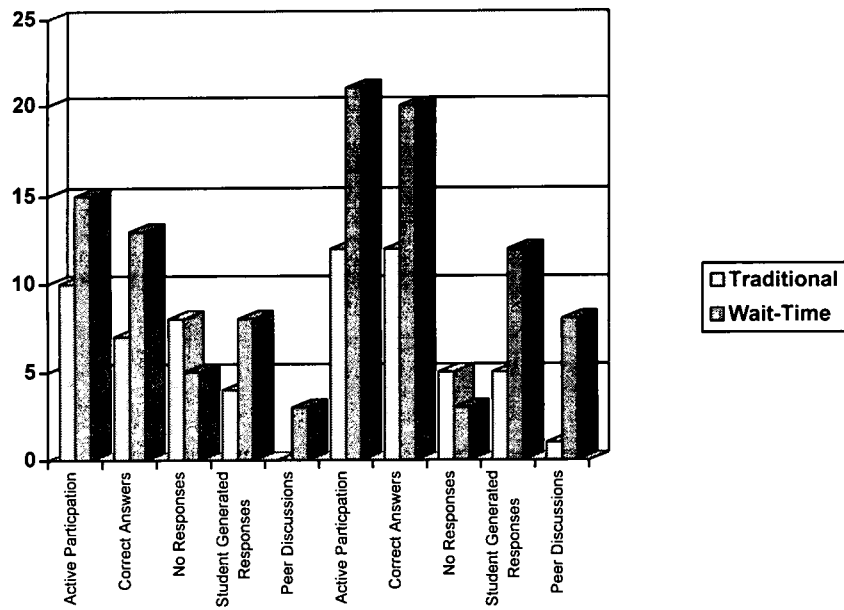
Figure 1

**Table of Responses from Two Groups
Two-day Lesson on Pioneers**

| Categories Being Tested | Responses From Control Students Taught in Traditional Manner | Responses From Students When "Wait time" Was Used |
|--|---|--|
| Day 1 # of students actively participating | 10 | 15 |
| Day 1 # of students answering questions correctly | 7 | 13 |
| Day 1 # of students failing to respond to questions | 8 | 5 |
| Day 1 # of student generated responses | 4 | 8 |
| Day 1 # of peer discussions of questions | 0 | 3 |
| Day 2 # of students actively participating | 12 | 21 |
| Day 2 # of students answering questions correctly | 12 | 20 |
| Day 2 # of students failing to respond to questions | 5 | 3 |
| Day 2 # of student generated responses | 5 | 12 |
| Day 2 # of peer discussions of questions | 1 | 8 |

Figure 2

Graph Comparing Results from “Wait time” Group & Control Group



The use of "wait time" had a number of positive effects. The results are not reflective of statistical comparisons because the number of behaviors observed was too small. The raw data does suggest, however, that the "wait time" did potentially make a difference. On Day 1 (1) there was active participation by more students in the "wait time" group than in the control group; (2) there were more students answering the questions correctly in the "wait time" group; (3) there were fewer students in the "wait time" group who failed to respond to questions; (4) and there was some peer discussion of the questions and responses.

Day 2 results indicate improvement in both groups, with the greater improvement in the "wait time" group. The number of students actively participating increased to 21 from 15 in the "wait time" group and to 12 from 10 in the control group. The number of students answering questions correctly increased from 13 to 20 in the "wait time" group and from 7 to 12 in the control group.

The number of students failing to respond to questions fell from 5 to 3 in the "wait time" group and from 8 to 5 in the control group. The number of student-generated responses increased from 8 to 12 in the "wait time" group and from 4 to 5 in the control group. Of special interest is the result that the number of peer discussions of questions increased from 3 to 8 in the "wait time" group while the number went from 0 to 1 in the control group. Peer discussion of questions takes place infrequently as that aspect of learning rarely happens when the technique of "wait time" is not used.

Determining a quality response is subjective. In this study, a quality response was one where the answer demonstrated that the student understood the material taught well enough to connect ideas and relate consequences. One question was "What is one of the biggest differences between pioneer times and modern life. One of the student answers was "Life is much easier

now. Farmers now have tractors and do not have to use horses. We also have cars now, so more things can get done in less time because we don't have to use horses." Such a response reflects more thoughtful and in-depth student cognitive processing of information.

Another positive outcome of the use of "wait time" was the higher average test scores for the students in the "wait time" group. The average for the "wait time" group was 91 per cent while the average for the control group was 79.3 per cent. Two of the "wait time" group scored 100 and there were 14 other scores that were 90 and above. There were no scores of 100 in the control group and there were only 4 other students with 90 and above in the control group.

Figure 3 is a graph showing the comparison between the test scores of the two groups and Figure 4 is a table of the actual scores.

Figure 3

Graph Showing Comparison of the Scores of the Two Groups

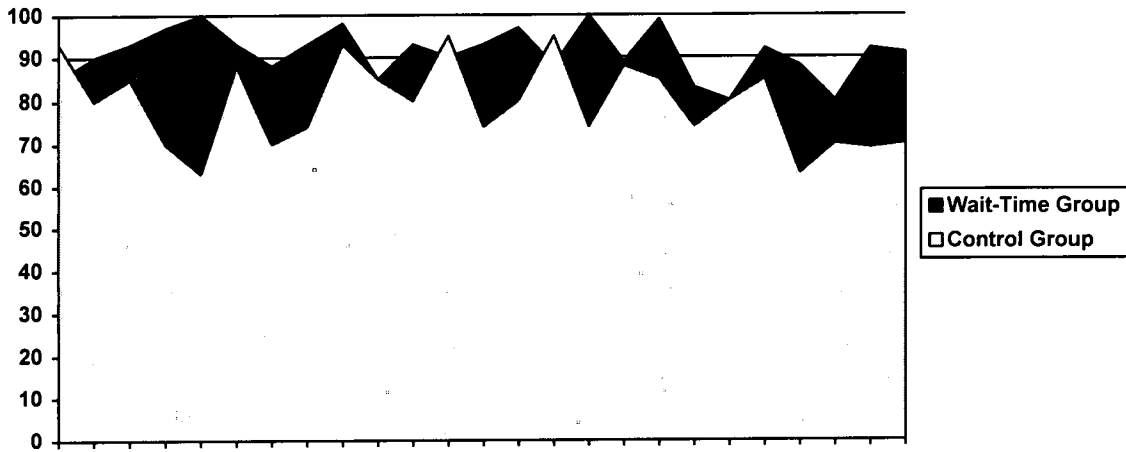


Figure 4

Table Showing Comparison of the Scores of the Two Groups

| Students | Control Group | “Wait time” Group |
|-----------------|----------------------|--------------------------|
| 1 | 93 | 85 |
| 2 | 80 | 90 |
| 3 | 85 | 93 |
| 4 | 70 | 97 |
| 5 | 63 | 100 |
| 6 | 88 | 93 |
| 7 | 70 | 88 |
| 8 | 74 | 93 |
| 9 | 93 | 98 |
| 10 | 85 | 85 |
| 11 | 80 | 93 |
| 12 | 95 | 90 |
| 13 | 74 | 93 |
| 14 | 80 | 97 |
| 15 | 95 | 88 |
| 16 | 74 | 100 |
| 17 | 88 | 89 |
| 18 | 85 | 99 |
| 19 | 74 | 83 |
| 20 | 80 | 80 |
| 21 | 85 | 92 |
| 22 | 63 | 88 |
| 23 | 70 | 80 |
| 24 | 69 | 92 |
| 25 | 70 | 91 |
| Average | 79.3 | 91.0 |

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The purpose of this study was to determine whether the use of “wait time,” which allows students time to think, results in increased numbers of correct responses, a decrease in the failure to respond to questions , and an increase in the number of student interactions.

The hypothesis was that there would no significant difference in the number of answers demonstrating comprehension of the taught material between two randomized groups of students when one group was exposed to the use of “wait time.”

The limitations affecting this project included the fact that (a) the sample size of each group may have been insufficient, (b) the writer (teacher) may not have always waited the three to five seconds required by “wait time,” and (c) the students in the control group may not have used their “wait time” effectively.

Conclusions

Based on this limited study, the conclusion is that the use of “wait time” can have positive outcomes: (1) more students participate actively; (2) more students give correct answers to the questions asked; (3) fewer students fail to respond to the questions at all; (4) there are more student generated responses; and (5) the number of peer discussion of the questions (and answers given by other students) increase. In addition, the average of the raw test scores of the “wait time” group were higher, but no formal statistical tests where possible.

In summary, there were more correct responses to the questions asked by the teacher, the number of unsolicited but appropriate responses increased, student-to-student interactions increased, the frequency of questions increased, and, best of all, the positive spirit within the classroom increased. Also, students who wanted to participate in the class discussion had to pay attention to what others were saying, so they had to work on their listening skills.

At first, it was difficult for the teacher to wait the required minimum of 3 seconds. However, as the teacher saw for herself the positive effects the “wait time” was having on the students, it became easier. Not only that, but the teacher found herself asking fewer questions as there was more student-to-student interaction.

Recommendations

While “wait time” is not the answer for all learning situations, it is a very valuable technique and all teachers should be made aware of the usefulness of the technique. Therefore, it is recommended that teachers have appropriate training to be able to use “wait time” effectively. As Mary Budd Rowe pointed out, protracted wait times were never intended for use in drill and practice. However, it is a valuable technique. Teachers should consider practicing the technique as they will find their teaching more enjoyable when their students have opportunities for more verbal interaction. It is important to remember that the rate at which information is presented to students should be matched with the cognitive processing capabilities of the students. It is recommended that this concept be emphasized in teacher training.

Finally, a more rigorous research design and more complete data collection process is needed to determine if the perceived effects that surfaced in this study are, in fact, as powerful as

the researcher projects them to be. Additional data would permit the researcher to do a more complete statistical analysis.

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R002578839