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Encouraging Reflective Thinking in the High School Classroom: Effective Use of Questioning and Wait Time Strategies

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Encouraging Reflective Thinking in the High School Classroom: Effective Use of Questioning and Wait Time Strategies

Abstract

Effective questioning techniques and the use of effective wait time can create a learning environment where all students are encouraged to process information and feel comfortable sharing their opinion. The root of reflective thinking lies in asking good questions and knowing how to ask them and when to ask them. Good questions create classroom interaction which has been found to promote student achievement. However, in our fast-paced classrooms, teachers tend to dominate discussions and often answer their own questions. This is where the effective use of wait time can be so crucial in establishing an atmosphere of inquiry – not inquisition. Too many students are left out or unengaged from the classroom because of the types of questions that are posed and the lack of waiting for responses.

Wouldn't it be great if students discussed the material in class and were actively involved in their own learning? I believe that reflective thinking can occur in the high school classroom with just a few changes: teachers asking better questions and waiting an appropriate amount of time for the students' response. If reflective thinking increases student achievement, then students will be able to go beyond "textbook" thinking and cultivate deeper and more creative thinking that will produce success inside and outside of the classroom.

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Encouraging Reflective Thinking in the High School Classroom:

Effective Use of Questioning & Wait Time Strategies

By

Jolyn M. Van Es

B. A. Northwestern College, 1993

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March, 2006

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Abstract

Effective questioning techniques and the use of effective wait time can create a learning environment where all students are encouraged to process information and feel comfortable sharing their opinion. The root of reflective thinking lies in asking good questions and knowing how to ask them and when to ask them. Good questions create classroom interaction which has been found to promote student achievement. However, in our fast-paced classrooms, teachers tend to dominate discussions and often answer their own questions. This is where the effective use of wait time can be so crucial in establishing an atmosphere of inquiry – not inquisition. Too many students are left out or unengaged from the classroom because of the types of questions that are posed and the lack of waiting for responses.

Wouldn't it be great if students discussed the material in class and were actively involved in their own learning? I believe that reflective thinking can occur in the high school classroom with just a few changes: teachers asking better questions and waiting an appropriate amount of time for the students' response. If reflective thinking increases student achievement, then students will be able to go beyond "textbook" thinking and cultivate deeper and more creative thinking that will produce success inside and outside of the classroom.

Introduction

Need For Study

No matter what educational philosophy teachers adhere to, the goal is to increase student learning and student achievement. Now, more than ever, teachers are under pressure to increase student achievement in their classrooms. The No Child Left Behind Act is one example of where some of the pressure is coming from. In response, teachers may argue that their test scores are higher and that their students are learning; however, one may question whether this is really *learning* or are the students just *memorizing* facts so that they can pass the test? I believe that if you asked teachers what their goal was for their students they would not say that fact memorization was one of them. And, as a Christian teacher, I believe that if my teaching becomes a "focus-on-the-facts" approach then I am not teaching to the whole child. Studies (Wilen, 1982) indicate that, in many high schools, students are simply recalling facts, but not necessarily engaging in thinking above the memory level. Schools are institutions called to prepare children to live a responsible, Christian life in service to God. As Christian teachers I feel like our calling is to go beyond memorization so that students can apply what they have learned to other situations in order to help make the world a better place – a place more glorifying to God.

So how does a teacher encourage students to learn – not just regurgitate? Students are spiritual beings created in God's image and learning is a religious act. Students want to be involved, they want to think deeper and be challenged, and they want to have meaningful discussions with their peers and teachers. The more I read, the more I begin to realize that student learning essentially happens when students are asked to reflect on what is happening in the classroom. If teachers truly want students to think beyond the memory level, to

understand and appreciate God's Kingdom, then teaching students to become reflective thinkers must become the norm in our high schools. In order to allow reflective thinking to become the norm, no matter how long we have been in the teaching profession, we must be enthusiastic about thinking differently. But change is difficult; trying new ideas is scary. Many teachers continue to follow the same methods and use the same strategies as they have in the past. Teachers are creatures of habit – changing how we think and teach requires hours of preparation and then there is the possibility that the new methods may be no more rewarding for teachers or students than the old. But if I truly want my students to make a difference in our society and God's Kingdom, then as a Christian teacher I will change whatever is necessary. Because the bottom line is that my students have been entrusted to me by their parents and God and I want what is best for them.

These thoughts, questions, and fears are what led to my thesis topic: encouraging reflective thinking in the high school classroom. According to Shermis (1999), reflective thinking skills help make it possible for students to achieve "deep learning"; beginning with the experience as opposed to the current trend of beginning with the instilling of information. The concept "reflective thought" was introduced by John Dewey in 1910 and his most basic assumption was that learning improves when reflection is part of the process. Research is proving that reflecting on our thoughts and actions helps us to process and internalize information more effectively. Reflection is also a gift from God that needs to be explored and utilized. And effective reflection goes beyond the application of concepts learned in the classroom, it promotes good citizenship in our society and glorifies God.

So, if reflective thinking is at the heart of student learning, how does an educator encourage students to think reflectively? As I focused on this concept, I began to realize that

to engage students in reflective thinking – no matter what the subject area – two key components are essential: effective use of good questioning techniques and the effective use of wait time strategies. Questions are about subject matter and subject matter is to be placed in a curriculum that causes learners to face God. Part of my Christian worldview is that I believe we are placed on this earth at exactly the right time and place to honor and obey God. From my perspective, part of honoring and obeying God is being good stewards of what God has entrusted to us. To me this means that it is my task to help students develop skills that they can use in their future careers so that they can use the talents God has entrusted to them.

Questions also give direction – point you toward something. That " something" is not a test created by the teacher or the state. Questions should lead students to grow in their faith by forcing them to make moral decisions and use higher level thinking skills. Students are either responding to God or worshipping something else. I feel that it is my calling as a Christian teacher to point my students toward Christ and, sometimes, this requires much patience and "wait time".

Research Questions

My hypothesis is that the effective use of questioning techniques and wait time strategies will encourage reflective thinking in the high school curriculum. See Figure 1 for a visual perspective. Specific research questions that I would like to address are:

1) What does research tell us about effective questioning?

   a. Evaluation of Questioning Research and Related Studies

   b. Two Detailed Studies

2) What does research say about wait time?

   a. Evaluation of Wait Time Research and Related Studies

b. Two Detailed Studies

Definition of Terms

Some basic terms that will be used throughout this paper I have defined as such:

Reflective Thinking – requires students to use higher order thinking or reasoning skills; produces real insight, valid opinions, and original ideas

Question - an instructional cue that conveys the content elements to be learned and directions for what they are to do and how they are to do it

Questioning Techniques – strategies used by teachers to involve students in lessons to find out what students have learned, and to encourage reflective thinking

Wait Time – periods of silence that follow teacher questions and students' completed responses

Wait Time One – the amount of time an instructor gives a student to respond to a question before moving on to another question or answering it him/herself

Wait Time Two – the amount of time the instructor waits after a student has responded to a question to allow that students to continue their response or to allow other students to respond

Think Time – distinct period of time of uninterrupted silence by the teacher and all students so that they can complete processing tasks, feelings, and actions

If increasing student learning and achievement is important to the school environment, then reflective thinking must be at the heart of how we teach. I believe that using good questioning techniques and the effective use of wait time are major contributors in reaching the goal of reflective thinking. The next portion of my thesis will discuss the

research findings that support my hypothesis and a detailed synopsis of four studies that have been done specifically on questioning techniques and wait time.

Review of Literature

Evaluation of Questioning Research and Related Studies

"For the last four decades, consensus thinking is that reflection in a classroom can take place only when a questioning strategy promotes it" (Shermis, 1999, p. 2). And we all know that teachers like to ask questions. In fact, a study done early in the 1900s stated that approximately 80 percent of a teacher's day is spent asking questions to students (Brualdi, 1998). However, too many questions are dead-end questions that are unproductive and choke student thought. This was proven in a study done by Brophy and Good (1984) when only 20 percent of teacher's questions required students to think. Literal, text bound, low-level questioning must be replaced by an approach that stimulates students to reflect on problems. Reflective theory says that teachers need to generate a problem (think like students) and then ask them questions that create conflict and confusion - followed by helping students reach an answer.

Other researchers (Williams, 1991; Black, 2001) have drawn the same conclusion that teachers ask too many factual questions. Williams (1991) found that 60 percent of questions require factual recall, and 20 percent are procedural in nature. A later study done by Black (2001) determined that teachers spend 35 to 50 percent of their instructional time asking students questions. So why are most of the questions teachers ask factual in nature? According to Williams' research, lower order questions are caused by: 1) The necessity of students knowing facts before they can progress to higher levels of thinking. 2) Curriculum, by nature is fact-oriented rather than thought-oriented so if teachers follow their curriculum

literally they will focus on factual questions.   3) Teachers lack the necessary skills to formulate questions that require higher level thinking.

Even though I feel these arguments have some validity, this does not encourage students to be involved in the conversation nor does it make them feel the freedom to express their ideas and opinions openly. Learning is not a spectator sport. Uninterrupted lecturing and low level questions fall short of creating an active learning environment. However, I feel the problem lies not in the fact that teachers are asking questions; but rather, the *type* of questions they are asking. In classroom practice, most teacher questions are lower order – those requiring only recall or comprehension on the part of students (Williams, 1991).

"Just two changes can result in increased student participation, increased student interest, and increased student learning. The first teaching change involves asking better questions…." (Kauffman, 1997, p. 134). There are many articles that show that asking good questions can create classroom interactions which will promote reflective thinking, leading to increased student learning and achievement. The problem is that many teachers don't know how to ask good questions. I find this to be a sad and scary thought because next to lecturing, questioning is the second most widely used teaching method. Literature (Kauffman, 1997) shows that there are five types of appropriate questions:

1. Attention-focusing questions: typically short-answer questions that draw your attention to a specific concept or measure or count. Examples: "have you seen?", "did you notice?", "what happens if?", "how often", or "how many?"

2. Comparison questions: open-ended questions that are mostly qualitative in nature. Examples: "how are…and…similar?" and "how do they differ?"

3. Action questions: these are the "what happens if" questions that are, again, open-ended.

4. Problem-posing questions: attempt to create a conflict between what they already know and what you want them to learn. Example: "can you find a way to?"

5. How and why questions: this is the category that is most often misused. Example: "why do you think?" These questions more often than not result in the teacher telling the students they are right or wrong, depending on what they say, and can do more harm than good in terms of student self-esteem.

Given these basic forms of questions, it is important to remember that questions must be of an appropriate level of difficulty so students will find them interesting, and they can follow a progression that is logical to the students. Randomly asking questions of various levels creates more confusion than clarity.

One strategy that follows this progression was developed by Kauffman (1997) under the premise that too often teachers, when teaching material to students for the first time, jump logical steps that could leave student comprehension behind. His feeling is that in order for students to learn, the questions must make sense to them. Therefore, a questioning model he believes teachers would find useful is the HRASE (History, Relationships, Application, Speculations, Explanation) Model.

- **H**istory of the student, or his or her experience. Find out what they already know, how they developed that conclusion.

- **R**elationships and patterns. Have students compare what that know to what they are seeking to know – draw relationships.

- **A**pplication of the knowledge. Using what they know and apply it to new experiences.

- **S**peculations about a different situation. Can they figure out what to do next in that new situation?

- **E**xplanation for the experience. How does that work? Is the response appropriate for another situation?

To summarize, the HRASE model is a questioning strategy that provides a logical order for asking questions. In fact, if you examine this model closely you will notice many similarities to Bloom's Taxonomy (Wilen, 1982). In the discussion section of my paper, I will give an example of how this model could be applied to a Business Education classroom.

Another twist to the idea of questioning is to think about how capable students are at asking appropriate questions of their teachers in order to gain knowledge or clarification. "Are there any questions?" is heard across the country in thousands of classrooms each day. But how many students really *ask* questions? Is the level of student involvement high enough during classroom discussions that students feel comfortable asking questions of the teacher? Philip Dauterman believed that

> "It is principally the teacher's questioning technique which affects the degree of student involvement. What questions he asks, how and when he asks them, how he replies to students, how he stimulates students to talk to each other – these are the crucial factors governing the success or failure of a class discussion." (Dauterman, 1970, 29)

This belief by Dauterman in 1970 led to research on six strategies that encourage student involvement and learning:

1. **To involve all students in class discussion**: list names of students the teacher tends to ignore and make a special effort to involve those students in further discussion.

2. **To encourage shy students to participate in a discussion**: ask "low-risk" questions that will pose little threat to the student's self-image.

3. **To generate greater interaction among students and reduce the amount of teacher-talk**: use a higher percentage of open-ended and/or thought-provoking questions. Factual questions lead to yes/no responses and are normally followed by "why." This is a poor sequence because it only involves one student.

4. **To avoid unnecessary repetition**: sequence questions carefully. Start with what students know and build on those experiences.

5. **To increase participation in class discussion**: use appropriate reinforcement – be specific in responses and avoid using responses like "okay" and "all right."

6. **To increase student learning**: teachers should not play the role of expert – encourage students to evaluate each other's responses. His research indicates that doing this increases learning.

In conclusion, Dauterman stated that "by changing the nature of the question, the teacher allows his class to be more open and honest about their reactions" (p. 31). He concluded his research by emphasizing that the verbal behavior of the teacher is probably the most important classroom variable affecting student learning affecting student learning. By using the above mentioned questioning strategies, the teacher stimulates class discussion and establishes an environment where students feel comfortable sharing their thoughts and opinions. "In short, through his questions he teaches" (Dauterman, 1970, p. 32)

Unfortunately, good discussions do not just happen. Getting students involved in classroom discussions is difficult but crucial. There is research about group dynamics, about who speaks and why, and about who is called on to talk. Teachers can analyze behavior during discussions and use that knowledge to improve everyone's speaking and listening skills. Jane C. Schaffer (1989), a high school instructor in California, conducted a study focused on classroom discussions. She wanted to know how to facilitate a meaningful

discussion with high school students. Here are her suggestions based on an experiment

conducted in her classroom:

1. Discussion questions must be important to students. Questions must address topics that they care about, that students want to hear discussed by their classmates.

2. Allow enough wait time for reflections before calling on students to speak. "There is no reward for grabbing the floor or jumping in as fast as possible" (Schaffer, 1989, p. 41). She found that the quantity and quality of response increased geometrically with every second when everyone has time to think.

3. Keep a record of who has spoken. We need to do this because we tend to think we called on more students than we actually have.

4. Stop letting the "I-don't-know" students off the hook. Stick with these students – ask them more specific questions. Some students just need to be probed more than others.

5. Acknowledge all students who speak up during discussions. She found that students want to be recognized for ALL responses given. Most students said that teachers ignore incorrect answers, pretend it was not said, and move on to another student. Students would rather be recognized for what was said and, if the response was incorrect, be told so in a constructive manner.

6. Acknowledgment should be meaningful. As mentioned in Dauterman's research, remarks to student responses should be meaningful. Teachers need to say something other than "O.K." if they want students to continue to contribute in discussions.

7. Plan for closure. Too many times the bell rings and teachers have not left enough time for reflection and summarizing. I will discuss closure options in the discussion section of this paper.

8. Students who speak the least may need this sort of activity the most. Having shy or reluctant students share in pairs first will increase their confidence and later those students will realize that it is worthwhile to share their thoughts with others. "Nothing substitutes for time and experience in speaking out, and every student needs and deserves the chance to develop the skill" (Schaffer, 1989, 42).

The following are the conclusions that can be drawn from these studies: 1) Ask open-ended questions, 2) Involve all students, 3) Encourage conversation among students, 4) Encourage students to elaborate, and 5) Be sure to always use wait time.

Two Detailed Research Studies That Address Effective Questioning

Study One

Introduction: To observe classroom questioning makes one focus on the teacher. Teachers ask many more questions than students and devote more of their movements around the room to encourage questioning by students than anything else. In high school, teachers ask about 87 percent of the substantive questions (those that are directly related to the content they are studying) while students ask only about 13 percent. High school teachers devote 47 percent of their time toward maneuvering around the room prompting students, which includes questioning and giving directions (Hyman, 1977).

Contrary to what some people believe, students ask few questions in the classroom. Research indicates that students ask less than two questions per half hour; and in junior high school students ask fewer questions than high school students. The focus of this study by Hyman (1977) was to examine the pattern in which teachers question students.

Research Questions:

1.   What type of sequence do teachers use when they ask questions?

2.   Do teachers question one student at a time or more than one student at a time?

3.   For which cognitive processes (Empirical, Evaluative, or Analytical) do teachers question most?

4.   Is there a dominate type of pattern teachers use when questioning students?

Participants: Six teachers agreed to have an observer gather data in their classrooms. These teachers were not aware of the focus of the observation. The teachers taught grades 7-11 in a new suburban New York City high school. Their areas of expertise were Social Studies, English, and Science. There was no attempt to have a controlled sampling of teachers in the school. Rather, the observer simply visited those teachers who permitted the observer in their classrooms.

Methods: According to this study done by Hyman (1977), whenever teachers ask students questions there are three parts to examining that question. The three parts are: 1) Sequence, 2) Student Respondents, 3) Cognitive Processes. Figure 2 is a visual of how the three parts are intended to fit together. All teachers' questions would fall into one of the blocked areas.

Sequence, as defined in this study, consists of the types of questions teachers ask. This study (Hyman, 1977) grouped questions into two types: plateau and peak. In plateaus questioning, the teacher asks a series of questions of the same type before asking a more complex question. For example, the teacher would ask fact stating questions before requesting the student to give a comparison of previous answers. In a peaks questioning sequence, the teacher asks a question and immediately goes to a more complex question to quickly engage the students in a more complex thinking process. For example, the teacher would ask the student to define something and then immediately interpret their definition. In peaks questioning the teacher does not stay on a plateau but goes back and forth between a "simple" question and a "complex" question. See Figure 3 for a comparison between plateau and peak questioning.

Student respondents, as defined in this study by Hyman (1977), are simply recording who answered the question asked by the teacher. This was used to determine if the teacher is questioning one student at a time or more than one student at a time. The study stated that it is possible to have a plateau sequence with one student or many students as well as to have a peak sequence with one student or many students.

Cognitive processes were the categories used to evaluate what types of cognitive questions teachers ask their students. The categories range from fact stating to interpreting. The rationale is that if a teacher asks a variety of questions in different sequences then students will be encouraged to think critically and reflectively. In this study it is assumed that the students have previous knowledge of the subject matter being discussed.

Results: The results show that about 95 percent of the questions are for the empirical process, about 90 percent are of the peaks type, and about 90 percent are directed to one student at a time. The shaded area in Figure 4 shows where most teachers' questions fall when evaluated in the areas of sequence, student respondents, and cognitive processes. Therefore, the data from the six teacher observations clearly indicate the strong use of *peaks* questioning with *one* student involved in the *empirical* cognitive processes. These results clearly indicate that teachers involved in this study (Hyman, 1977) went from a simple question that asks for a specific answer directly to a complex question that only involved one student.

Conclusions: One conclusion that can be drawn from this study indicates that when teachers question to find out what facts students know, they rely on a peaks pattern involving only one student. Previous educational theories would say that if a teacher wants to encourage inquiry learning – which is recommended when teaching students the process of

critical (reflective) thinking – then plateau questioning would be fundamental to this process. The idea is that students are given data and they are to draw conclusions, comparisons, and explanations. *And* this is done with groups of students working together - not individually. Plateau questioning does not suggest that students need to be given ALL the facts – just relevant ones – which will allow them to draw their conclusions and comparisons.

Another conclusion that is worth mentioning is the motivational factor. Where there are 15-20 students approximately in a classroom and the teacher has a question/answer session with only one student, the rest of the students lose interest. It is difficult for the "outsiders" to keep track of the discussion and virtually impossible for them to participate and draw any conclusions or offer any explanations because they did not participate in the discussion. Not that questioning one student at a time does not have its value BUT if the goal is to create a more inquiry, investigative environment where students learn to think critically and reflectively than the having more students involved in the discussion will result in the following:

1.   Increased likelihood of an intelligent discussion

2.   Will keep the interest of more students

3.   Increased number of explanations and opinions will be generated

In conclusion, the results indicate that one pattern, the teacher questioning one student at a time for the empirical process using peaks sequences, dominates all other possible scenarios (Figure 4). The implications of this study by Hyman (1977) are that teachers need help in creative questioning in order to provoke critical thinking and reflective responses from students.

Study Two

Introduction: This study by Barnette (1994) reports on the program developed by the Appalachia Educational Laboratory (AEL) called QUILT (Questioning and Understanding to Improve Learning and Thinking). QUILT is a staff development program for classroom teachers designed to test the most effective way to train teachers to use appropriate questioning techniques in the classroom. This specific study done by QUILT is designed to improve classroom teacher questioning skills because too many times teachers are using questions as a way to maintain control of the classroom rather than stimulating thought and reflection.

Research Questions:

1.   How do the number of teacher and student initiated questions compare?

2.   What impact does wait time have in classroom questioning?

3.   Does the cognitive level of questioning affect student responses?

4.   How are students designated to answer questions?

5.   What desirable and undesirable types of responses and feedback do teachers give students?

Participants: Who participated in this research study was pretty vague. Basically, the only statement made about the participants was that they were spread out over five states – Kentucky, North Carolina, Tennessee, Virginia, and West Virginia. This study lasted one school year and involved four major components- which essentially were the methods used to carry out this study. QUILT believes firmly that staff development is a long term commitment. Therefore, feedback and "partnering" in classroom instruction are key elements to its design.

Strategies: The four major components or methods QUILT used were:

1.   Induction Training – a three-day, 18-hour program conducted by trainers from

Appalachia Educational Laboratory where participants are provided with research-

based theory and practice effective questioning techniques.

2.   Collegiums – are groups of teachers and administrators that met seven times during

the school year. During that time they reviewed information about questioning and

reinforced changes in teacher questioning behaviors. Each meeting focused on

reinforcing particular questioning skills and behaviors.

3.   Partnering – within the collegiums teachers are paired up to provide ongoing, mutual

support activities within each school. These activities include visiting each other's

classrooms to observe and help each other monitor progress.

4.   Independent Study and Analysis - throughout the year participants read

independently, practiced their skills, and compiled data on their own classroom

behaviors and student responses.

QUILT implemented this study (Barnette, 1994) on three levels with schools that

were randomly assigned to one of three groups. Group A schools completed the full QUILT

program which included all four components mentioned earlier. Group B schools completed

only the three-day induction training and Group C schools received only a three-hour

orientation session related to QUILT questioning concepts.

Extensive research was done to assess teachers' knowledge, attitudes, and classroom

questioning techniques both before and after the study by Barnette (1994). The Classroom

Questioning Observation Instrument (CQOI) was developed to collect specific information

on teachers' classroom questioning behaviors. The data was used to help analyze teacher

classroom questioning behavior changes. Because the participating teachers were spread out over five states, instead of an actual observer in the classroom, videotapes were used to record 15-minute segments of classroom teaching episodes.   Finally, it should be noted that the people who watched the videotapes were specifically trained to observe specific behaviors.

Results: The first result dealt with the number of questions that teachers ask students. It was observed that all three groups had reductions in the number of teacher questions. There were no significant differences between Groups A, B, and C before the training. However, after the training, Group A had a significantly lower number of teacher initiated questions than Group B. Group C saw no change in the number of questions teachers asked.

As far as wait time, the predicted result was that wait time would increase as a result of QUILT training. This prediction was true in both the time that teachers wait after initially asking a question (Wait Time I) and the time after responding to a student's answer (Wait Time II). Groups A and B had significant increases in Wait Time I but Group A had a higher increase from pre-training to post-training than Group B in this area.   The same result held true for Wait Time II – all groups improved but Group A showed the most improvement.

One objective of QUILT training was to increase the frequency of higher level questioning. The results showed that the only group that demonstrated a significant difference in this area was Group A.

Because only involving one student in a teacher-student questioning session is common, this study found that, after receiving QUILT training, Group A did the best job of redirecting a question to other students but Groups B and C also saw an increase as well. There was also an increase seen in student involvement when the teacher designated a

student to answer the question after it was stated rather than before. Finally, the students' thinking process comes to a halt when the teacher repeats the student's answer because the rest of the class assumes the answer is correct. Group A was the only group that showed a decrease in repeating student responses that was significant enough to mention.

Conclusions: It is clear that Group A had the greatest degree of change in predicted and desirable results. Groups B and C saw some improvement but not nearly as significant as Group A. Because teachers were randomly selected and assigned to the three groups, there is strong evidence that teacher behavior was positively influenced by the QUILT program. I believe this study (Barnette, 1994) demonstrates that investing in teacher training as a long term commitment rather than a one time event positively effects teacher/student questioning sessions. All teacher training in this study caused positive improvement, but Group A excelled to the greatest extent.

Evaluation of Wait Time Research and Related Studies

Research conducted over the past 20 years on the subject of wait time has resulted in the clarification of the effects of increased wait time duration. Literature on wait time overwhelmingly suggests that wait time is important for reflective thinking to occur (Gooding, 1984). In a study of "wait time" in more than 300 classrooms, University of Florida researcher, Rowe (1986), discovered that when teachers wait at least three seconds or more, students give longer answers, more correct answers, and volunteer answers more often (Black, 2001). Waiting that little bit longer gives students time to process the question and frame an answer. It also allows the teacher time to think about acceptable answers. And after a student has answered a question it is recommended that teachers remain quiet a few more seconds to encourage students to elaborate on their answers.

A study done by Rowe (1986) found that when the average length of wait time is increased, the quantity and quality of students' responses improved dramatically. The following benefits were observed:

1.   The length and quality of students' responses increased. Students were more likely to elaborate on their explanations; and those responses were supported by logic and evidence of learning.

2.   The number of unsolicited but appropriate responses increased and more students participated voluntarily, including students considered to be poor performers.

3.   The number of students failing to respond at all or saying "I don't know" decreased. Even if a student "passed" the first time around, they were 70 percent more likely to get back into the discussion before the period was over.

4.   The confidence and self-esteem of students appeared to increase. Giving a student a chance to respond without interruption and without immediate rejection or acceptance makes a difference.

5.   There was an increase of student-to-student exchanges. Students began listening to each other more and respecting each others' opinions.

6.   The number of questions the students asked the teacher and other students increased.

7.   Motivation appeared to increase and disciplinary problems decreased. Students were more attentive and cooperative.

8.   Achievement improved on more complex test items. More studies I found suggested this idea – that wait time produces a positive effect on achievement (Gooding, 1984).

Atwood and Wilen (1991) also maintain that using the appropriate amount of wait time also produces positive behavioral changes in teachers. Teachers did not monopolize discussions; in fact, teachers asked fewer questions and those questions were more probing. Essentially, what seems to happen is that the discussion becomes more conversational between students and teachers. "Inquisition is what teachers DO to students; Inquiry is what

teachers do WITH students" (Atwood & Wilen, 1991, 179). Unfortunately, talking less and listening more is a huge part of this process that teachers still struggle with.

Gooding (1984) discovered that it is difficult for teachers to maintain pausing patterns once these have been established through training, observation, and feedback. The problem is that even after knowing the benefits of more wait time, teachers still dominate classes. Recitation is still the "language of the classroom" (Atwood & Wilen, 1991, p. 181). However, if teachers truly believe that wait time is a key component in increasing achievement and reflective thinking; then they MUST modify their strategies in order to achieve the most beneficial results for students.

Finally, researchers note that they believe that teachers give students they believe to be slow or poor learners less wait time than students they believe to be more capable learners. Therefore, maintaining the "three second rule" is important because it "conveys the teacher's high expectations and gives every student an equal opportunity to participate in classroom learning" (Black, 2001, 45). Numerous researchers have shown that it is possible to train teachers to moderate their pace of asking questions and waiting for responses – to allow more time for students to express their thoughts in the classroom.

One specific study done by Gooding (1984) discussed the use of a wait timer – an electronic device that signals teachers and students when appropriate pauses have been observed. This device seems to be highly effective in training teachers and students to pause and to maintain appropriate wait time. Later, by listening to tape recordings of class time dialogue, the teachers observed the following themes: 1) Amount of time students talk compared to teachers, 2) Actual amount of words that teachers use compared to students, 3) Amount of interruptions by teachers, 4) Derogatory comments made by teachers, and 5)

Disciplinary remarks made by teachers. Just being made aware of these themes can

challenge teachers to produce more reflective interactions between students and teachers.

Kauffman (1997) also suggests that once you start using wait time ask colleagues to observe

and evaluate pauses by measuring the quality and length of responses before and after wait

time.

Two Detailed Research Studies That Address Wait Time

       Study One

       <u>Introduction:</u> As mentioned previously in this paper, along with effective questioning

techniques, the proper use of wait time when asking questions is another crucial component

to encouraging reflective thinking in the classroom. The definitions of Wait Time I and Wait

Time II are given early in this paper but are again defined below:

Relationship between Wait Time I and Wait Time II

Question By the Teacher	Wait Time I	Response by the Student	Wait Time II	Reaction by the Teacher
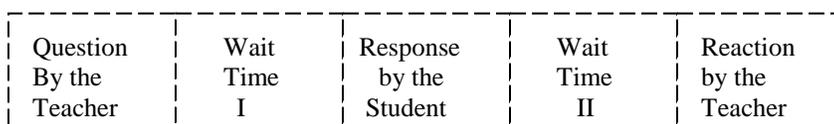
Note that student responses usually occur in bursts of words with short pauses between bursts.

*In some studies, Wait Time I has been called <u>student wait time</u> because the length of the pause is controlled by student responses. In the same way, Wait Time II has been called <u>teacher wait time</u> because the length of the pause is controlled by the response of the teacher.

       This research study done by Swift (1985) tests two methods of increasing wait time.

Previous research has indicated that typical pauses between teacher and student remarks are

short. In fact, they average approximately 1 second. Research (Atwood & Wilen, 1991) also

has already shown us that if the pause is lengthened to 3 seconds or longer there is a

significant improvement in the intellectual and social performance of students. However, even after knowing the positive results that increased wait time can have, many teachers still do not allow for significant periods of silence in their classrooms.

Research Questions: Since most efforts to train teachers to effectively use wait time have met with little success, it appears that teachers who are trained to pause do not do so consistently. In light of this knowledge the research questions for this study (Swift, 1985) were developed:

1. Can an electronic device that provides automatic, continuous monitoring of pauses improve wait time in a classroom?

2. Is this wait time device enough to change teachers' questioning behaviors permanently or is follow up needed?

3. If follow up is needed, what would be most beneficial for teachers?

Participants: This study has two sets of participants. Forty middle school science teachers were divided up into four groups of ten: a comparison group (which received no treatment), a group that received written instructions on pausing and questioning techniques, a group that used the wait time devices in their classes with no other rationale other than that wait time was a factor of interest, and a group that received both written instructions and wait time devices. The duration of this phase of the study was 12 weeks.

In the second phase of the study, from the 40 teachers 12 were contacted and asked to participate in the next phase. Of these 12, eleven agreed and the first ten were accepted. Of the ten participants, three were in the comparison group of the first phase of the study, one had used the written instructions only, and six had used the wait time devices without written instructions.

Methods: The wait time feedback device consists of voice activated switches, a variable timer, and a system of read and green lights. When a person is speaking a red light is activated, and then after a fixed period of time of sustained silences a green light shines. How long the red light stays on at the end of a question, response, or other pause can be regulated to control wait time length. When three seconds have elapsed, the green light is activated to signal that it is appropriate for someone else to speak.

The first phase of the study (Swift, 1985) was also set up so that there would be minimal contact between the research team and the participating teachers. For example, tape recordings of class discussions were collected each week by a staff member – not someone from the research team. The premise behind this was that they wanted to insure that any observed changes were because of immediate feedback and guides, not interaction with the investigators.

The analysis of those tape recordings led to the second phase of this study – the need for follow up in helping teachers use wait time effectively. This phase entailed a workshop, weekly tape recordings of the participants' classes, analysis of the recordings, and sessions with the teachers concerning their effectiveness.

In the first part of the second phase, the teachers participated in a 2 ½ hour workshop in which data from the first phase was presented and analyzed. Also, each teacher was provided with an electronic wait time device. The next step was to have these ten teachers analyze tape recordings on how to improve discussion strategies. Analysis of the tapes focused on emphasizing teaching successes and areas for professional growth - negative comments were avoided.

Two important distinctions need to be made between Phase One and Phase Two of this study done by Swift (1985): 1) Duration – the first phase lasted 12 weeks and the second phase lasted 4 weeks and 2) There was interaction between the participants and the investigators during Phase Two. Each Monday morning the research team consulted with the ten teachers and provided opportunities for support and discussion.

Results: Baseline data gathered from all teachers revealed no significant differences in teachers' wait time before Phase One began. After 12 weeks of Phase One, there was an increase in wait time for all groups. The table below shows the average increases of the first phase of the study:

Table 1

Average Increases in Wait Time I and Wait Time II Between Four Groups of Teachers

	Group 1 Mean	Group 2 Mean	Group 3 Mean	Group 4 Mean
Wait Time 1	1.19	1.35	2.62	1.80
Wait Time 2	.54	.68	1.36	.97

*These pauses are given in seconds and were calculated using an automated computer device.

To summarize these results, the comparison group (Group 1) made essentially no changes in their teaching behavior during the semester. Groups 2 and 4 showed a small increase in both Wait Time 1 and 2. Remember that Group 2 was given only written instructions on pausing and Group 4 was given both instructions and the use of the wait time device. Surprisingly Group 3, which used the wait time feedback device only, extended their pause durations significantly. Phase Two of this study by Swift (1985) saw similar increases in wait time – the use of a wait time device makes a definite impact.

For those in the experimental groups in both phases, the presence of the wait time device helped both teachers and students increase the length of their pause. Students quickly took advantage of the thinking time that was given. Teachers, however, feeling more pressure to get through a lesson were less able to be patient. But with the help of the wait time device and supportive intervention, their pauses for wait time 1 increased. The change in wait time 2 was not as great but still very significant from a statistical point of view.

Teachers still tend to dominate discussions but the percentage of time that students were talking about topics relevant to the lessons nearly doubled (17.3% to 30.4%). One of the most important consequences of using longer wait time was in the percent of higher level questions that were asked by students. Baseline data showed that only 8% of questions asked demonstrated the use of critical thinking skills. Just the wait time device only increased that percentage to 19% and adding supportive intervention brought it up to 37 %. And it should be noted that these changes occurred without any instruction in questioning techniques. Finally, word counts, which excluded stammering and fillers such as "uh" revealed that the short replies of middle school students became longer, another indication of the use of reflective thinking skills.

Conclusions: In regards to using a wait time feedback device, the results by Swift (1985) indicate that it does help to have a visual reminder of how long to pause after teacher and student responses. Some specific conclusions were: 1) longer wait times produced higher levels of critical thinking, 2) students gave longer and more relevant responses, 3) teacher and student dialogue was much more interactive, 4) there was no difference with respect to discipline in the classroom – a concern that teachers had expressed. As a result of

these findings, wait time devices are being made available to schools for professional development.

The second phase of this study (Swift, 1985) indicates that monitoring wait times using an electronic device along with supportive intervention does provide an opportunity for improvement of teaching skills. Because of the important role that support and training play in this study, researchers are also in the process of designing a comprehensive faculty professional development program which will include wait time feedback training as a core component of the program.

Lastly, I feel it is important to mention that all of the teachers in this study felt a high degree of satisfaction when supportive intervention was provided. They also felt like their teaching skills improved which brought about a positive self-image and enthusiasm toward professional growth. The teachers expressed interest in continuing the techniques on their own which I think is crucial to the long-term success of this study program. If teachers don't believe it will help them grow as professionals or it will help them become a better instructor, then the efforts made would be short-lived which, in the long run, hurts the students the most.

Study Two

Introduction: As stated before in earlier studies, the recommended wait time is 3-5 seconds. However, the typical classroom has a wait time of less than one second (Stahl, 1994). Indications are that a slower pace of recitation is more conducive to a good learning environment. In fast paced classrooms teachers tend to dominate discussions and often answer their own questions. Teacher questions also tend to be of a lower order when wait time is short. The purpose of this study (Honea, 1982) was to show that if wait time is extended, many of the teacher and student shortcomings disappear.

Research Question:

1)   Does longer wait time make a difference in student learning?

Participants: In this experiment, there were 24 students. Each student received instruction for ten class days pertaining to five American government topics. Each topic was taught for two days during a summer school session. It should be mentioned that this is an unusual format for a study because it does not represent a typical classroom.

Methods: Each day's instruction lasted for 5 ½ hours. Approximately 2 hours of each day's schedule included time for television news watching, current events discussions, library research, and reporting. However, the primary activity for all units was a classroom discussion on a particular topic. These discussions lasted for about 3 ½ hours every class day. The discussions were structured so that the main content ideas were repeated often, content outlines were provided, lesson objectives were clearly stated, and prior information was summarized. A questioning strategy was implemented so that approximately 60% of each unit's questions were of a higher order. The teacher emphasized praise when reacting to student responses and included little criticism.

Essentially, instruction was the same for each two-day topic, with only two exceptions: The topics were different and the pace of recitation was different. During the first, third, and fifth topics, a short wait time schedule was prominent. During the second and fourth topics, an extended wait time (3-5 seconds) was used. The assumption was that if extended wait time was introduced the same way each topic, then changes in classroom behavior was a result of the extended wait time.

Results: There were three basic findings that came as a result of this research study by Honea (1982):

1)   The teacher asked fewer questions during units two and four because the students

         gave longer responses.

2)   There were more student-to-student interactions during units two and four.

3)   More students asked questions during the extended wait time units.

Table 2

Correlation between Teacher Questions, Student-to-Student Interactions, and Student

Questions per Unit

Unit of Instruction	Wait Time Mean	Teacher Questions	Student-to-Student Interactions	Students Questions
I	1.56	118	90	73
II	4.84	99	232	91
III	0.69	124	184	54
IV	4.34	81	228	90
V	0.55	122	196	81

Some other general findings from this study (Honea, 1982) indicated that when

students gave longer responses, the slower pace results in a more relaxed classroom

environment. There was also more opportunity to interact with each other. More student-to-

student interactions meant that students worked together to discover key concepts and they

were able to make generalizations they never had a chance to explore when they did short

wait time units. Lastly, because the students felt more relaxed during longer wait time units,

confidence among students began to grow as well. Both individual and group goals were

accomplished which led to a feeling of togetherness.

        Conclusions: The study (Honea, 1982) described resulted in some very promising

observations about extended wait time in a classroom discussion situation. When longer wait

time was achieved by the teacher, six positive student variables resulted:

1)   Length of student responses increased

2)   The number of unsolicited but appropriate responses increases

3)   The number and length of pauses within the discussion increased

4)   Student-to-student interactions increased

5)   The frequency of questions asked by students increased

6)   Confidence improved for individual students and the group as a whole

The researcher (Honea, 1982) in this study is so convinced of his findings that he believes

that the use of wait time should be considered as a tool to judge a teacher's competence – be

part of their evaluation.

Conclusions

"Questioning creates opportunities for students to reflect aloud, to be heard by one or

more peers, and to be prompted to expand and extend thinking through follow-up questions"

(Lee & Barnett, 1994, 17). Williams (1991) believed that questions serve many purposes in a

classroom:

1)   To encourage students to participate

2)   To determine what students know and don't know

3)   To engage students in discussion

4)   To attract students' attention

5)   To provide students with an opportunity to shine in the eyes of their peers

6)   To assess students' level of understanding

7)   To provide a review of content

8)   To develop critical and creative thinking skills

With this in mind, it is crucial for teachers to develop questioning strategies or programs in which students are able to think reflectively and a classroom where meaningful discussions take place. Nothing is taught in isolation. I feel as Christian educators it is our task to help students find the connections between what this world offers and what God intends for our lives.

According to the research (Napell, 2001) there is a time and place for every type of question. One of the key ingredients to developing effective questioning techniques is to prepare questions carefully. Of course you can not plan for every situation but there are some specific guidelines for preparing questions. These are:

1. *Base questions on the student's own experiences.* Any questions a teacher asks need to be anchored in what students already know.

2. *Word questions in neutral, non-judgmental ways.* Teachers should avoid implying that they already have one correct answer in mind and nothing else.

3. *Keep an overall purpose.* Do not ask a question just for the sake of asking another question – have a reason for asking the question. And be open to the idea that there is not one, single answer for a question.

4. *Be prepared to follow up initial questions.* This is where teacher preparation becomes important. After the initial question, the discussion could go a variety of different directions. The discussion will go nowhere if the teacher is not prepared to take the next step.

Besides preparing the questions themselves, it is also crucial that teachers be attentive to the classroom environment. You want to provide an environment where students will feel safe voicing their opinions and asking/answering questions freely. Because the teacher is the one who controls the classroom climate, you must pay particular attention to the dynamics of the classroom. From the research (Lee & Barnett, 1994), I concluded that there are four basic guidelines that can assist in creating the classroom environment teachers desire:

1. *Use a neutral tone of voice.* A teacher's tone of voice and body language need to send a non-judgmental, supportive message to the students. Emphasizing the wrong words or how you stand may send the wrong message.

2. *Incorporate active listening skills.* This is difficult for teachers to do because their tendency is to immediately respond to the student. This is where ample wait time becomes critical, but that will be discussed later. Here it is important to note that students need to be given time to think aloud and expand on their initial thoughts. Active listening can be demonstrated by making eye contact, nodding, restating key words, or using sounds (for example, "uh-huh" or "mm-hm") that signal the student to continue.

3. *Refrain from giving advice.* The teacher's advice/opinion may influence the student's own thinking or it causes the discussion to shift from reflection to problem solving. Students may want the teacher's advice later but this is not the time or place.

4. *It is OK not to know the answer.* As teachers we are told very early on in our educational training that we need to be the experts in our subject area. But…it is OK not to know all the answers. In fact, research suggests that when teachers ask questions that they do not know the answers to, where they are truly seeking information, students are more likely to respond thoughtfully rather than with a memorized answer. And it takes away the fear of responding with the incorrect answer.

Teachers are responsible for creating a safe, comfortable environment for all students and, as difficult as it may be sometimes, it is imperative to follow these few basic guidelines to insure that environment. When Christian teachers establish a safe classroom environment they are also demonstrating Christ like characteristics. It is important that students view each other as children of God. These guidelines seem like a small price to pay for creating meaningful discussions where students think critically and reflectively.

As stated many times throughout this paper, teachers ask many questions a day. And I believe it is principally the teacher's questioning techniques which affect the degree of student involvement. What questions he/she asks, how and when he/she asks them, how he/she replies to students – these are crucial factors determining the success or failure of a

class discussion. With these thoughts in mind, my fears and exasperations that I spoke of in the beginning of this paper began to surface again. My biggest question was: How do I know if I am asking the right questions? Teachers are creatures of habit and I may be doing something very wrong that I think is correct. I was comforted when I began to find research on examples of bad questions and some basic strategies to help ask good questions.

So what are bad questions? The "simple" answer to that question would be to say that any question that does not require students to think or reflect is a bad question. But I do not wholeheartedly agree with that statement - there is a time and place for fact finding, recall type of questions. However, too often teachers do not move to higher level questions and this is where bad questions become evident. Christ challenged His disciples by asking them thought-provoking questions and I feel it is our task as Christian teachers to do the same with our students. The research (Bonnstetter, 1988) gave some excellent strategies to avoid bad questioning:

1. *Avoid yes/no responses.* This type of question gives students an "out". It requires very little mental engagement and the teacher rarely finds out what the student is really thinking. The most classic example is "Do you have any questions?" Most of the time students will say no. A better way to ask this would be: "What questions do you have?" This requires feedback and does not let students off the hook so easily.

2. *Avoid rephrasing a question.* Most rephrasing is an effort to correct perceived problems with the original question – many times leading to more confusion. Or worse, attempted clarification may lead to oversimplification. Every action should move the class toward greater understanding.

3. *Do not phrase the question insinuating your opinion.* Questions like "Don't you think that…" or "Did you like…." put the student in an awkward position. These types of questions imply that the teacher is really telling the students rather than letting them discover. They stifle discussions and if the student disagrees with what the teacher thinks or likes they are in an embarrassing position. And anytime that occurs the student will be less likely to be involved in the discussion the next time.

Much of the research I have discussed so far concerning questioning strategies have been general guidelines; however, there are also some specific research-based strategies that I think would be very helpful. These strategies given by Dauterman (1970) are self-explanatory and very good reminders of what teachers can do to encourage student involvement and learning:

1)   List the names of students the teacher tends to ignore and make a special effort to involve them

2)   Use low-risk questions to encourage shy students to participate

3)   Consciously utilize a greater percentage of open-ended and/or thought provoking questions

4)   Sequence questions carefully

5)   Use appropriate reinforcement

6)   Encourage students to evaluate each other's responses

In my research (Black, 2001) I also found some other questioning strategies that specifically caught my attention because I know that these are areas that I struggle in or they are strategies or that would take me out of my comfort zone. These strategies are to promote higher level thinking in the classroom:

1)   Prompt other students to expand on a student's answer. Ask, "What else can you think of?"

2)   Use questions that begin with "why?" and "how?" instead of always beginning questions with "what?" and "when?"

3)   Encourage students to answer questions without using words. Let students use materials such as colored pencils and rulers to graph or sketch their answers

4)   Allow students to respond to questions in pairs or in cooperative learning groups

5)   Call on students randomly. For example, use a technique such as pulling popsicle sticks with students' names on them from a jar. Replace the stick after every question and answer to assure randomness.

6)   Teach students how to describe their thinking, and ask students to explain how they arrived at an answer

7)   Encourage students to add their emotions to their answers. Ask, for example, "How did you feel at the end of the story?"

Being able to use these strategies effectively will take a conscious effort by the teacher to practice them. However, "teachers who use a combination of high-and-low-level questions – and those who increase their percentage of high-level inquiry – are more likely to raise student achievement" (Black, 2001, 44).

Lastly, an interesting conclusion that I found was that some articles take the question-asking farther by saying that students, as well as teachers, need to be trained to ask good questions (Williams, 1991). If teachers can model good questioning techniques in the classroom and students can learn to ask good questions of themselves and others, this will assist them in the learning process, not only in the classroom, but in life as well. Students should be able to look at a text or listen to a lecture and think about the larger repercussions of the subject. Memory increases when students create their own questions because they are investing more time in thinking through the subject. Enabling students to ask good questions will also help them form their own worldview and think carefully about God's creation.

"In our technological age, it seems more important that teachers not only develop their own questioning skills, but also encourage their students to do the same" (Williams,

1991, 5). Because of our changing society, it is imperative to train students how to ask the types of questions that will lead to divergent thinking and stimulate independent learning. In the last few years I have resigned to the fact that I can not teach students everything there is to know in the business world. My goals have become that whatever I teach them – teach it well and teach students to become independent thinkers. I believe that becoming an independent thinker is directly connected to being able to ask the right questions. And being able to ask the right questions will allow students to be more effective disciples of Christ.

In her article, <u>Improving Discussion Questions: Is Anyone Out There Listening?</u>, Jane C. Schaffer (1989) describes a strategy in which her students wrote interpretive questions. The guidelines for writing these questions were: 1) The questions could not have a right or wrong answers: 2) The questions had to address topics that they cared about: 3) The responses would need to be supported by references.   These questions were used as discussion starters and Schaffer discovered some interesting results. The students' questions were much more interesting than hers, and, knowing that they would have to write questions, the students were more active participants in their own reading and talking. Lastly, an important advantage to note is that students developed more self confidence in her classrooms. Why? When students' questions were selected, they were flattered. She never identified who wrote what question but the student's behavior usually gave it away.

So if there is an essential relationship between questioning, wait time, and thinking, but teachers ask an average of 2-4 questions per minute (Atwood & Wilen, 1991), this brings up the question: "When do students get time to think?" This is where the concept of wait time becomes critical – when teachers talk less and listen more reflective thinking is more likely to happen. In fact, the research (Gooding, 1984) concludes that when the average

length of both Wait Time One and Wait Time Two was greater than approximately three seconds, the quantity and quality of students' responses improved dramatically. The specific benefits of increased wait time are given on page 27 of this document. In summary, positive student changes are: 1) Length and correctness of responses increased, 2) "I don't knows" decreased, 3) There was an increase in volunteered, appropriate responses by more students, 4) Scores on achievement tests tend to increase.

From the research (Stahl, 1994) we can conclude that the quality and quantity of student participation increases with more wait time for all students – including lower-ability students. Students also contribute more appropriate comments and questions, which indicates higher level, more reflective thinking. These results are important because this means that students are less likely to be talking off task and there are fewer discipline problems.

So what strategies can be used to increase teachers' awareness of using wait time? First of all, it should be noted that research (Honea, 1982) shows that noise levels, physical conditions, and seating patterns in the classroom are factors in wait time as well as the type of lesson being taught. A lesson that is conducted at the memory/review level will not benefit to any great extent from extended wait times. The teacher must move to questions that require higher order thinking skills to be used in order for additional thinking time to be important to students. As eluded to before, if students have too much time then discipline problems may occur and they are more likely to get off task. Therefore, it is important to adjust the level of wait time to the type of question being asked.

Numerous researchers have shown that it is possible to train teachers to moderate their pace of asking questions and waiting for responses. So how can this be done? Recall

that Gooding (1984) discussed the use of a wait timer – an electronic device that signals teachers and students when appropriate pauses have been observed. But there are also less expensive, effective ways to increase teachers' awareness of wait time usage. One very common, yet effective method is staff development. Of course, before this can happen, the school has to believe that wait time is a educational topic that is worth the time, energy, and resources.

A staff development session would need to include the following items: 1) training materials, 2) modeling, 3) microteaching, 4) observational feedback. Training materials would probably include research on the importance of wait time and how effective proper wait time can enhance student responses and thinking. Modeling would be an important component because I believe teachers *think* they use appropriate wait time but if they saw it modeled they would quickly realize that they do not give as much time for responses as they think. Then the next step would be for teachers to practice using appropriate wait time – microteaching. And lastly, each teacher needs feedback on their progress. Suggested here is to have colleagues observe and evaluate pauses by measuring the quality and length of responses before after wait time. This is also the place where the use of a wait timer would be advantageous to measure the length of wait time.

If a staff development program is not feasible, there is another option for teachers who wish to become more effective at using wait time. Individual teachers simply videotape class session and then become their own critics. Simply put a video camera in the back of the classroom and tape yourself teaching a lesson. It is never easy to watch yourself on tape but hopefully this would give you a good indication of how well you use wait time. A couple of items for teachers to be aware of when watching themselves are that neutral responses by

teachers can be OK and that encouraging remarks increase interaction. Neutral responses are acceptable because research shows that praising a student too much indicates that the correct answer has been given and the other students stop thinking. Also, preliminary evidence indicates that positive reinforcement after a response does facilitate interaction greatly. This ties back to self-confidence in students. If students feel more confident in the classroom, they are more likely to respond and interact during discussions.

Finally, I feel it is important to summarize the positive impact increased wait time has on teachers. Wait time is not just advantageous for students but for teachers as well. Research (Stahl, 1994) concludes that teachers who use wait time effectively demonstrated the following:

1) Greater flexibility in the range of student responses accepted

2) Decrease in the quantity but increase in the quality of questions asked

3) Any additional questions that were asked required more complex thinking

4) Expectations of performance of students improved – particularly lower achieving students

These results definitely seem worth the effort of developing wait time strategies. In conclusion, I think it is important to keep in mind that the concern is not to find an *exact* number of wait times but provide the period of time that will effectively assist students in processing information. Remember, the goal is to encourage reflective thinking and that may look different in different classrooms on different days. And reflective thinking is an important component of increased student learning and achievement. And the common goal is that both students and teachers will be equipped to use their talents and gifts to serve God.

Implications

I struggled with coming up with a thesis topic for quite a while. But the bottom line for me became this: What can I do better as a teacher so that my students can be more successful? As I began to dig into this idea I realized that student achievement and learning were connected to how well students think reflectively. As a Christian teacher, it is my responsibility to encourage students to think beyond the facts – to use the mind that God gave them. As I continued to research I discovered that if I want my students to truly reflect, this requires me to have an understanding of how to question and respond in an appropriate and timely manner.

But there is a deeper level to my paper as well. Reflection helps all of us to grow and learn more thoroughly and, this affects not only ourselves, but the people we come into contact with. And my task as a Christian teacher is to equip students with the skills necessary to worship God in their occupations and have an impact on eternity. Recently in a newsletter given to the staff at the school where I teach during American Education Week stated "A teacher affects eternity; he/she can never tell where his/her influence stops." Serving in the Kingdom of God is a privilege we have and I feel it is my calling to teach students to think critically about the world they live in. Enabling students to think reflectively and to self learn helps to make them more productive citizens of our society and more glorifying children of God.

One of the first implications I realized is that my philosophy of education has a lot to do with my questioning techniques. It does make a difference how I ask questions – questions are not just questions. While I am questioning students I should constantly be asking myself "Where will this take me?" I now have a clearer understanding of why

establishing essential learnings for each class is crucial. When I took the class Structuring

School Curriculum, one of my assignments was to develop a curriculum map for a course I

taught. At the time I found it useful for my classroom strictly from an organizational stand

point. But now I realize that the "big ideas" I developed then are an important starting line

for writing essential questions that will engage students' interest and lead them to important

ideas. These essential questions serve as a doorway to focused discussions, inquiry, and

reflective thinking.

One of the questioning models that was discussed in the research of my paper was the

HRASE Model (Kauffman, 1997). This is by no means the only appropriate model for

developing questioning strategies but I believe that it fits well with my subject area –

business. The HRASE Model (Kauffman, 1997) of questioning is especially effective when

teaching students a new concept for the first time. I would like to give an example of how

the HRASE Model (Kauffman, 1997) would be used in a lesson on calculating an

employee's paycheck for a pay period:

History of the Student – I would have each student bring a couple of their paycheck stubs to

class or I would have examples of some paystubs. Each student would look at the paystub

and I would ask "What do you find?" This would help students make a connection with past

experience that is relevant to them.

Relationships and Patterns – Here we would examine a couple of paystubs from previous pay

periods to make comparisons. The appropriate question here is: "What is a common

theme?"

Application of Knowledge – This is where teachers need to make the connection between

students' personal experiences and the concept you wish to teach them. Typical questions

asked here would be: "What information is needed to calculate your payroll deductions?" and "After your payroll deductions are calculated, how does your employer decide how much to write your paycheck for?" Together we would formulate the equations for calculating net pay and payroll deductions.

Speculations about a New Situation – In this phase of the model the teacher helps students transition from what they have learned in the Application phase to applying that knowledge to a new situation. At this point I would give students examples of employee payroll information and ask "How would you calculate their payroll deductions and net pay?"

Explanation for the Experience – Here is where it is critical for the teacher to demonstrate to students why it is important to know this concept as well as apply it to changes in the situation. Examples of questions that would be appropriate are: "What difference does it make that you understand how your employer calculated your payroll deductions?" and "How would the paycheck be different if the number of allowances or marital status was changed?"

The implications using this model in my classroom would be very rewarding because I know there are too many times when I assume that students know certain pieces of knowledge. The HRASE Model (Kauffman, 1997) would force me to first find out what they know before applying it to new situations. Furthermore, I believe that by asking appropriate questions in a logical sequence will help improve the quality of in-class student interaction.

Another implication that I have already been using in my classroom for about two years. In fact, this strategy of how to effectively use and increase wait time is what partially influenced my research this particular topic. I was introduced to a wait time strategy during an extensive staff development in the Fall of 2003. According to information given at this

staff development, wait time is a three-step process which allows students time to process an asked question and to think about the answer before being called on. The three-step process flows as:

1)   Teacher asks ALL students a question.

2)   Teacher pauses and allows students to think about the questions and how he/she is going to answer the question.

3)   Teacher retrieves the answer from a student or students.

A couple things to note here are that the typical wait time suggested by research is 3-5 seconds unless the question in more complex. The rule of thumb is that the more complex the question, the longer the wait time should be. Also, after an initial response by the student(s) it is appropriate to prompt other students to respond to each other.

The above strategy for wait time is nothing new. However, I wanted to summarize it here again so that I can now show you the extended wait time strategy that I use in my classroom and how it is different. Extended wait time is a four-step process which allows students time to process an asked question, think about an answer and discuss the question and answer with a partner before being called on. Extended wait time would look like:

1)   Teacher asks ALL students a question.

2)   Teacher pauses and allows students to think about the question and process his/her answer.

3)   Teacher allows students to pair up with another student to share each other's responses.

4)   Teacher will retrieve answer(s) from student(s).

The key difference, as you can see, in wait time and extended wait time is step 3. It is important to note her that when teachers allow students to pair up with other students to share responses to organize it in such a way as to not cause disruption to the flow of the lesson.

A couple key components are to make sure that while the students are sharing, the teacher is walking around and listening for correct responses. This insures that students are staying on task and the teacher can guide groups that are not heading in the right direction. Along with walking around, it is crucial to give the groups a time limit. I call this "on the clock". I use this component to help keep students on task and to keep the discussion moving. I like to pick bizarre time limits such as 37 seconds or 1 minute and 11 seconds. I did not do this when I first started to use this strategy and I found that students did not listen for the time; they were too eager to begin the task. But what I found with using unusual time limits is that students listen more carefully for the time limit and they seem to enjoy it. I use an oven time as my "on the clock".

The reason I have found extended wait time to be successful in my classroom is because sometimes higher order thinking questions can increase student anxiety and result in less participation. Allowing students time to share their responses with their peers has resulted in students feeling less anxious about the possibility of proposing a wrong idea. I also will, in some situations, write all students' responses on the board. Then as a class we go back and evaluate the responses together. This distances the rejection of an incorrect answer from the student and helps students feel more comfortable giving responses.

In researching this topic, I found that the concepts of wait time and questioning are tightly intertwined because the best way to encourage good use of wait time is to use good questioning techniques. The opposite also holds true: extended periods of wait time after

imprecise questions tends to increase confusion, frustration, and lead to no response at all.

Therefore, the two concepts of questioning and wait time go hand-in-hand when the goal is to

increase reflective thinking. And reflective thinking has direct implications and student

learning and achievement.

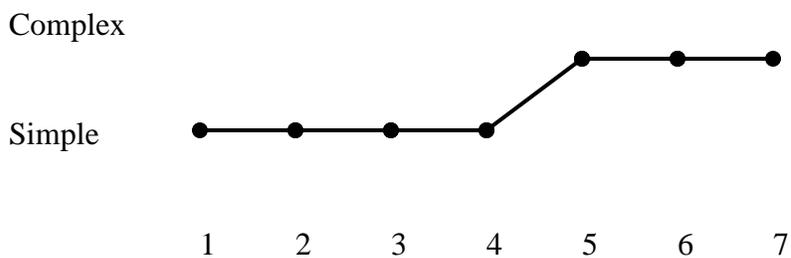**Figure 1:**   **Correlation of Thesis Topics**
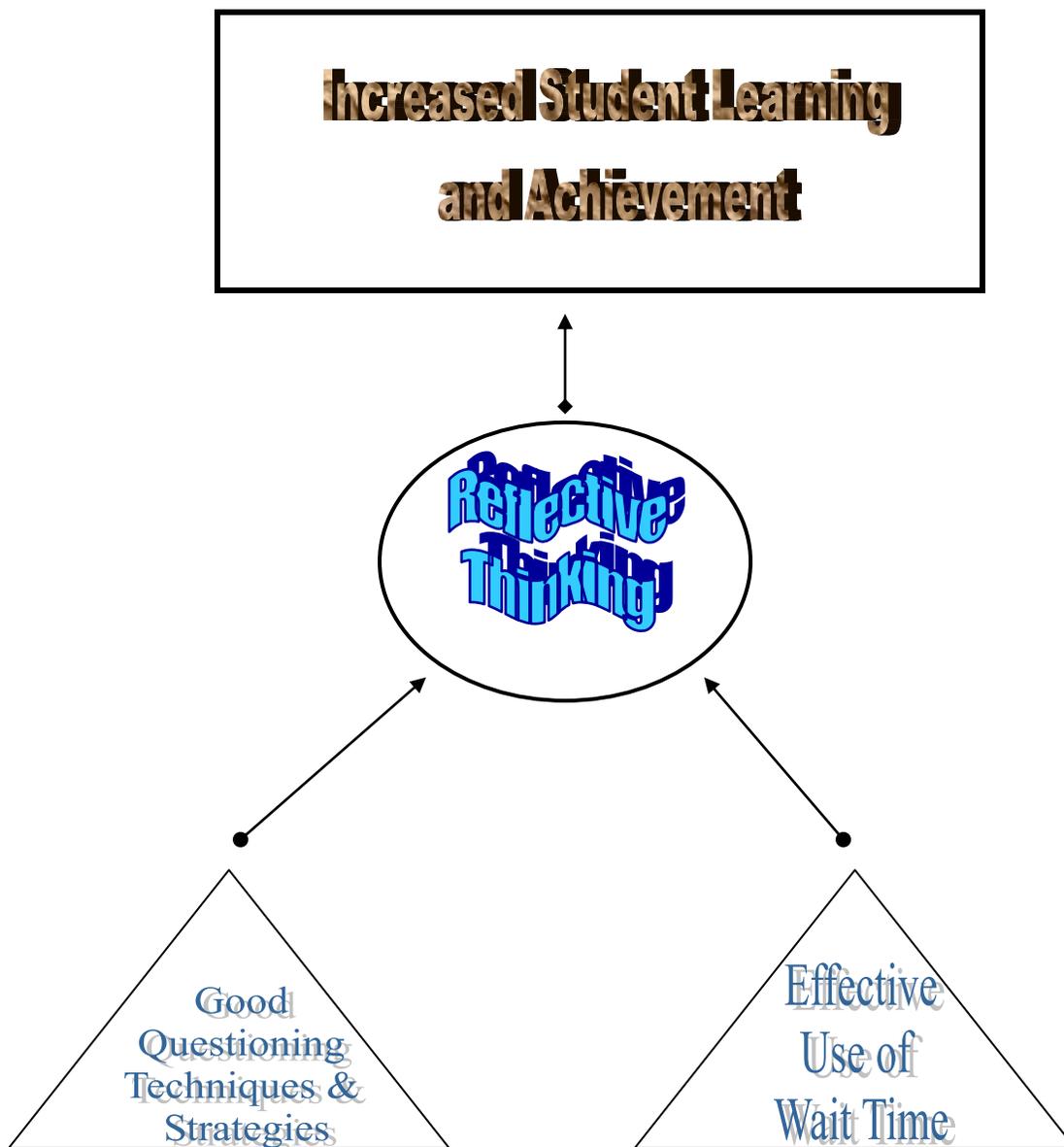
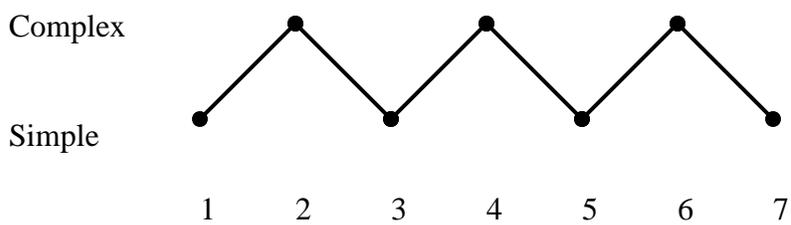**Figure 2:   Focusing Device For Observation**
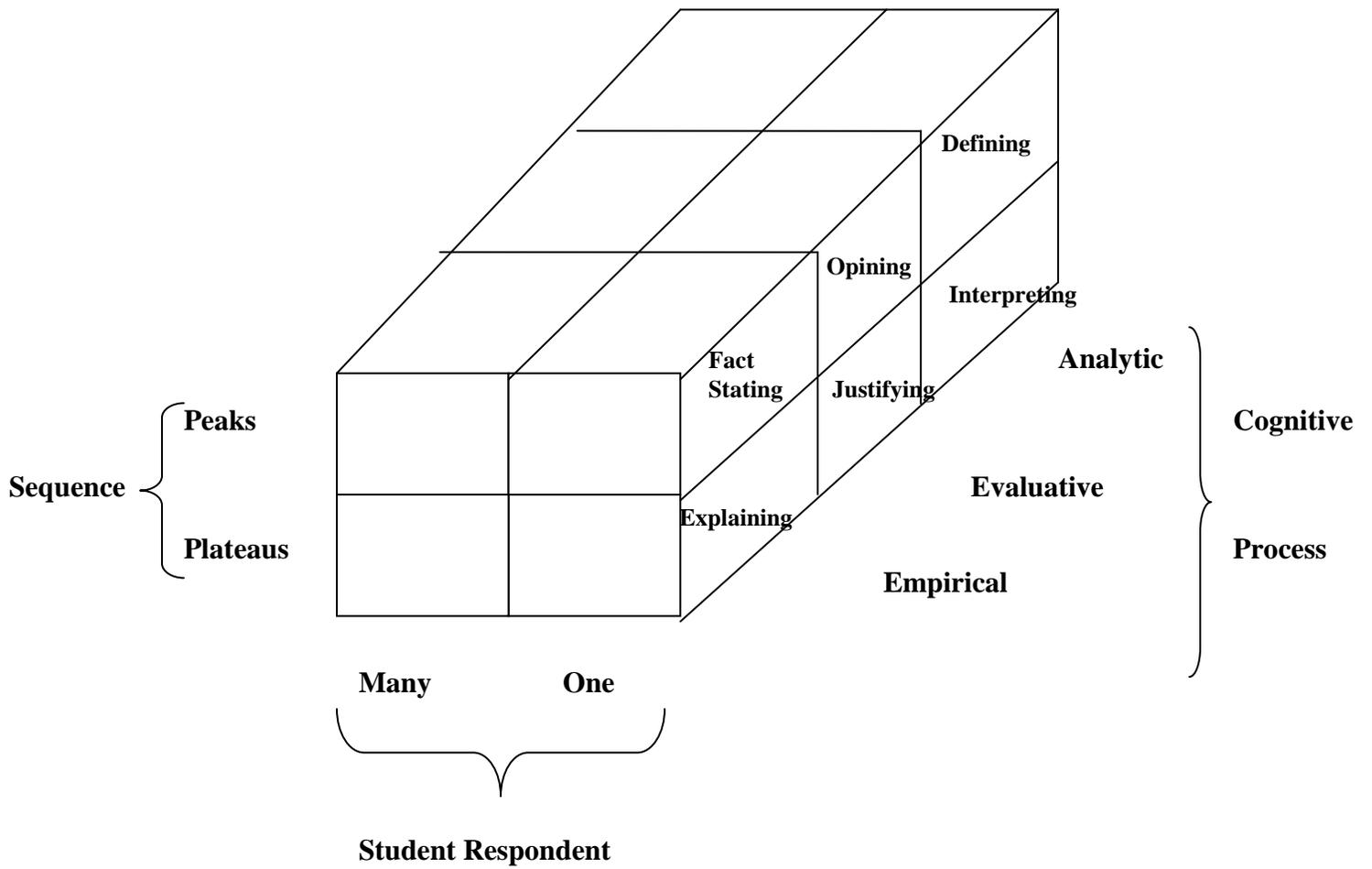
* Data comes from "Questioning in the Classroom", R. T. Hyman, 1977.

Figure 3:   **Plateau and Peak Questioning**
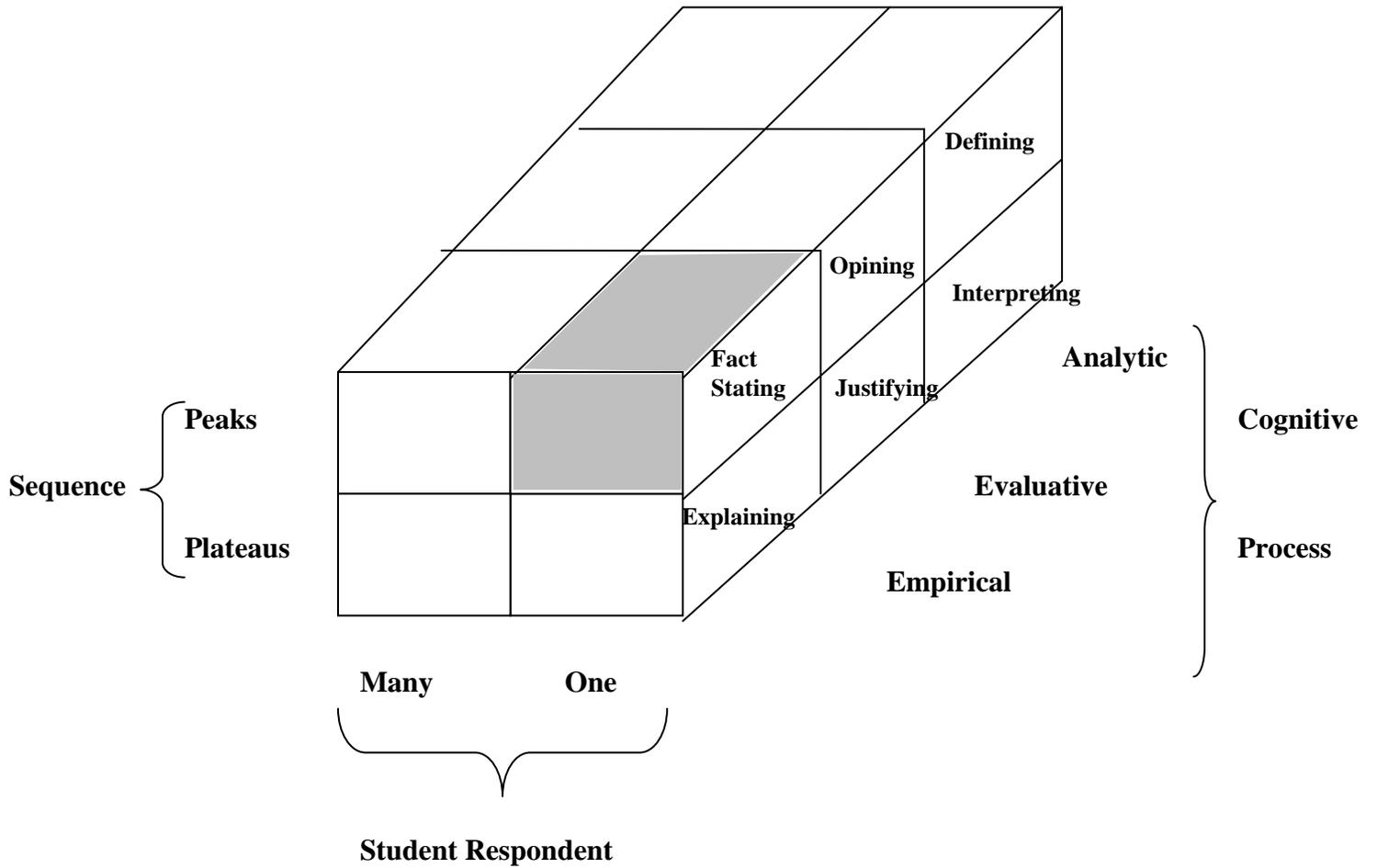
Plateaus questioning looks like this:

Complex

Simple

        1   2   3   4   5   6   7

Peaks questioning looks like this:

Complex

Simple

        1   2   3   4   5   6   7

* Data comes from "Questioning in the Classroom", R. T. Hyman, 1977.

Figure 4: **Shows Dominance of Teacher Questioning Patterns**

* Data comes from "Questioning in the Classroom", R. T. Hyman, 1977.

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