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3-28-2011

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WAIT TIME IN THE CLASSROOM

by
Logan Melder

A Thesis

Submitted in partial fulfillment of the requirements
of the Master of Science in Teaching Degree
of
The Graduate School
at
Rowan University
June 17, 2010

Thesis Chair: Valarie Lee, Ed.D

ABSTRACT

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WAIT TIME IN THE CLASSROOM
2009/10
Valarie Lee, Ed.D.
Master of Science in Teaching Degree

The purpose of this study was to evaluate the effects of increasing wait time, the time interval after a teacher poses a verbal question to students and when a teacher calls on a student, as it affects the amount of class participation. There were two phases of the study: phase one was teaching using unmodified wait time for five days, and phase two was modified wait time, extending it to a minimum of three second for an additional five day period. In this study I played both roles of teacher and researcher. The teaching sessions were observed and recorded during the daily twenty minute language arts lesson. Wait time was modified with the help of a large timer placed in the rear of the classroom to insure that the three second time period was provided. The study found that the average amount of wait time given during the first phase was only 1.376 seconds and the class responded averaging 2.452 hands raised. With the implementation of a three second wait time after each question, the amount of class participation increased dramatically with an increase of over 300% in the amount of students responding to questioned by raising their hands. After completing this study, I feel that implementing increased wait time into the everyday practice of the classroom will increase the amount of classroom participation, as it did in my classroom.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER ONE

Introduction

You walk into a classroom and the class is taking a test. You look at test and there are 20 questions given on it. The class is given 20 minutes to take the test. The majority of the class is able to finish the test within the given time. However, there are some students that are able to finish the test within 10 minutes, others 12 minutes. The teacher accepts the test as they are finished, and is not surprised when some are handed in early, while others take their time to finish the test.

This is an everyday occurrence in many classrooms. Tests are given and everyone finishes at different times. No one questions this. No one is rushed to finish in the same time as the first student who has finished. Yet, when an oral question is asked during an in class lesson, there is a rush to answer the question. While some students are trying to process and understand the question, it has already been answered by another student.

Purpose Statement

A significant number of articles and literature has been written on the concept of think/wait time. It is not a new concept in the educational field, even though it has become more popular in more recent years. Mary Budd Rowe (1972) first published a paper on the concept of "wait time." She defined wait time as the period of silence following an oral question and ending with a student response.

Gambrell in 1983 in her article "The Occurrence of Think-time During Reading Comprehension Instruction" studied the concept of wait time in elementary school classrooms. In her study she found that in these classrooms there is an average of 36 questions asked by the teacher in an average 25 minute lesson (Gambrell, 1983). Also in this study she established that on average, the amount of time that was provided for a student to answer the question before calling on someone else, or restating the questions, was only .968 of a second (Gambrell, 1983).

Gambrell's research took an objective look at the amount of time given to students to think of an answer, but that was it. The study simply observed and reported on the lack of wait/ think time that was afforded students in her study. Knowing and quantifying actual class room practices of class room teachers successfully demonstrated how little time students had to respond during class room questioning, but nothing was implemented. Gambrell came to the conclusion that there was no wait time given to answer questions in the classroom. To identify a condition was the goal of Gambrell's research, but there was no follow through in the publication that would provide some kind of adjustment to wait time put into practice. My question for this study examines if additional think/wait time fosters increased student participation. Given that all students learn and process information at different speeds, will the addition of increased think/wait time change the dynamic of the classroom and offer more students the opportunity participate in class room discussions?

Stahl (1992) maintains that there are eight different situations during a typical classroom discussion in which teachers should give think time. These situations range from the teacher asking the class questions to when the teachers themselves need to have

their own think/wait time, such as between subjects, or to restate a concept that was not understood by some of the students.

According to Stahl, everyone, teachers and students alike, need think/wait time. He talks in theory, of what effects changing think/wait time could have when implemented. However, no empirical testing was included in his discussion, and no quantitative data was provided in support of his theoretical conclusions.

Statement of research problem and question

When a teacher asks a question to the class, she is looking for an answer. She tends to look for those students first to raise their hands to answer the question asked, thus limiting the participation of all students. This study explores whether teachers providing more wait/think time when asking oral classroom discussion questions will increase the amount of class participation?

Story of the Question

I walked into my first day of school so excited, after preparing for four years in a college classroom, and having academic and theoretical discussions about teaching. Now when I entered the classroom as a teacher I knew I had arrived. I had the highest hopes of everything that I would be being doing in my clinical internship. But as all first days of school go, it was all about the paper work.

In my first classroom, I was told by my teacher to sit in the back of that class. She informed me that there were many of things that were needed to be accomplished that day and that as a new student teacher I really could not help with expediting the

necessary tasks. As I sat there, in the back of the classroom, at a desk that had been provided for me by the teacher, I began to read some of the literature that my teacher had placed on my desk.

The article that she furnished me with was about wait time in the classroom. I read it over and thought it was interesting. The article introduced me to the concept of providing more time for student's to think before calling on someone for an answer. I read it and thought nothing more of it until my professor made reference during her lecture to something that she called "wait time."

The concept now has come up twice in one week. An idea that I never had heard of and had very little knowledge of was repeating itself. It became the topic of conversation during my graduate education class, and how important it is to give students the time to think about a question and the need to give them time to think about the answer.

When I returned to the elementary classroom the following Monday, I took particular notice when the classroom teacher asked questions to the class. I observed that right after she would pose a question to the class, the little girl in the back would have her hand up before the teacher had finished asking the question. I also took notice of the number of students hands were raised in response to the question. The questions that were presented to the students were of appropriate level for the class. Everyone should have been able to answer the questions, but only a couple of students responded by having their hands raised.

I thought about why there were so few students participating in the oral questions that were asked during class time. I also began to notice how the concept of wait time was practiced or observed in other classrooms. Every teacher used verbal questioning techniques. Many teachers were guilty of saying "Come on, there should be more hands raised," or "Everyone should know this answer." When wait time was given to students, it was not really intentional and was not really useful.

With all of the observations and discussion on wait time, a question was conceived. If teachers provide more wait/think time, will this in turn increase the amount of classroom participation?

Limitations

Measuring think/wait time and determining the benefits in the classroom will have its limitations. First, as described in the definition of think/wait time, the time of silence following the end of a question and the beginning of a student's response. The operative word in the definition is silence. To be classified as true think time, to provide quality time for information processing and contemplative reflection, the classroom has to be conducive to this needed silent time. Controlling the classroom environment may prove to be difficult. Not only can think time be interrupted by any of the members of the class but also other environmental influences such as announcements, interruptions, and unruly behavior. The classroom teacher may be inadvertently modifying think/wait time by instinctively repeating the question or making comments in reference to the question poised during the wait time. When the think/wait time is interrupted it is lost.

Also the concept of wait/think time can only be implemented if the teacher allows it. Introducing a three to five second think/wait time may in discussion seem like an almost insignificant amount of time but in practice it may seem like an uncomfortable pause for many professionals. Standing in front of the classroom and waiting three to five seconds to call on a student when others in the class are jumping out of their seats to answer the question will take a conscious effort on the part of the classroom teacher. It will also necessitate the teacher to be patient enough to wait for additional participants to respond to the question posed. Allowing for this wait/think time for every question can quickly become frustrating in the classroom and as the school day progresses the amount of think/wait time allowed may shrink considerably if the teaching professional becomes desensitized throughout the day thus, affecting the study.

To introduce the practice of longer think/wait time for students, the teaching staff will require coaching and practice. It may be necessary to provide teachers a visual reminder or cue to provide a standardized period of time. The practice of rapid fire questioning for some teaching professionals has become almost a habitual part of their teaching method. Habits are very hard to alter, and finding an effective and universal mnemonic device may prove to be difficult. Any such device will need to be able to affect the teachers questioning dynamic while at the same time it should not have an effect on the students responding to the questions.

Organization of the Thesis

Chapter Two of this thesis is comprised of an historical review of the academic literature that has been published in reference to classroom questioning and the subject of

think/wait time. This chapter looks into the concept of wait/think time in detail. Chapter Three describes the methodology that is used in this study. Also it looks into the context of the study. Chapter Four is statistical analysis of the data and results, discussing the findings of this study. Chapter Five provides the outcome of the study, determining whether the implementation of a three second wait time increases the class participation.

CHAPTER TWO

Classroom Questioning

The practice of teachers asking students questions in the classroom has been

around for as long as there have been teachers and students. As early as 1912, Romiett

Stevens, PhD. in his book noted that over eighty percent of a teacher's day was spent

asking questions. On average, his study found teachers asked 395 questions per day.

Stevens noted in this early publication that a principal from an urban school wrote to him

saying "By a random estimate (of his school) he placed the percentage of (questioning)

activity at 85 percent, 95 percent, and in a few instances 100 percent, His investigation

brought him promptly to the conclusion that the reason why our pupils gain so little in

intellectual power is because our teachers do all the intellectual work." (Stevens, 1912).

This principal felt that the barrage of questions only required the student to memorize

information and students did not engage in any deeper thought processes in regards to

the academic material. This is a practice that continues to present times with teachers

typically asking three to four hundred questions per day (Leven and Long 1981).

There are a number of reasons for teachers to ask questions (Morgan and

Saxton,1991). Asking questions keeps students involved with the lesson, and keeps the

students on task where they are less likely to lose attention. Asking questions gives the

students the chance to express their thoughts. Also, it enables peer review, allowing

students to add to other students' thoughts. Asking questions helps teachers to modify

behavior. Most importantly asking questions helps teaches evaluate levels of understanding, it can be a form of informal assessment in the classroom.

It is obvious to even the casual observer that questions are, and have been, the one of the most popular methods of teaching. While the act of asking questions can help the learning process, it can also hinder the process, by intimidating students and turning them off to learning (Brualdi, 1998). The exercise of asking questions can promote student-teacher interaction, and increased interaction is believed to promote a student's academic success (Rosenshine, 1971).

Questions asked by teachers are often at distinctive levels of Bloom's thinking taxonomy (Bloom, 1956) such as: Level one of Bloom's taxonomy is knowledge, this is questions that involve recall information for, and including questions using words like define, label and match. The second level is comprehension, or understanding, being able to understand the information that is read or told to the students, it uses words such as compare, differentiates and outline. The third level is application, or transfer, using information to solve problems in a new situation. The third level uses words such convert, prepare and examine. The forth level of Bloom's Taxonomy is analysis, or examining, breaking up the information and seeing how the parts relate to each other. This level question uses words such as classify, determine, and transform. The fifth level is synthesis, or combing, this is making judgments on the information using a standard or rubric; this level uses words in its question such as award, judge, and defend. The final level of Bloom's is level six which is evolution, or rating, this level puts things together to get a new whole. This level will use words such as arrange, blend and syntheses in the question.

In more recent studies, questions have been classified into one of two categories: low-level cognitive questions, or high-level cognitive questions. Low level questions require memorized answers, such as dates, places, patterns, etc. High level questions require students to use reasoning, and problem solving thought processes. Teachers use low level questions most of the time (Wilen,1991). Brualdi refers to Ellis's 1991 study stating that teachers use low level cognitive questions to speed up lessons and keep the students' attention. It is illustrated by Brualdi that debate over the effectiveness of both low level and high level cognitive questions may have more to do with the characteristics and abilities of the students than the questioning techniques themselves (Gall, 1984, Arends, 1994, Wilen, 1991).

Why should schools be concerned about critical thinking, and call for a higher level of thinking skills in the classroom? Teachers need to ask for more than just recall from their students; teachers need to actively engage student in critical thinking (Tama, 1989). The body of research reviewed by Kathleen Cotton (1988), of the Northwest Regional Education Laboratory, in her paper entitled "Classroom Questioning" found a number of finding in relationship to cognitive levels of questioning. Cotton found that in 60% of classroom questions are low cognitive questions and 20% are higher level cognitive type and 20% are classified as other (Cotton, 1988). In classrooms, higher cognitive questions are not necessarily better than the lower cognitive questions when it comes to learning. The lower level cognitive questions are more effective with younger students. The lower level cognitive questions are better for memorizing facts, like Bloom's Taxonomy says; the first level is recall from the long term memory. Frequent low cognitive questions can lead to a positive student experience. Lower level questions

should be easy enough for most students to answer correctly (Cotton, 1988). A combination of both types of questions is more effective than using one type or the other. Slower students are asked fewer questions than higher performing students (Cotton, 1988). Greater learning gains are experienced through higher cognitive questions, especially for older students. Giving higher cognitive questions improves behavior, student responses, student participation, peer interactions and exploratory questions from students (Cotton, 1988).

Wait Time

The question arises: with such an emphases on higher cognitive questioning in the classroom; why is so little time given to students to answer the questions, regardless of the type of questions? First introduced by Mary Budd Rowe (1972), the concept of "wait time" is defined as the period of silence following an oral question and ending with a student response. This time period is an astonishingly short time period (Gambrell, 1983). This is exemplified by the study of reading comprehension in which Gambrell looked at nine teachers in seven schools and had the teacher's video record their reading comprehension classroom lessons. The researcher then reviewed each of the videotaped lessons using a stopwatch to record the "wait time" observed in each lesson. The results were 964 questions asked, with 63% being text-based and 37% being scriptural questions. The lessons were averaged to be 25 minutes long, with 36 questions asked per lesson. This equated to every 43 seconds a question was asked, and on average .968 of a second of "think-time" was observed before an student was called on or the question was repeated.. Gambrell concluded that in these classrooms, the teachers used "rapid fire questioning technique" (Gambrell, 1983).

Teachers routinely ask oral questions to students to quickly assess student's reading comprehension. Gambrell points out that "Effective reading comprehension requires that the reader understands the ideas presented in the text, reflect on the significance of the ideas, evaluate the ideas critically, discover relationships between them, and clarify the personal understanding of the ideas apprehended." Students are expected to do all of this in less than one second from the time the teacher asks the question. American teachers average one second of think-time before asking the question again, asking another question, or calling on a student for the answer (Gambrell, 1983).

Gambrell put the concept of wait time in perspective. Being able to observe and document the numbers for the amount of "wait time" that is given for each question was eye opening. Asking questions is part of every classroom lesson, for many it is seen as part of the assessment process (Gambrell, 1983). Providing wait time is an important part of the class. All teachers maybe guilty of repeating the question too soon, or just calling on the first hand that appears in a classroom full of students, but providing additional "wait time" may lead to more hands raised or more developed ideas. Wait time may be a critical factor related to effective teacher questioning since wait time provides the student with a period of reflection or rehearsal which may be especially valuable in developing reading-thinking skills." (Gambrell, 1983). If wait time is so valuable and important why are we, as teachers and educators, not providing more of it to the students?

Gambrell's study on wait times was insightful. However, determining that classroom teachers are not providing enough wait time only identifies the problem. The study offered no recommendations or solutions or any evidence that increasing the amount of wait time in classroom would change students behavior in the class room.

12

Supplying additional wait time may facilitate greater classroom participation. The research it gave quantitative insight into the amount of time given to the students to think, but it did not provide the outcome of the questions. Were the questions answered correctly? If they were, does this reflect on the correct amount of think-time given or the students' intelligence? Did the teacher, at a wrong answer, move right on to giving the correct answer, or ask the question again? If the question was asked again, was it to be answered by another student did, and did that count as another question, or was it counted by the researcher only one time. The information that was given in the article was insightful but the missing information, is just as important to understanding "think-time."

Think Time

Stahl (1994) took the idea of "wait time" and expanded the concept into what he refers to as "think time." Stahl defines think time as "a distinct period of uninterrupted silence by the teacher and all students so that they both can complete appropriate information processing tasks, feelings, oral responses, and actions." Stahl (1994) favors the term "think time" over the more general phrase of "wait time" as he describes for three chief reasons. First, it accurately names the mental activity and purpose of the period of silence that is provided for on-task thinking. Secondly, he states "there are places where periods of silence are as important as those "wait time periods" reported in research literature." Finally, Stahl identifies periods of silence used as dramatic pauses as an exception to "wait time" (Stahl, 1994).

Stahl (1994) further refines the periods of classroom silence into eight distinct categories that are named by their location of occurrence or their implied purpose. Stahl submits these are all sub-sets to the umbrella term of "think time."

First there is the post-teacher question wait time. This occurs when there is a period of three or more seconds of uninterrupted silence following a well structured question by the teacher to the class. It is important that the students have enough time to reflect upon and then answer the question (Stahl, 1994). For the purpose of this study it is the most important wait time. This will be the category of "wait time" that will be examined and tested within this research paper.

Second, is the within-student response pause time which is when a student begins and then abruptly stops his/her answer for three or more seconds before continuing their answer. Stahl points out that most students are not given the chance to complete their answers because teachers will interrupt or cut off the student's response after .5 seconds (Stahl, 1994). Teachers tend to cut off correct answers, because the student has demonstrated sufficient knowledge of the material, and cut off wrong answers and move to another student or question, rather than give the first student another chance.

Third is the post-student response wait-time. Defined as, three or more seconds after a student has answered a question and other students contemplate adding to or commenting on the previous answer. Stahl believes that the opportunity for student initiated academic discussions are critical to foster interaction between students (Stahl, 1994).

Fourth is the student paused-time. This is the time when a student is asking a question, and he/she pauses or hesitates in the middle to reformulate or rephrase the question. Allowing for this time the student will have the opportunity to think out the answer at times and can be beneficial because it can lead to more complex or better defined questions (Stahl, 1994). Using this time can lead to higher level of questioning from the student and higher level of thinking from the student.

Fifth is teacher pause-time. This occurs when a teacher deliberately stops for three or more seconds to evaluate or formulate the next response. This often can occur when asked by a student to provide a different example to illustrate a concept (Stahl, 1994). Having the teacher pause and process what could be the best way to explain a concept in a new and different way, to facilitate the students understanding of the information presented.

Sixth is within the teacher presentation pause time. When a teacher is explaining a subject matter or concept to the class and pauses to allow the students to process the material just presented to them (Stahl, 1994). This pause allows the class to ask questions before they become overwhelmed with too much new information that is presented to them.

Seventh is the student task-completion work time. Student task-completion work time can be as short as three to five seconds or as long as two to four minutes of uninterrupted silence that is given for students to finish a given task (Stahl, 1994).

Eighth is the impact pause-time. This is when, in an attempt to focus students' attention on a specific idea, a dramatic pause is introduced into the presentation or lecture

(Stahl, 1994). This pause maybe used for dramatic impact but, also draws students into the lesson. Thus more students will have the opportunity to pay attention because the pause has caught their attention. It has the opportunity to bring non attentive students focus back to the teacher.

To increase "wait time"/ "think-time" calls for a change in the way teachers conduct themselves in the classroom. Researchers point out that changing teacher behavior to provide increased "wait time" will involve coaching and modeling behavior (Tama, 1989). To achieve these changes, Tama cites Hayes and Alvermann's study that included observing classrooms through videotape. The video tapes would be reviewed and coaching techniques would be developed to promote increased response times for the students. When the teachers were coached it led to the acknowledgement of students remarks (Tama, 1989). Research shows that when "wait time/think time" is increased beyond three seconds there are higher student achievement levels, improved information retention, more student participation and, longer responses (Cotton, 1988). By expanding wait time there was a decrease in student interruptions, and an increase in student to student communications (Cotton, 1988) Tobin states that allowing a three to five second pause after a question is posed to students will permit them to have more cognitive discourse (Tama,1989). But "wait time" alone will not always lead to more critical thinking without a curriculum that provides students with opportunities to develop thinking skills (Tama, 1989).

In the research study by the National Science Foundation, "Wait Time and Questioning Skills of Middle School Science Teachers" the emphasis was on seeing what changes occur if a longer time is given to students and teachers to think and work

together. The study yielded that without special training the think time for students was only 1.25 seconds, between questions and responses (Swift and Goodings, 1996). The study followed 40 teachers who were tape recorded once a week for 15 weeks thus providing 600 samples. Samples most provided fast paced low level questions i.e. test reviews. Researchers stated that, "We found that students typically do not ask questions in classroom discussions, Nor are they encouraged to do so." (Swift, Swift, & Gooding, 1985). Swift and Gooding were able to introduce longer wait times into the class with the use of a timing device (Swift, Swift, & Gooding, 1985). The device (Wait Timer™) was a yellow light that was voice activated and remained illuminated for three seconds after talking ended. When the light went out this was the visual cue that a question could begin discussion. The study showed the use of the timing light changed the classroom behavior to "include more extensive use of evaluative questions, longer student responses, and improved level of student participation in discussions." (Swift and Goodings, 1996). The extended think time provided by the Wait Timer™ device "help students extend and enrich their answers."

The implementation of a Wait Timer ™ is not a practical one. Though this devise may help to increase the amount of time afforded to students for "wait time/think time." to install one in every classroom does not seem reasonable both from a practical and economic point of view.

Cotton notes that the advantages using higher cognitive questioning and that of providing additional "think time" are very similar (Cotton, 1988). Research shows that raising the cognitive function of questions and providing more "think time" are synergistic; a greater overall improvement than by just changing one or the other.

"Maintaining the right of free choice itself may depend on the ability to think clearly" (Mullins, Gardner, 1983). That may seem like a bold statement, but it implies that to have a real choice a person needs wait time just to think of what the choices are. "The skills needed to begin to think about issues and problems do not suddenly appear in students," (Tama, 1989). Providing "wait time" to students is just one step to ensure student success. Coaching and provide teachers with the necessary tools is the other part. Schools need to provide a good curriculum for teachers to teach. Students need the means to help develop how to critically think. Also, teachers need to be ready and tolerant of conflict, "raise issues which create dissonance and refrain from expressing their own bias, letting the students debate and resolve problems" (Tama, 1989). It is the purpose of this study to determine if providing additional wait/think time in the classroom setting will provide an increase in student participation.

CHAPTER THREE

Methodology

The study on wait time was conducted in the classroom using practitioner inquiry.

Practitioner inquiry is an umbrella term for different methodologies, which include action

research, teacher research, self study, the scholarship of teaching, and using practice as

site for research (Cochran-Smith & Lytle, 2009, p.39). The best form of inquiry for this

study was using teacher research which allows one to look directly into the classroom

and implement a change to improve the classroom. Teacher research required the

teacher to examine the classroom as someone who knows the class and can account

for the unexpected.

"Inquiry as stance is seen as a positive thesis, that goes beyond mere critique of

the current educational regime and contributes to efforts to re-envision the work of

practitioners in global societies (Cochran-Smith & Lytle, 2009 119)." The purpose of this

study was not to look at what the teachers were currently doing wrong, but to change a

practice in the classroom in an attempt to improve the classroom experience for both the

student and the teacher. The classroom is the environment designed to help children excel

academically. If it is demonstrated that a change in a classroom practice by the teacher

enhanced the learning experience for more students in the class then efforts should be

implemented to encourage the new procedures.

Practitioners that are engaged in the work of teaching and learning with the help

of the parents and community groups generate knowledge on how to figure out how to

improve the practices to enhance the student's experience (Cochran-Smith & Lytle, 2009, p125). Teacher research was the best option for this work because it looked to improve the classroom. This study sought improvement first by looking at the current practices in the classroom, observing the class as a whole, and investigating actions that when implemented will enhance the student's classroom experience.

Inquiry as stance is not just figuring out how to do things and to get things done; rather, it is questioning what needs to be accomplished and what is the purpose of a practice and looking to find the best way to accomplish the goal (Cochran-Smith & Lytle, 2009). In observing a classroom the practitioner is not just looking at students answering questions. Getting a correct answer from a student conveys a message to the teacher about that particular student but usually ignores the behavior and reactions of the rest of the class. When a teacher asks an oral question it is great to have a hand shoot up and to get a correct response to the inquiry, but is this the best practice for the rest of the class? Teacher research looks not just at that one student getting the correct answer, but what is happening with the rest of the class. What is preventing the remaining members of the class from participating, and more specifically if more wait/think time is provided, did the rest of the class participate in the discussion?

Context of the Study

Baker Elementary School is an inner city school and is one of 32 schools in the school district. The school is a Pre K to 8 school, with a ratio of 1:11 teacher to students. There are 65 teachers and 690 students with an average class size for the school of 15.9 students per class. The student population is 79% African American and 21% Hispanic. 85% of the school is eligible for free lunch and 3% is eligible for reduced lunch.

Under the "No Child Left Behind Act" (NCLB), Baker Elementary has been classified as a school "in need of improvement" for the past six years, and in each of these years the school has failed to reach the state set adequate yearly progress (AYP). Students with disabilities, students with IEP's (Individualized Education Programs) make up 24.7% of the student population. The student mobility rate is almost three times the states average at 30.5%. The school day is six and a half hours long, with five hours thirty five minutes of dedicated instructional time each day.

The community that surrounds the school is a low income, inner city. Since the school is located in the inner city, the majority of the students walk to school. The community that immediately surrounds the Baker School consists of a population of 24,602 households. Based on 2006 data from the United States Census Bureau, 44% of the city's residents live in poverty, the highest rate in the nation. The city had a median household income of $18,007, the lowest of all U.S. communities with populations of more than 65,000 residents, making it America's poorest city.

Procedural Practice

The most important part of using teacher research was the use of practice, not just collecting the data if there needs to be a change (Cochran-Smith & Lytle, 2009). The teacher researcher had the ability to implement change in a practice of a classroom and measure the effect of this change. This study will implement change by adjusting the amount of wait/think time that is provided to students. The practitioner modified the teacher's action to include a three second minimum of wait/think time and recording the change in classroom participation.

The procedural practice was to answer the question posed in this paper to determine if providing additional time for students to answer oral questions in a classroom setting had increased student participation required three different experimental phases. The first phase required quantitative measurements taken of present classroom practices. The second phase was to implement practices to modify classroom behavior. The last phase of the experiment was to re-measure the variables.

Phase one necessitated measuring both the amount of wait time, and the students' classroom participation. The act of measuring wait time was accomplished with the use of a stop watch. Wait time as defined by Rowe (1972) is as the period of silence following an oral question and ending with a student response. A stop watch was started at the end of a question and stopped the clock when the silence is broken. The silence could be broken by the teacher calling on a student for the answer, or a student calling out, or the teacher repeats the question or asks a different question. The raw data collected in this manner established a baseline for wait time in a particular classroom. The second variable that was quantified was classroom participation, collected through classroom observation. For the purpose of this experiment, classroom participation was only demonstrated by students raising their hands in response to the questions posed by the teacher. Only hands raised during the wait time were recorded and tallied. At the conclusion of the first phase, raw data produced a baseline measurement of both variables. First, the average wait time that was expressed as a unit of time, and second, the average student participation. These numbers, for reasons of comparison were a specific baseline for the classroom and teacher.

When researching and measuring behavior elements in a real world environment attempts must be made to reduce what is commonly referred to as psychological reactivity. Reactivity is a phenomenon that occurs when individuals alter their performance or behavior due to the awareness that they are being observed (Heppner, Wampold, & Kivlighan). To minimize this effect the researcher observed the classroom through video recordings. A small digital video recording device was placed inconspicuously in the classroom to record not only the teacher's oral questioning but, also the visual cues of students responding to the questions. Since digital recordings can be played back in both real time and through digital editing software accurate measurements of time were easily obtained. The use of the digital video recorder eliminated the reactive effect of having an observer with a stop watch in the back of the classroom. To reduce the reactive effect on the classroom teacher, the teaching of lessons for both phases of the study was performed by myself as both the researcher and the teacher. It was emphasized to all participants and classroom teachers that only the researcher will view the recordings and that after the data had been collected, all recordings will be erased. Observations and recordings were in a Fifth grade class room and all lessons will be recorded during language arts class. The classroom was observed and recorded for one five day week during this phase. Prior to beginning phase one, recordings approvals were obtained from the school district's board of education to conduct the research.

The second phase of the experiment was behavior modification. Based upon baseline data in Phase One, questioning wait time was modified. To facilitate supplemental wait time for students, the classrooms were outfitted with a mnemonic

device. The classroom was outfitted with a large digital clock that displays seconds. The wall clock served as a reminder to help in providing a uniform predetermined wait time.

The third and final phase of the experiment was to record the classroom activity with the adjusted questioning behavior. The method implemented in this phase mirrored the actions of phase one. The recordings were reviewed daily by the researcher. In the third phase recordings of language arts class continued until five good samples were obtained. A good sample was defined in this experiment, as a class session in which eighty percent or more of oral questions asked provide the required wait time. Since this was a different behavior for myself it required additional recording sessions to produce five viable sessions for comparison.

Upon completion of phase three, the data compiled from phase one and phase three were compared and analyzed to determine if there was a statistical correlation between additional wait time and classroom participation as defined in this project. The data that was collected from phase one was recorded as the baseline of the study. This data was used to compare with the data later collected as a comparison of the modification of wait time that was implemented. Once the data was collected from phase three, it was compared to the baseline to determine if there was a correlation between wait time and class participation.

Looking Forward

Chapter Four looks at the data collected using the methods in Chapter Three. The chapter concludes with analysis of the impact of wait time on student participation.

CHAPTER FOUR

This chapter provides statistical analysis of the data and discussion of the findings of this study. It starts with phase one which is a five days of language arts lessons without the wait time modification implemented. The lessons were taught just as I would naturally teach them. After the five days of phase one, phase two starts which is the implantation of the three second wait time where after a question is presented to the class the teacher allows for a minimum of three seconds of silence before calling on a student.

Phase One

The first phase of this study consisted of five days of videotaping lessons in my fifth grade classroom with nineteen students. The first five days of classroom observations were to establish a baseline. Wait time and responses were observed with no attempts made to alter any of my teaching habits or timing.

Prior to recording the classroom activities, the students were informed that the lessons would be videotaped. I explained the importance of not watching the camera as they were given instruction and the students needed to pay attention to the lesson at hand and not the video camera. The students were reminded how beautiful they were and that they did not have to run to the bathroom to look in the mirror and fix their hair.

Day One

The first day of the study was an introduction to the unit the class was about to start. The class was using the text based program, Read 180, a Scholastic program

designed for struggling readers. The unit of study was historical fiction. The class was reading a text on the subject of a boy during the Great Depression, the character in the text was homeless and without a family. During the lesson, the teacher posed 11 questions during the 20 minute lesson. The class was provided with an average of 1.43 seconds of wait time (per question) for the students to respond. After the question was posed, and the unmodified wait time had been provided, the average response was 2.01 hands raised for each question.

Day Two

At the onset of the session, the students were reminded of the class rule, to raise their hands. They were reminded of the importance of waiting to be called on, and that students should refrain from calling out. The students were informed at the beginning of the class that unfortunately I would not be able to call on all of them.

The second lesson was a discussion on how the Depression affected the people of the United States. The teacher asked a total of 12 questions during the time of the lesson. Of the twelve questions, two times there was no wait time provided because the teacher continued to talk and explain the questions, additionally there were two times the teacher called on students that were not paying attention. During the lesson an average of 1.04 seconds of wait time was provided for each of the remaining ten questions, with an average response of 2.1 hands raised to answer the questions.

Day Three

The lesson on day three of the study was the first day of reading the text. The class had established background information concerning the printed material and now

had a better understanding of what The Great Depression was about. During the lesson there were ten questions asked to the class. Two questions were deemed unusable. The first question the teacher provided no wait time, and the second disqualified question was due to a student calling out the answer. I provided, on each of the remaining questions, an average of 1.25 seconds of wait time before identifying a student. The average response was calculated to be 2.5 hands raised per question.

Day Four

The instructor posed eight questions to the class during the allotted instructional time. Two questions regarding the textbook were not applicable because they required written answers to verbally asked questions. These questions were asked to the students and the entire class was given a minimum of at least two full minutes to respond to the questions and to edit their answers for grammar and spelling. After the questions were answered every student had the opportunity to read their answers out loud to the class.

Of the six remaining verbal questions given to the class during the 20 minute language arts lesson, there was on average 1.6 seconds of wait time provide per question. The average response was 3.0 hands raised for each question.

Day Five

The lesson started with a review of the information that had been introduced to the class over the past four days. I re-read the story contained in the text book, to the class. Students were again reminded of the classroom rules to raise their hands in response to verbal questions, and to refrain from calling out in class. During the lesson, I asked eight questions to the class. Of these, one question was disqualified from the study

because it was answered by the entire class, (I walked around the classroom asking each student to answer the same question.) Of the remaining seven questions there was an average of .98 seconds of wait time for each question. For one question I provided 3.2 seconds of wait time. This was the first time in the study that more than two seconds of wait time was provided to the class. The average responses to the questions were 2.65 hands raised per question.

Prior to beginning the study, I predicted that my results were going to be very different. I felt that I knew a lot about wait time, and I was already giving more than the three seconds that I would be researching. However, I was surprised to see that was not the case. Throughout the five days and the 47 questions I asked to the class, I only naturally gave three seconds one time and that was on the fifth day. On average there were 9.4 questions per 20 minute lesson. There was on average 1.376 seconds of wait time and there was, on average, 2.452 hands raised for each question.

During the five day observation I gave 44 verbal questions to the class. In only one case was the wait time provided to the students of three seconds or more, each 20 minute lesson contained on average 8.8 verbal questions. The study provided, on average, 1.26 seconds of wait time per question posed to the class over the five day period (Table 1). The collective classroom participation as identified as students raising their hands in response to the verbal questions was on average 2.452 hands raised for each question. The summary of phase one is illustrated in Table 1.

Table 1

Phase One

Day	Question asked	Hands raised	Wait time
1	11	2.01	1.43
2	12	2.1	1.04
3	8	2.5	1.25
4	6	3.0	1.6
5	7	2.65	.98

Phase Two

During this phase of the study, I modified the instruction to provide additional wait time when asking verbal questions to the class. A minimum of three seconds of wait time per question was required for this study. By providing three seconds of wait time this did, in most instances, triple the previous time given to the students to respond to the verbal questions. To help me, a large faced timing clock was placed in the rear of the classroom. The clock was visible to me, while I was addressing the class and served as a visual prompt to insure adequate wait time was provided during this phase of the study. I was instructed to change the wait time for all questions asked during the day, but for the purpose of this study only the language arts lessons were recorded and analyzed.

Day Six

For the Day six lesson, I started with a review of what was read the day before, and read the next two pages of the text to the class. This was the first day of implementing the three second wait time. Before starting the lesson, I reminded the

students of the importance of the class rules. This is a reminder that I did every day, because the students would get very excited and call out the answer when they think that they had the right answer, even if it is the wrong answer.

Today I asked the class 10 questions throughout the twenty minute language arts lesson. One of these questions was disqualified because everyone in the class was required to answer verbally. During the remaining nine questions I provided an average of 3.2 seconds of wait time. The counted classroom average response was 8.4 hands raised per question.

Day Seven

The lesson started with a review of what was read the day before, I read the next two pages of the text to the class. This day there were 10 verbal questions given to the students. One of these questions was answered in their text book. I provided an average of 3.1 seconds of wait time per question. The average response was 8.2 hands raised for each of the questions.

Day Eight

The lesson started with a review of what was read the day before, the teacher read the next two pages of the text to the class. Today there were 10 questions asked to the students. One question was asked twice to the students because of the class being so loud. The average wait time provided for each question was 3.1 seconds. The average response was 6.8 hands raised.

Day Nine

The lesson started with a review of what was read the days before. Along with the teacher the class read the last pages of the text. Today there were 10 questions given to the class, of these 10 questions, one of the questions was answered by the whole class. The vocabulary words are often answered by every student to reinforce the teaching of the new words. The average wait time was 3.4 second and the average response was 7.2 hands raised per question.

Day Ten

This lesson was on the vocabulary taught during the duration of the text. The class reviewed the words that were taught and students used the words in sentences. I asked 10 questions to the class. There was an average of 3.3 second of wait time per question and there was an average response of 9.3 hands raised. The summary of phase two is illustrated in table 2.

Table 2

Phase Two

Day	Question asked	Hands raised	Wait time
6	10	8.4	3.2
7	9	8.2	3.1
8	10	6.8	3.1
9	9	7.2	3.4
10	10	9.3	3.3

The implementation of the three second wait time resulted in a dramatic increase of class participation. During the five day testing period there were 48 questions posed to the students. Each of the lessons averaged 9.6 questions. The class averaged 7.98 hand responses per question. That is an increase of 325% from phase one levels. My original research question for this study was answered by showing that with the implementation of a three second wait time did increase class participation. The summary of the study is illustrated in table 3 and in table 4. Table 3 illustrates unmodified wait time and class participation. Table 4 illustrates the implementation of a three second wait time and class participation.

Table 3

Phase One Summary

Day	Questions Asked	Average # Hands Raised	Average Wait Time(sec.)
1	11	2.01	1.43
2	12	2.1	1.04
3	8	2.5	1.25
4	6	3	1.6
5	7	2.65	.98
Average	8.8	2.45	1.26

Table 4

Phase Two Summary

Day	Questions Asked	Average # Hands Raised	Average Wait Time (sec.)
6	10	8.4	3.2
7	9	8.2	3.1
8	10	6.8	3.1
9	9	7.2	3.4
10	10	9.3	3.3
Average	9.6	7.98	3.22

As the study advanced, the altered wait time provided by me appeared more natural. Also I could tell visually that more hands were raised. After five days of implementing the adjustment of wait time, I commented that "In the beginning three seconds standing in front of a class of anxious fifth graders was a little awkward, but as the week progressed it seemed it was getting easier and the students are also getting more accustomed to the additional wait time because I have had to remind them less about raising their hands and not calling out their answers." Chapter five goes into detail about change in the classroom after the three second wait time was implemented. The amount of class participation increased on average by 300%.

CHAPTER FIVE

Wait time seems like such an insignificant part of the teaching process. It is

something most teachers never even think about as they deal with so many other subjects

throughout the day. Yet this chapter will illustrate how small changes can noticeably

affect the students. The severe conditions of the school district and the surrounding

community present both challenges and opportunities in conducting this study. As a

school district that consistently performs poorly on standardized testing, changes in

teaching habits could have a profound effect on the student's performance.

Conclusions

During the five day observation, I asked 44 questions to the class. The majority of

the questions were level one and level two on Bloom's six level "Thinking Taxonomy"

(Bloom 1956) requiring recall and comprehension of information. These questions, as

suggested by Kathleen Cotton (1988) were easy enough for most students to answer. The

lessons were scripted from the language arts program that is used in the class. In only one

case was the wait time provided to the students of three seconds or more, each 20 minute

lesson contained on average 9.4 verbal questions. The study provided, on average, 1.376

seconds of wait time per question posed to the class over the five day period. The

collective classroom participation, as identified as students raising their hands in response

to the verbal questions, was on average 2.452 hands raised for each question.

This study demonstrated that with wait time considerably less than three seconds,

there was little class participation. On average there were only two or three hands raised,

a small amount of class participation. When a teacher asks a question it is a way to evaluate what the students are retaining. It is not the expectation to have every student raise their hands for every question. However there should be more than two students in a class of nineteen, responding to the questions.

Before I started recording for the study I thought that the study would be difficult to do because I thought I had good wait time. I surprised myself when I reviewed the tapes and saw how little time I gave the students to answer the question. On average there was only 1.376 seconds provided for the students to process the question and formulate an answer. This was only marginally longer that the Gambrell study looking at nine teachers in seven schools that averaged .968 seconds of wait time (Gambrell 1983). The 1.376 seconds of wait time that I provided the students was consistent with the National Science foundation's study of forty middle school science teachers that provided an average of 1.25 seconds of wait time. I was not surprised with the low class participation in light of the small amount of wait time that was given.

I found it surprising that I often rephrased questions. I would ask the question and then ask it again without even noticing I was doing it. This cut into the little wait time that I was giving to the students. Though rephrasing a question may be good at times because the students may not understand the question or concept, it ultimately reduces the overall wait time period.

Phases two implemented the practice of a three second wait time. This was three seconds of complete silence in the classroom following a verbal question. This is what

Stahl (1994) labeled post teacher question wait time. I found that when I rephrased or repeated the question, it interrupted the wait time.

Looking Back

I was getting ready to start the video recording and data collection phase of my study when I had a conference with my supervisor. He told me that I was doing great but, as a recommendation I should work on my wait time. I sat there and thought about it, me wait time. I thought he was crazy. One of my biggest fears was that my study would not work because I was so conscious of wait time that I must be giving at least three seconds, probably more like four seconds of wait time when I am teaching. Well I was wrong. Looking back of my ten days of my thesis study I can see the differences. I did think that it was going to be easy to have three seconds of wait time because I assumed I already provided adequate wait time, but that was not the case.

It was very hard to stand in front of the class for three seconds when you had several students ready to fall out of their seats with the answers. As in the Swift, Swift, Goooding study (1985), the use of a timing devise in the classroom helped considerably in providing the increased wait time needed for this study. Students may be conditioned to expect a fast paced question and answer sequence when responding to verbal questions in the classroom. Implementing a three second wait time may have caused the students to believe they were being ignored. Three seconds may not sound like a significant amount of time, but it represents a 300% increase in wait time.

Limitations of the Study

Implementing wait time for this study wait time was recorded exclusively in a language arts class; however I felt that implementing it in all subjects should be considered. Ideally we would like all our students to participate all the time, but that is ideal not real. We, as education professionals, could get closer to this goal by providing students with increased wait time in the classroom after a question is posed.

The implementation of wait time must be combined with strong classroom management. The lack of classroom management skills has the potential of having students calling out and interpreting the wait time. I found that reminding the students to raise their hands helped them, however a strong classroom rules would help. Students get excited to answer the question, which is great, but they need to realize raising their hands is the preferred response.

The lessons that were taught during the study were scripted through the language arts program the school used. The program provided the teacher with scripted questions and answers, which may have help the teacher with wait time. Having the questions written out before the lesson allowed for the teacher to concentrate on the wait time and not on coming up with the next question.

Implications

Change is never easy, after years of teaching; classroom teachers develop a habitual cadence. However this small study showed that by making just a little change in the amount of wait time provided to students, their classroom participation increased noticeably. Does increased classroom participation translate into students that learn

better? That will be the subject of future studies, but increased classroom participation is a pretty good indicator of students being engaged in the teaching process. As a teacher I want my students to be fully engaged in the classroom activities because before learning can take place, the students need to be part of the process. Three seconds of wait time seems like such an easy thing to do and if it helps students become more engaged in the process of learning, I feel it is something that every teacher needs to examine in their own practices.

This study illustrated, as in the Gambrell study, that I was very naive in estimating the amont of wait time I was providing the students. It was not clear to me how little time I was giving the students to answer questions. Given the remarkable increase in classroom participation, as I begin my professional teaching career I will be looking closely at the wait time I am providing my students. I may even, from time to time, record my lessons and review what the actual wait time is that I am providing students. The timing clock will defiantly be a permanent fixture in my classroom.

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